A NEW IMPACT MEASUREMENT FRAMEWORK FOR THE OCEAN INNOVATION ECOSYSTEM

TECHNICAL APPENDIX

WORK IN PROGRESS

THE OCEAN IMPACT NAVIGATOR

1000 OCEAN STARTUPS

report prepared by SYSTEMIQ
INTRODUCTION

This Technical Appendix has been written as a companion to the Ocean Impact Navigator: A New Impact Measurement Framework for the Ocean Innovation Ecosystem. It provides further details on the KPIs proposed within the Navigator framework.

At the time of publication in June 2022, the Navigator has not yet been finalised, but is embarking on a period of testing, feedback and refinement that is expected to culminate in the launch of an online tool at the end of the year. It is in this spirit of soliciting feedback from the ocean impact and innovation community that this Appendix is published, as we hope that it will enable interested members of the community to review and provide more nuanced and detailed comments on the proposed framework. It is expected both that the set of KPIs elaborated in this Appendix will be revised in the coming months, and that the detailed guidance outlined in this Appendix will also be refined, based on the feedback that is received. It is also hoped that Navigator users – both now and in the future, will find this a practical tool to support implementation of the framework for their own impact measurement.

The Technical Appendix proceeds as follows. For each of the Navigator’s 30 priority KPIs, a standard set of guidance has been developed, encompassing the following sections:

- **1. METHOD**: This section outlines a recommended approach for users to report on the KPI
  - **1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES**: Where a KPI can be measured quantitatively, the approach is outlined in this section, and typically includes:
    - Reference to existing methodologies from which the approach is derived (where relevant)
    - A logic tree describing the calculation steps
    - Definitions of relevant terms within the methodology
  - **1.2. QUALITATIVE REPORTING**: All KPIs can be measured qualitatively. Where a methodology is already outlined under section 1.1. QUANTITATIVE REPORTING, this section typically does not elaborate further on the proposed approach. However, where a KPI can only be reported qualitatively, a recommended methodology is detailed in this section, and typically includes:
    - An explanation of why a qualitative approach is recommended for this KPI, and any challenges typically associated with
    - Reference to existing methodologies
    - Definitions of relevant terms within the methodology
  - **1.3. COMMENTS AND SUPPORTING EVIDENCE**: This section elaborates on additional detail that users are encouraged to document alongside their reporting e.g. substantiating data points, key assumptions, disaggregation of the headline KPI etc.

- **2. CASE STUDY**: This section aims to demonstrate the KPI in practice
  - **2.1. DESCRIPTION**: Describes the problem statement and an illustrative innovation
  - **2.2. APPLYING RECOMMENDED METHOD**: This section outlines how the innovation describes could report on this KPI. Where quantitative reporting is an option, it outlines how the KPI could be derived at different levels of robustness – depending on whether the result is certified, measured, or estimated. It also outlines how a qualitative assessment could be undertaken, and provides examples of the type of information that could additionally be captured under Comments and Supporting Evidence.

- **3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES**: Where specific useful resources to support evaluation were identified, these are included here.
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1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although several work-in-progress standards focus on biodiversity stakes, these references do not provide standardised biomass measurement KPIs to date. In line with the recommendations made by the PRI regarding the implementation of the Mitigation Hierarchy, a logic tree based on reduction / avoidance / restoration overall mechanisms should be considered for the present KPI:

- “Biomass loss avoided” can be attributed to a “product replacement”, to be understood as in effective “substitution”, i.e. same use case, commercial segment and similar specs (e.g. new fishing gear technologies, avoiding most of bycatch vs. conventional nets)
- “Biomass loss reduced” can be attributed when it is the usage rather than the product that is changed – i.e. in the sense of a usage with less negative consequences (e.g. fishing gears unchanged, but complementary technology s.a. tracking buoys allowing for a decrease in lost gears, hence reduced consequences of ghost fishing)
- “Biomass restored” can be attributed when positive outcomes occur after effective protective measures are put in place (e.g. through an MPA)
- Note: vegetal biomass benefitting to ocean’s health is tracked in the “Thriving and restored marine habitats” impact area, through the restoration and the protection of key marine habitats (s.a. kelp forests, seagrass, salt marshes, etc.). In order not to create any confusion or double-counting issues, the present KPI only refers to animal biomass

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain the breakdown of:
  - Biomass loss avoided / loss reduced / restored
  - Specific species / categories of animals impacted
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
If the product / service is certified / eco-labelled
If the impacted species / categories are endangered / threatened or protected species
If the impacted species are a keystone species
If the impacted species contribute to the restoration of ocean’s health (and how?)
Indirect contribution to positive outcomes (e.g. as a consequence of an algae farming project)
Input / output metrics (e.g. number of tracking buoys sold)

2. CASE STUDY: SMART BUOYS

2.1. DESCRIPTION

- **Ghost fishing is a major threat:** 640k tonnes of fishing nets are est. to be lost at sea each year, severely increasing plastic pollution and contributing to the loss in biomass, as **ghost nets still kill many years after they are lost** (e.g. about 140k sea mammals per year are estimated to get trapped or entangled in lost gears, resulting in a painful death)
- Potential contribution to solving this issue: **reserve buoy automatically released to find lost fishing gear**
  - Fishermen sink the smart buoy with their fishing gear
  - Once the fishing operation is over, the smart buoy receives a coded acoustic signal emitted by the fishing vessel, and rises to the surface, allowing fishermen to retrieve their gear

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing an official audit of biomass preserved due to smart buoys (e.g. certifying the decrease in lost fishing gears by fisheries using smart buoys) – renewed every year / reporting period by the same auditor to ensure consistency over time
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at fisheries level, taking note of every fishing operation and inventorying lost nets – including date of loss and area – at a complete fleet scale to measure the decrease in lost nets that can be attributed to the increasing usage of smart buoys
- **Estimated:** in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the decrease in lost fishing nets and the average quantity of marine animals killed per sqm were established based on a sampling:
  - The complete calculation of the KPI could also be a combination of these various approaches (e.g. decrease in lost fishing nets measured, and quantity of marine animals killed estimated), with two key principles:
    - Perform as detailed calculations as possible
    - Report the assumptions, sources and methodologies used for such calculations

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- In line with the recommendations applicable to most of the KPIs employed by the Ocean Impact Navigator, a logic tree based on reduction and avoidance overall mechanisms should be considered for the present KPI:

```
Value chain: Fisheries operations, Aquaculture operations, Logistics, Commercialisation, Consumption
Upstream: Fisheries waste reduced
Downstream: Seafood waste valorised
```

- "Seafood waste reduced" can be attributed when it is the usage rather than the product that is changed – i.e. in the sense of a usage with less negative consequences. Waste reduction could occur upstream in the value chain (e.g. improved processing technology on fishing vessels) or downstream (e.g. increased shelf life)

- "Seafood waste valorised" happens when value is created out of seafood that would have otherwise been wasted (i.e. turning current waste by-products into valuable co-products), with a circular economy pattern as new use cases will increase the value of a large share of the seafood production that is currently wasted (e.g. reuse and remanufacture use cases s.a. renewable energy, snacking, packing, fertilisers, healthcare supplements or fashion)

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain the breakdown of seafood waste reduction into actual reduction (upstream and downstream) vs. valorisation mechanisms
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
If the product / service is certified / eco-labelled
If the product / service will positively affect specific species / categories that are endangered / overfished / contributing to the restoration of ocean health (and how?)
Indirect positive outcomes (e.g. improved livelihoods for local communities)
Input / output metrics (e.g. number of seafood conservation technology units deployed)

2. CASE STUDY: CHITOSAN

2.1. DESCRIPTION

- **Chitosan** is a biopolymer – close derivative of chitin – and is the second most abundant polymer in the world, after cellulose. Chitosan is nontoxic, biodegradable and biocompatible, and presents a unique combination of chemical properties (e.g. positively charged, fire retardant, biostimulant)
- Based on these properties and **combined with a competitive cost vs. conventional chemicals**, it could gain shares vs. e.g. heavy metal antimicrobials, inorganic flocculants and coagulants, pesticides and insecticides
- Chitosan can be extracted through a process allowing for the **full utilisation of crab shells**

2.2. APPLYING RECOMMENDED METHOD

- **Certified**: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of the volume of crab shell that has been valorised through the organisation’s activities instead of generating waste – renewed every year / reporting period by the same auditor to ensure consistency over time
- **Measured**: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at facility level, taking note of the volume of crab shells processed by the organisation, with records at e.g. operating line level
- **Estimated**: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the volume of crab shells processed to produce a vol. unit of chitosan is established based on operations records:

  - The complete calculation of the KPI could also be a combination of these various approaches (e.g. volume of crab shells processed measured for some facilities, and estimated for others), with two key principles:
    - Perform as detailed calculations as possible
    - Report the assumptions, sources and methodologies used for such calculations

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- Food Loss and Waste Accounting and Reporting Standard
- Iceland Ocean Cluster (IOC) 100% Fish Project
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- As the present KPI is a pure production metric, a simple logic tree splitting this production by nature should be considered:

  ![Logic Tree]

- Note: as their value chains, methods of production and impacts on ecosystems can be joint – or are at least complementary – both Seaweed and Bivalves productions are to be reported under the present KPI – but displayed with two different metrics (Seaweed on one hand, Bivalves on the other)

- “Seaweed produced” refers to the volume of seaweed that has been cultivated by the organisation during the reporting period. In order to provide a homogeneous reporting across organisations, seaweed weight is expected to be reported in **wet metric tonnes**.

- “Bivalves produced” refers to the volume of bivalves that has been farmed by the organisation during the reporting period. In order to provide a homogeneous reporting across organisations, bivalves weight is expected to be reported as **shell-on weight, in metric tonnes**.

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence.

- To complement quantitative reporting, it is recommended to display and explain the breakdown of seaweed and / or bivalves productions by species.

- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
  - Geographies
  - If the production is certified / eco-labelled
  - If the production is part of an Integrated Multi-Trophic Aquaculture (IMTA) project
  - If the production will positively affect specific species / categories that are endangered / overfished / contributing to the restoration of ocean health (and how?)
  - Applications of the production sold (e.g. food, feed, biostimulants, cosmetics, packaging, textiles)
  - Indirect contribution to positive outcomes (e.g. enabling technologies s.a. optimisation softwares)
  - Input / output metrics (e.g. number of production units deployed, potential per unit)
2. CASE STUDY: SACCHARINA LATISSIMA AQUACULTURE

2.1. DESCRIPTION

- Saccharina latissimi is a brown alga, also commonly referred to as “sugar kelp”. It is currently mostly farmed for food applications.
- A typical setup could be a 100 hectares site on the coast of England, producing 4,500 wet tonnes of seaweed per year, and who started to grow oysters in the same farm for the past two years, achieving an annual production of bivalves of 15 shell-on tonnes.

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing an official audit of the organisation’s production volumes – renewed every year / reporting period by the same auditor to ensure consistency over time.
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at farm level, taking note of the volume of seaweed and bivalves produced by the organisation, while recording products specs (e.g. species, use cases).
- **As this is a production metric, it is expected that every project could report based on direct measurements** (hence making estimations / proxy methods not relevant for the present KPI).

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- Practical Guidance for the UN Global Compact Sustainable Ocean principles: Seaweed
- European Commission Strategic guidelines for a more sustainable and competitive EU aquaculture for the period 2021 to 2030
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- There is no unique quantitative metric associated with this indicator. This indicator should therefore be reported on qualitatively.

1.2. QUALITATIVE REPORTING

Reporting on animal welfare raises several challenges as:

- The suffering of marine animals encompasses a broad range of very different living creatures, such as fish, mammals, birds and reptiles among others, with every negatively impacted species potentially causing chain reactions and adverse effects to specific links in the food chain and geographical areas – making every case a unique story to be told
- Animal suffering is caused by many different although compounding stressors, some directly resulting from human activities (e.g. ghost fishing, plastic pollution), and others being an indirect consequence of these activities (e.g. through evolving habitats due to climate change)
- Wild animals suffer (e.g. due to destructive and unselective fishing practices, hundreds of thousands of cetaceans are killed every year), farmed animals do to (e.g. due to diseases such as sea lice)
- Finally, quantifying welfare or suffering in a homogeneous way across species, cases and time would be a task far too complicated if considered at a start-up level
- For these reasons, the “Welfare of marine life” KPI is integrated to the Ocean Impact Navigator as a qualitative KPI, while encouraging the communication of specific data points, as explained hereunder
- As quantitative reporting is not possible, users are invited to report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI, provided that the following conditions are met:
  o The impacted species are clearly identified
  o The mechanisms leading to an improvement in their welfare are identified as well
  o An improvement in the welfare of the impacted species provides proven benefits to the ocean, marine ecosystems, biodiversity, water quality and / or human health
- Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence, regarding e.g.
  o The type of animals / species that are impacted
  o Their conservation status
  o If they are the subject of a specific regulation
  o If the product / service is certified / eco-labelled
  o How it does impact animal welfare
  o Tests / Scientific measurements performed (and expected outcomes based on these data points)
  o Indirect contribution to positive outcomes (e.g. enabling technologies, such as new materials)
  o Input / output metrics (e.g. number of devices deployed, potential per device)
2. CASE STUDY
n.a.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- Browman, H. I., Cooke, S. J., Cowx, I. G., Derbyshire, S. W. G., Kasumyan, A., Key, B., Rose, J. D., Schwab, A., Skiftesvik, A. B., Stevens, E. D., Watson, C. A and Arlinghaus, R. Welfare of aquatic animals: where things are, where they are going, and what it means for research, aquaculture, recreational angling, and commercial fishing. – ICES Journal of Marine Science, 76: 82–92
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific waste-related metrics that can be derived for the construction of a logic tree adapted to all key components of plastic diversion. This logic tree can be represented as follows:

```
Core for 1000 OS

Macro-plastic waste reductions due to Sales - Plastic waste produced + Macro-plastic waste reductions due to Operations

Macro-plastic waste reductions from Products sold + Macro-plastic waste reductions from Services sold

Macro-plastic waste avoided + Macro-plastic waste recovered
```

- “Macro-plastic waste reductions due to Sales” are applicable to organisations that produce and sell products or services that lead to macro-plastic reduction, reuse or recycling. As defined by IRIS, such a metric may capture “the lifetime waste reductions of those products or services sold during the reporting period (i.e. the waste reductions achieved may actually occur after the reporting period, throughout the remainder of the products’ lifetime)”

- “Plastic Produced” refers to the volume of waste generated by the organisation’s activities. If relevant, this metric should be accounted in order to capture net plastic diversion. Depending on production processes and materials employed, the way of splitting this sub-KPI between macro- and micro-plastic produced should be arbitrated on a case-by-case basis.

- “Macro-plastic waste reductions due to Operations” are applicable as follows:
  - “Macro-plastic Avoided” refers to the volume of refurbished / reused / recycled plastic-based materials employed in order to develop or deliver the organisation’s products or services (i.e. at the input level; e.g. by using recycled plastic in the products as opposed to virgin)
  - “Macro-plastic Reduced” refers to reduction / reuse / recycling of the organisation’s plastic-based materials through its operational activities (i.e. at the process and output level; e.g. increased reuse of production scraps vs. previous period)

- Note 1: as the Ocean Impact Navigator is designed for assessing impact at a start-up level, the “Macro-plastic waste reductions due to Operations” might be of secondary interest for a significant share of the reporting organisations.

- Note 2: as large plastics usually breakdown into secondary micro-plastics, the volume of macro-plastic accounted and reported under the present KPI should not be counted again and displayed under the KPI dedicated to (primary) micro-plastic diversion (although it is still possible to complete the present quantitative reporting with a qualitative explanation about secondary micro-plastics and their consequences).
1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence.
- To complement quantitative reporting, it is recommended to display and explain the breakdown of:
  - Macro-plastic reductions due to Sales vs. due to Operations
  - Macro-plastic diversion causes: reduction, reuse, recycling
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.:
  - If the product/service is certified/eco-labelled
  - Indirect contribution to positive outcomes (e.g. for enabling technologies such as AI/computer vision for waste stream identification)
  - Input/output metrics (e.g. number of products sold, recycling potential per unit)

2. CASE STUDY: REUSABLE PACKAGINGS FOR E-COMMERCE

2.1. DESCRIPTION

- Service enabling the return and reuse of delivery packaging for online retailers and their customers
- On supported e-commerce websites, the customer can choose to select the reusable packaging for his online order; he would then receive the goods in a recyclable packaging, that can be returned by dropping it to a local mailbox
- A reusable packaging can handle 20-40 cycles, lowering environmental footprint vs. single-use

2.2. APPLYING RECOMMENDED METHOD

- Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of plastic waste reductions due to products sold – renewed every year/reporting period by the same auditor to ensure consistency over time
- Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at reusable packaging level, taking note of the specs of every product sold crossed with the actual number of reuse cycles recorded on reusable packaging of similar specs during their lifetime (i.e. based on historical data) through e.g. tracking ID
- Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average number of deliveries per reusable packaging was established based on a sampling:

  ![Diagram](image)

  - Note: if the reusable packaging is initially produced with recycled materials, then the sub-KPI “Macro-plastic waste reductions due to Operations” could be added to the calculation, as it is an extra amount of plastic that is diverted from nature or landfill in a first place
  - The complete calculation of the KPI could also be a combination of these various approaches (e.g. plastic waste produced audited, and plastic waste reductions estimated), with two key principles:
    - Perform as detailed calculations as possible
    - Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- IUCN “Review of plastic footprint methodologies” (2019)
- The PEW Charitable Trusts and Systemiq “Breaking the plastic wave” (2020)
- UNEP “From pollution to solution” (2021)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific waste-related metrics that can be derived for the construction of a logic tree adapted to all key components of plastic diversion. This logic tree can be represented as follows:

```
Micro-plastic waste reductions due to Sales
- Plastic waste produced
  + Micro-plastic waste reductions due to Operations
```

- “Micro-plastic waste reductions due to Sales” are applicable to organisations that produce and sell products or services that lead to micro-plastic reduction, reuse or recycling. As defined by IRIS, such a metric may capture “the lifetime waste reductions of those products or services sold during the reporting period (i.e. the waste reductions achieved may actually occur after the reporting period, throughout the remainder of the products' lifetime)”

- “Plastic Produced” refers to the volume of waste generated by the organisation’s activities. If relevant, this metric should be accounted in order to capture net plastic diversion. Depending on production processes and materials employed, the way of splitting this sub-KPI between macro- and micro-plastic produced should be arbitrated on a case-by-case basis

- “Micro-plastic waste reductions due to Operations” are applicable as follows:
  - “Micro-plastic Avoided” refers to the volume of refurbished / reused / recycled plastic-based materials employed in order to develop or deliver the organisation’s products or services (i.e. at the input level; e.g. by using recycled plastic in the products as opposed to virgin)
  - “Micro-plastic Reduced” refers to reduction / reuse / recycling of the organisation’s plastic-based materials through its operational activities (i.e. at the process and output level; e.g. increased reuse of production scraps vs. previous period)

- **Note 1:** as the Ocean Impact Navigator is designed for assessing impact at a start-up level, the “Micro-plastic waste reductions due to Operations” might be of secondary interest for a significant share of the reporting organisations

- **Note 2:** as large plastics usually breakdown into secondary micro-plastics, the volume of micro-plastic accounted and reported under the present KPI should only include primary micro-plastic diversion, i.e. not originated by the disintegration of macro-plastics. It is possible to complete the “macro-plastic diversion” KPI with a qualitative explanation about secondary micro-plastics and their consequences
1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence.
- To complement quantitative reporting, it is recommended to display and explain the breakdown of:
  - Micro-plastic reductions due to Sales vs. due to Operations
  - Micro-plastic diversion causes: reduction, reuse, recycling
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.:
  - If the product/service is certified/eco-labelled
  - Indirect contribution to positive outcomes (e.g. for enabling technologies)
  - Input/output metrics (e.g. number of products sold, recycling potential per unit)

2. CASE STUDY: MICROPLASTIC FILTERS

2.1. DESCRIPTION

- Reusable filters, attached to the discharge system of laundry machines (both domestic and commercial), catching the microplastic fibres from polyester and acrylic materials that are shed in the wash before going into drainage.
- About 90% of all shed fibres could be filtered by the dispensable cartridge, which need to be replaced on a monthly basis. When replaced, the cartridge can be sent back to the company, cleaned and sent again to the customer, with a total reuse potential of about six times.
- The collected microplastic fibres are reused (e.g. into washing machine insulation panels).

2.2. APPLYING RECOMMENDED METHOD

- Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of plastic waste reductions due to products sold – renewed every year/reporting period by the same auditor to ensure consistency over time.
- Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct measurements of the volume of micro-plastic captured, e.g. during the cleaning process of the cartridges (to be effective, this method necessitates that (almost) all used cartridges are sent back to the company to be cleaned).
- Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the reference metrics used for the calculation (laundry cycles during filter lifetime, vol. of micro-plastic shed per laundry cycle, and % of shed fibres captured by a filter) were established based on a sampling:

  - Micro-plastic waste reductions due to Sales = # of filters sold × Avg # of laundry cycles during filter lifetime × Avg vol. of micro-plastic shed per laundry cycle × Avg % of shed fibres captured by a filter

  - Plastic waste produced = # of filters sold × Vol. of waste of 1 filter

- Note: if the filter is initially produced with recycled materials, then the sub-KPI “Macro-plastic waste reductions due to Operations” could be added to the calculation, as it is an extra amount of plastic that is diverted from nature or landfill in the first place.
- The complete calculation of the KPI could also be a combination of these various approaches (e.g. plastic waste produced audited, and plastic waste reductions estimated), with two key principles:
  - Perform as detailed calculations as possible.
  - Report the assumptions, sources and methodologies used for such calculations.
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- IUCN “Review of plastic footprint methodologies” (2019)
- The PEW Charitable Trusts and Systemiq “Breaking the plastic wave” (2020)
- UNEP “From pollution to solution” (2021)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- To ensure consistency among KPIs and as the calculation scheme suggested by the IRIS Taxonomy for GHG emissions mitigation provides an efficient working structure, a similar logic tree should be considered for other types of pollution, including Nutrients pollution:

  Note: sequestration not applicable, replaced by “removal”

![Nutrients pollution mitigated](image)

- “N / P pollution avoided” can be attributed to a “product replacement”, i.e. same use case, commercial segment and similar specs (e.g. phosphate-free detergents)
- “N / P pollution reduced” can be attributed when it is the usage rather than the product that is changed – i.e. in the sense of a usage with less negative consequences (e.g. IoT-enabled agricultural equipment for variable rate fertiliser application, allowing for precision farming practices)
- “N / P pollution removed” can be attributed to a decrease in nutrient pollution after it actually occurred, be it through bioremediation (e.g. use of wetlands) or technology-based remediation (e.g. ultrasonic algae control systems)
- Note: as their sources and impacts on ecosystems are often joint, both Nitrogen and Phosphorous pollutions mitigations are to be reported under the present KPI – but with two different metrics (Nitrogen on one hand, Phosphorous on the other)

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain the breakdown of Nitrogen / Phosphorous pollution mitigation by type of mitigation: avoidance, reduction and removal
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
2. CASE STUDY: MICROBIAL NITROGEN PRODUCTS

2.1. DESCRIPTION

- Crops naturally rely on microbes in the soil to turn nitrogen from the air into a form that can be assimilated by plants. During the past century, global agriculture has been relying on synthetic nitrogen fertilisers to ensure and increase food production. However, a large portion of synthetic fertilisers are actually not consumed by the plants, but lost to volatilisation and leaching, or bound in the soil.
- Example of solution: *proprietary microbial technology*, i.e. using specific microbes offering a high transformation rate of atmospheric nitrogen, without all the negative impacts associated with synthetic nitrogen.
- Beyond the reduction in marine pollution, microbial nitrogen products are also expected to boost farmers productivity and avoid GHG emissions (associated to synth. nitrogen production).

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing an official audit of nitrogen pollution avoided due to microbial nitrogen products sold – renewed every year / reporting period by the same auditor to ensure consistency over time.
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to track microbial nitrogen products sold at farm level as well as farms’ respective volumes of production based on microbial nitrogen, and compare it with prior local data points regarding synthetic nitrogen usage.
- **Estimated:** in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the reference metrics used for the calculation (microbial vs. synthetic nitrogen used per relevant unit of production, and % of synthetic nitrogen “lost” after spreading – meaning volatilised, leached or bound in the soil) were established based on a sampling:

  ![Substitution ratio diagram]

- The complete calculation of the KPI could also be a combination of these various approaches (e.g. microbial vs. synthetic nitrogen substitution ratio audited, and % of synthetic nitrogen “lost” measured for some farms, and estimated for others), with two key principles:
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- To ensure consistency among KPIs, a logic tree based on reduction / avoidance overall mechanisms should be considered for wastewater pollution mitigation. In order to fit with the specificities of wastewater pollution, this logic tree can be represented as follows:

```
Wastewater treated
| Physical treatments
| Chemical treatments
| Biological treatments
| Hybrid treatments

Other wastewater discharge avoided
```

- “Wastewater treated” is applicable to organisations that produce and sell products or services that lead to physical, chemical, biological and / or hybrid processes that lead to the removal of contaminants from sewage and wastewater, before the treated water is discharged back into the environment or valorised in an environmentally friendly manner (e.g. sewage used as crop fertilisers)
- “Other wastewater discharge avoided” is applicable to organisations that produce and sell products and services that are not wastewater / sewage treatment systems, but still lead to the reduction of wastewater spread into water ways (e.g. spill detection systems)
- **Note:** although the Ocean Impact Navigator is designed for tracking and reporting impact on ocean health, wastewater diversion is primarily related to indirect land-based sources of pollution, such as industrial and agricultural activities, domestic, commercial and / or urban runoffs. The present KPI does take into account all these sources of water pollution and allow for their accounting under the relevant technical KPI components described hereabove.

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- **To complement quantitative reporting,** it is recommended to display and explain the breakdown of:
  - Wastewater treated by treatment type: physical, chemical, biological, hybrid
  - Wastewater diverted by origin (if identifiable): industrial, agricultural, urban runoffs
- **To complement either quantitative or qualitative reporting,** users may wish to describe and explain the points listed hereabove, as well as e.g.
  - If the product / service is certified / eco-labelled
  - Geographies affected (if relevant)
  - If the treated sewage is valorised / ecologically reused, and how (if relevant)
o Indirect contribution to positive outcomes (e.g. for enabling technologies such as data collection systems)
o Input / output metrics (e.g. number of devices installed, water treatment potential per unit)

2. CASE STUDY: ZERO-POWER BIO-MIMICKING SEWAGE TREATMENT PLANT

2.1. DESCRIPTION

• “Zero-power, zero-operator” sewage treatment plant for residential buildings and factories for onsite treatment of wastewater, inspired from the functioning of a cow’s multi-chambered stomach
• 4 steps to execute the process of anaerobic digestion:
o 1st chamber: solid matters (e.g. plastic) settle at the bottom
o 2nd chamber: anaerobic bacteria (made from cow dung) feeds on contaminated materials
o 3rd chamber: water passes through several filter mass
o 4th chamber: pathogens and nutrients are removed thanks to horizontal wetland / gravel
• Final result: clean non-potable water (treatment est. 85% cheaper vs. a conventional plant)

2.2. APPLYING RECOMMENDED METHOD

• Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of the volume of wastewater effectively treated, and its post-treatment quality renewed every year / reporting period by the same auditor to ensure consistency over time
• Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to track operations at a plant level and measure the volume of wastewater treated during the reporting period, as well as its quality before release or reuse
• Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the reference metrics used for the calculation (average utilisation rate, average efficiency ratio) were established based on a sampling:

![Diagram]

Wastewater diverted from waterways = Wastewater Treated (hybrid treatments)

# of treatments plants installed × Potential vol. of wastewater treated per plant × Average utilisation rate × Average efficiency ratio

By plant size segments

• The complete calculation of the KPI could also be a combination of these various approaches (e.g. potential volume of wastewater treated (i.e. capacity) audited, and average utilisation rate and efficiency ratio estimated), with two key principles:
o Perform as detailed calculations as possible
o Report the assumptions, sources and methodologies used for such calculations

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

• UNEP “Good practices for regulating wastewater treatment” (2015)
• UN WWAP “Wastewater: the untapped resource” (2017)
• UN Habitat and WHO “Progress on wastewater treatment” (2021)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- There is no unique quantitative metric associated with this indicator. **This indicator should therefore be reported on qualitatively.**

1.2. QUALITATIVE REPORTING

Reporting on biological pollution mitigation raises several challenges:

- Invasive species encompass a broad range of very different bacteria, microbes, small invertebrates, algae, eggs, cysts, larvae or larger plants and animals, with each one of them potentially causing specific adverse effects and chain reactions to specific geographical areas – making every case a unique story to be told.
- Invasive species originate from various sources (e.g. discharged ballast water, escapes from fish farms), some directly resulting from human activities (e.g. biofouling), and others being an indirect consequence of these activities (e.g. through evolving habitats due to climate change).
- Invasive species can have small-to-large-scale adverse effects on ecosystems and biodiversity, economies, public health... with some of these consequences still being a field for studies and discussions. Quantifying the impact of every single biological pollution mitigation initiative would be a task far too complicated if considered at a start-up level.
- For these reasons, the “Invasive species reduced or avoided” KPI is integrated to the Ocean Impact Navigator as a **qualitative KPI, while encouraging the communication of specific data points**, as explained hereunder.
- **As quantitative reporting is not possible, users are invited to report qualitatively on this indicator**, by indicating that the solution creates positive impact for the present KPI, provided that the following conditions are met:
  - The targeted biological pollution is clearly identified (at a relevant scale)
  - The vector of pollution is identified as well (e.g. hull fouling)
  - The potential risk of biological pollution is recognised by the scientific community
  - The reduction, the avoidance or the removal of the targeted species provides proven benefits to the ocean, marine ecosystems, biodiversity, water quality and / or human health
- Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence, regarding e.g.
  - Geographies affected
  - The type of invasive species that is targeted
  - If it has proven, or debated, consequences on biodiversity; water quality; human health
  - If it is the subject of a specific regulation
  - The mitigation type of the product / service: reduction? avoidance? removal?
  - If the product / service is certified / eco-labelled
  - Tests / Scientific measurements performed (and expected outcomes based on these data points)
o Indirect contribution to positive outcomes (e.g. enabling technologies, such as green chemicals)
o Input / output metrics (e.g. number of devices deployed, mitigation potential per device)

2. CASE STUDY
n.a.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- IMO “Guidelines for the control and management of ships’ biofouling to minimize the transfer of invasive aquatic species” (2011)
Preliminary note:

Plastic (macro and micro), nutrients, invasive species and wastewater pollutions mitigation are to be reported under their dedicated KPIs. It is still possible to report the mitigation of other kinds of marine pollution under the present KPI, provided all the criteria listed hereunder are met:

- the pollutant is clearly identified
- the pollutant is recognised as such by the scientific community
- the pollutant does pollute the ocean and / or waterways
- reduction, avoidance or removal of the pollutant provides proven benefits to the ocean, marine ecosystems, biodiversity, climate change mitigation and / or climate-related hazards mitigation
- the pollutant does belong to one of the following categories:
  - Noise
  - Non-plastic solid waste
  - Antibiotics
  - Parasiticides / Pesticides
  - Other pharmaceuticals
  - Heavy metals
  - Industrial chemicals (including persistent organic pollutants)
  - Oil and Gas

When reporting under this KPI, “[other] pollution” should be replaced by the official denomination of the actual kind of pollution that is mitigated, at the relevant level of detail (e.g. by heavy metal type rather than aggregating volumes of heterogeneous heavy metals)

1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The following logic tree should be considered for reporting the mitigation of [other] pollution:

  ![Logic Tree Diagram]

- “Pollution avoided” can be attributed to a “product replacement”, to be understood as in effective “substitution”, i.e. same use case, commercial segment and similar specs (e.g. green chemicals replacing conventional harmful chemicals)
- “Pollution reduced” can be attributed when it is the usage rather than the product that is changed – i.e. in the sense of a usage with less negative consequences (e.g. hull air lubrication systems reducing ships flow noise)
"Pollution removed" can be attributed to a decrease in pollution after it actually occurred, be it through nature-based or technology-based solutions (e.g. ocean trash collecting robot collecting non-plastic solid waste)

1.2. QUALITATIVE REPORTING

Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

All users are encouraged to provide comments and supporting evidence

To complement quantitative reporting, it is recommended to display and explain the breakdown of pollution mitigation by mitigation type: avoidance, reduction, removal

To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
- If the product / service is certified / eco-labelled
- Geographies affected (if relevant)
- If the treated pollutant is valorised / ecologically reused, and how (if relevant)
- Indirect contribution to positive outcomes (e.g. for enabling technologies such as data collection systems)
- Input / output metrics (e.g. number of devices installed, pollution reduction potential per unit)

2. APPLYING RECOMMENDED METHOD

- **Certified:** In a best-case scenario, the KPI should be certified by an independent company providing an official audit of the pollution mitigated – renewed every year / reporting period by the same auditor to ensure consistency over time
- **Measured:** In case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements, taking note of the pollution effectively mitigated
- **Estimated:** In case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, to be designed on an ad hoc basis for the pollution type considered
  - The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
    - Perform as detailed calculations as possible
    - Report the assumptions, sources and methodologies used for such calculations

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

-
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although the external frameworks reviewed do not provide directly actionable metrics regarding areas of marine habitats protected or restored, the GRI (304-3) does operate a distinction between protection and restoration initiatives, which can be used for the breakdown of a logic tree as follows:

  - “Area protected” is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:
    - Fully Protected MPAs, i.e. with “no impact from extractive or destructive activities”
    - Highly Protected MPAs, i.e. with “minimal impact from extractive or destructive activities”
    - Both of them being at least Implemented, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))
  - “Area restored” is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”. In the case of coral reefs, the effectiveness of the restoration operation has to be verified at multiple points in time in order to track the actual coral repopulation over the years (as not all corals survive)

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain, if relevant:
  - The breakdown between area protected and area restored
  - The breakdown of area protected by Levels of protection (according to the MPA Guide)
  - The breakdown of area protected by Stage of establishment (according to the MPA Guide)
  - The breakdown of area effectively restored by years since restoration (e.g. <1y; 1-5 y; >5 y)
To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
- The locations of areas protected / restored
- If the protection is permanent or non-permanent
- If the protected area is certified / eco-labelled
- Indirect contribution to positive outcomes (e.g. enabling technology that contributes to monitoring and enforcement of MPAs including coral reefs)
- Input / output metrics (e.g. number of restoration units deployed, restoration potential per unit)

2. CASE STUDY: CORAL MICRO-FRAGMENTATION PROCESS

2.1. DESCRIPTION

- 75% to 90% of all coral reefs could be lost by 2050 due to increasing ocean temperatures and other anthropogenic stressors. Farming corals to repopulate and restore coral reefs is a very long process, which can take 25 years
- The coral micro-fragmentation process, developed to an industrial scale, can reduce the time needed to repopulate a coral reef down to 2 years
- Potential solution: land-based micro-fragmentation facilities for outplanting to reefs

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing an official audit of coral reef area restored, based on a detailed assessment of every coral farming facility effectively deployed and their respective amount / area of coral transplanted onto damaged reefs, with an evaluation of coral survival over time – renewed every year / base period by the same auditor to ensure consistency over time
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at micro-fragmentation facility level, taking note of the area of reefs effectively reskinned with transplanted coral, with an evaluation of coral survival over time
- **Estimated:** in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average area of coral reefs restored per “unit” of transplanted coral (referred to as the restoration ratio) was established based on a sampling:

![Diagram of KPI calculation]

- **Note:** In case of an estimation, the relevant “unit” of transplanted coral to be used is to be determined based on the specificities of each organisation’s operations (could be e.g. a reference area of outplanted corals, or a number of outplanted individuals). Furthermore, and as local conditions and constraints would impact the restoration ratio (either negatively or positively), it is recommended to base the sampling used to establish this ratio on a location-by-location basis
- The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The MPA Guide: A framework to achieve global goals for the ocean (2021)
  - The MPA Guide Paper
  - Expanded Guidance for Level of Protection
  - Level of Protection Decision Tree
  - Expanded Guidance for Stage of Establishment

- IUCN guidelines for the management of Protected Areas
  - Guidelines for applying protected area management categories (2013)
  - Large-Scale Marine Protected Areas: guidelines for design and management (2017)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although the external frameworks reviewed do not provide directly actionable metrics regarding areas of marine habitats protected or restored, the GRI (304-3) does operate a distinction between protection and restoration initiatives, which can be used for the breakdown of a logic tree as follows:

- **“Area protected”** is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:
  - Fully Protected MPAs, i.e. with “no impact from extractive or destructive activities”
  - Highly Protected MPAs, i.e. with “minimal impact from extractive or destructive activities”

- Both of them being at least Implemented, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))

- **“Area restored”** is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence

- To complement quantitative reporting, it is recommended to display and explain, if relevant:
  - The breakdown between area protected and area restored
  - The breakdown of area protected by Levels of protection (according to the MPA Guide)
  - The breakdown of area protected by Stage of establishment (according to the MPA Guide)

- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
  - The locations of areas protected / restored
  - If the protection is permanent or non-permanent
2. CASE STUDY: SEED-DROPPING DRONES

2.1. DESCRIPTION

- Drone mangrove restoration projects in order to mitigate CO₂ (through sequestration) and enhance local communities’ adaptation and resilience to climate change and climate related hazards
- Drones (Long range UAVs) created from simple and scalable 3D-printed components
- Drones equipped with 4th generation communications imagery for e.g. blue carbon mapping, then paired with precision planting capacities (of 2k germinated seeds in 10 minutes), and able to drop seeds at the right e.g. location, time, tide levels, soil depths based on the aerial surveys performed

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing an official audit of mangrove area restored, based on a detailed assessment of every drone operation effectively performed, and consequently of the increase in mangrove area observed – renewed every year / base period by the same auditor to ensure consistency over time
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at aerial seeding operation level, taking note of the mangrove area effectively restored. For that purpose, e.g. aerial surveys by UAVs can be used for comparisons vs. base period
- **Estimated:** in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average area of mangrove restored per “unit” of seeds dropped (referred to as the restoration ratio) was established based on a sampling:

\[
\text{Mangroves protected} \rightarrow \text{Mangroves restored} \rightarrow \text{Restoration ratio} = \frac{\text{Avg area of mangrove restored} \times \text{“Units” of seeds dropped by aerial seeding operations}}{\text{“Units” of seeds dropped by drone}}
\]

- **Note:** In case of an estimation, the relevant “unit” of seeds dropped by drone to be used is to be determined based on the specificities of each organisation’s operations (could be e.g. an actual number of individual seeds, or bags / cartridges if seeds are grouped, or a seeding distance covered by the drone). Furthermore, and as local conditions and constraints would impact the restoration ratio (either negatively or positively), it is recommended to base the sampling used to establish this ratio on a location-by-location basis
- The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The MPA Guide: A framework to achieve global goals for the ocean (2021)
  - The MPA Guide Paper
  - Expanded Guidance for Level of Protection
  - Level of Protection Decision Tree
  - Expanded Guidance for Stage of Establishment

- IUCN guidelines for the management of Protected Areas
  - Guidelines for applying protected area management categories (2013)
  - Large-Scale Marine Protected Areas: guidelines for design and management (2017)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although the external frameworks reviewed do not provide directly actionable metrics regarding areas of marine habitats protected or restored, the GRI (304-3) does operate a distinction between protection and restoration initiatives, which can be used for the breakdown of a logic tree as follows:

- **“Area protected”** is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:
  - **Fully Protected MPAs**, i.e. with “no impact from extractive or destructive activities”
  - **Highly Protected MPAs**, i.e. with “minimal impact from extractive or destructive activities”
  - **Both of them being at least Implemented**, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))

- **“Area restored”** is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- **To complement quantitative reporting**, it is recommended to display and explain, if relevant:
  - The breakdown between area protected and area restored
  - The breakdown of area protected by Levels of protection (according to the MPA Guide)
  - The breakdown of area protected by Stage of establishment (according to the MPA Guide)
- **To complement either quantitative or qualitative reporting**, users may wish to describe and explain the points listed hereabove, as well as e.g.
  - The locations of areas protected / restored
  - If the protection is permanent or non-permanent
If the protected area is certified / eco-labelled
- Indirect contribution to positive outcomes (e.g. enabling technology that contributes to monitoring and enforcement of MPAs including seagrasses)
- Input / output metrics (e.g. number of robots deployed, planting potential of one robot)

2. CASE STUDY: SEAGRASS-PLANTING UNDERWATER ROBOT

2.1. DESCRIPTION

- Seagrass cover 0.1% of the world’s seafloors, but are responsible for 11% of all organic oceanic CO₂ storage. Globally, 35% of all seagrass on Earth has been lost over the last 100 years
- Current restoration methods are time-consuming and resource-intensive (as largely done by hand, with teams of volunteers diving)
- Solution: laptop-controlled underwater robot planting seagrass seeds (and repelling crabs)

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing an official audit of seagrass area restored, based on a detailed assessment of every seed-sowing robot operation effectively performed, and consequently of the increase in seagrass area observed – renewed every year / base period by the same auditor to ensure consistency over time
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at robot operation level, taking note of the seagrass area effectively restored. For that purpose, e.g. aerial surveys by UAVs can be used for comparisons vs. base period
- **Estimated:** in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average area of seagrass restored per "unit" of seeds planted (referred to as the restoration ratio) was established based on a sampling:

```
Area of seagrasses
protected or restored

Seagrasses
protected

Seagrasses
restored

\[ \text{Restoration ratio} = \frac{\text{Avg area of seagrass}}{\text{restored per "unit" of}} \times \frac{\text{seeds planted by}}{\text{seed-sowing}} \times \frac{\text{robot operations}}{\text{seed-sowing}} \]

```

- **Note:** In case of an estimation, the relevant “unit” of seeds planted by seed-sowing robots to be used is to be determined based on the specificities of each organisation’s operations (could be e.g. an actual number of individual seeds, or bags / cartridges if seeds are grouped, or a seeding distance covered by the robot). Furthermore, and as local conditions and constraints would impact the restoration ratio (either negatively or positively), it is recommended to base the sampling used to establish this ratio on a location-by-location basis
- The complete calculation of the KPI could also be a **combination of these various approaches, with two key principles:**
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The MPA Guide: A framework to achieve global goals for the ocean (2021)
  - The MPA Guide Paper
  - Expanded Guidance for Level of Protection
  - Level of Protection Decision Tree
  - Expanded Guidance for Stage of Establishment

- IUCN guidelines for the management of Protected Areas
  - Guidelines for applying protected area management categories (2013)
  - Large-Scale Marine Protected Areas: guidelines for design and management (2017)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although the external frameworks reviewed do not provide directly actionable metrics regarding areas of marine habitats protected or restored, the GRI (304-3) does operate a distinction between protection and restoration initiatives, which can be used for the breakdown of a logic tree as follows:

```
<table>
<thead>
<tr>
<th>Area of salt marshes protected or restored</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus KPI Components</td>
</tr>
<tr>
<td>KEY</td>
</tr>
<tr>
<td>Salt marshes protected</td>
</tr>
<tr>
<td>Through Fully Protected MPAs</td>
</tr>
<tr>
<td>Salt marshes restored</td>
</tr>
<tr>
<td>Through Highly Protected MPAs</td>
</tr>
</tbody>
</table>
```

- “Area protected” is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:
  - Fully Protected MPAs, i.e. with “no impact from extractive or destructive activities”
  - Highly Protected MPAs, i.e. with “minimal impact from extractive or destructive activities”
  - Both of them being at least Implemented, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))

- “Area restored” is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain, if relevant:
  - The breakdown between area protected and area restored
  - The breakdown of area protected by Levels of protection (according to the MPA Guide)
  - The breakdown of area protected by Stage of establishment (according to the MPA Guide)
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
  - The locations of areas protected / restored
If the protection is permanent or non-permanent
If the protected area is certified / eco-labelled
Indirect contribution to positive outcomes (e.g. enabling technology that contributes to monitoring and enforcement of MPAs including salt marshes)
Input / output metrics (e.g. number of restoration units, restoration potential per unit)

2. CASE STUDY: “SALT MARSHES SAUSAGES”

2.1. DESCRIPTION

- Salt marshes are natural carbon sinks, able to capture about 2 tonnes of carbon per hectare per year
- Globally, 50% of all salt marshes have been lost to erosion, coastal development and / or pollution
- Experimental approach: 3-metre-long coir roll structures made out of waste products from coconuts (described as “salt marshes sausages”) placed into selected salt marshes channels, where the sediment is accreting, allowing the vegetation to establish on the structures and the surrounding sediment, hence reducing tidal energy and erosion

2.2. APPLYING RECOMMENDED METHOD

- Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of salt marshes area restored, based on a detailed assessment of every operation effectively performed, and consequently of the increase in salt marshes area observed – renewed every year / base period by the same auditor to ensure consistency over time
- Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at operation level, taking note of the salt marshes area effectively restored. For that purpose, e.g. aerial surveys by UAVs can be used for comparisons vs. base period
- Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average area of salt marshes restored per “unit” of coir roll placed (referred to as the restoration ratio) was established based on a sampling:

![Diagram of calculation method]

Note: In case of an estimation, the relevant “unit” of coir roll placed to be used is to be determined based on the specificities of each organisation’s operations (could be e.g. an actual number of coir rolls, or the distance these rolls cover in the saltmarshes). Furthermore, and as local conditions and constraints would impact the restoration ratio (either negatively or positively), it is recommended to base the sampling used to establish this ratio on a location-by-location basis.

The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
- Perform as detailed calculations as possible
- Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The MPA Guide: A framework to achieve global goals for the ocean (2021)
  - The MPA Guide Paper
  - Expanded Guidance for Level of Protection
  - Level of Protection Decision Tree
  - Expanded Guidance for Stage of Establishment

- IUCN guidelines for the management of Protected Areas
  - Guidelines for applying protected area management categories (2013)
  - Large-Scale Marine Protected Areas: guidelines for design and management (2017)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although the external frameworks reviewed do not provide directly actionable metrics regarding areas of marine habitats protected or restored, the GRI (304-3) does operate a distinction between protection and restoration initiatives, which can be used for the breakdown of a logic tree as follows:

  - **“Area protected”** is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:
    - Fully Protected MPAs, i.e. with “no impact from extractive or destructive activities”
    - Highly Protected MPAs, i.e. with “minimal impact from extractive or destructive activities”
    - Both of them being at least Implemented, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))

  - **“Area restored”** is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”

- **Note**: the present KPI refers to kelp as natural marine habitat, not to be confused with the productive exploitation of seaweed (e.g. through a farm), that is actually covered by the KPI “Ocean-based seaweed and bivalves produced”

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence

To complement quantitative reporting, it is recommended to display and explain, if relevant:

- The breakdown between area protected and area restored
- The breakdown of area protected by Levels of protection (according to the MPA Guide)
- The breakdown of area protected by Stage of establishment (according to the MPA Guide)
To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.:
- The locations of areas protected / restored
- If the protection is permanent or non-permanent
- If the protected area is certified / eco-labelled
- Indirect contribution to positive outcomes (e.g. enabling technology that contributes to monitoring and enforcement of MPAs including kelp forests)
- Input / output metrics (e.g. number of outplanting operations, restoration potential per operation)

2. CASE STUDY: GREEN GRAVEL

2.1. DESCRIPTION

- Current efforts to restore kelp forests are focused on high investment (labour- and skill-intensive) approaches, generally involving scuba diving under challenging conditions
- Green gravel consists of small rocks seeded with kelp and reared in a laboratory until 2-3cm, before being outplanted (potentially dropped from the surface), with high levels of survival and growth
- Green gravel allows for cost-effective (with personnel working from the surface rather than underwater) large-scale deployment, and provides potential pathways to propagate resistant genotypes, making kelp forests less vulnerable to potential future stress factors

2.2. APPLYING RECOMMENDED METHOD

- **Certified**: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of kelp forests area restored, based on a detailed assessment of every out-planting operation effectively performed, and consequently of the increase in kelp forests area observed – renewed every year / base period by the same auditor to ensure consistency over time
- **Measured**: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at green gravel planting operation level, taking note of the kelp forests area effectively restored. For that purpose, e.g. aerial surveys by UAVs can be used for comparisons vs. base period
- **Estimated**: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average area of kelp forests restored per “unit” of green gravel planted (referred to as the restoration ratio) was established based on a sampling:

  ![Diagram](image)

  \[
  \text{Area of kelp forests protected or restored} = \frac{\text{Kelp forests restored}}{\text{Avg area of kelp forests restored per "unit" of green gravel planted}} \times \text{“Units” of green gravel planted}
  \]

- **Note**: In case of an estimation, the relevant “unit” of green gravel planted to be used is to be determined based on the specificities of each organisation’s operations (could be e.g. an actual number of individual seeds, or bags / cartridges if seeds are grouped, or a seeding distance covered). Furthermore, and as local conditions and constraints would impact the restoration ratio (either negatively or positively), it is recommended to base the sampling used to establish this ratio on a location-by-location basis.

  The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The MPA Guide: A framework to achieve global goals for the ocean (2021)
  - The MPA Guide Paper
  - Expanded Guidance for Level of Protection
  - Level of Protection Decision Tree
  - Expanded Guidance for Stage of Establishment

- IUCN guidelines for the management of Protected Areas
  - Guidelines for applying protected area management categories (2013)
  - Large-Scale Marine Protected Areas: guidelines for design and management (2017)
Preliminary note:
Coral reefs, mangroves, seagrasses, salt marshes and kelp forests protection and / or restoration are to be reported under their dedicated KPIs. For other marine habitats, it is possible to report protection and / or restoration initiatives under the “Area of [other habitat] protected or restored” provided the impacted type of habitat:

- is clearly identified
- is recognised as such by the scientific community
- provides proven benefits to the ocean, marine ecosystems, biodiversity, climate change mitigation and / or climate-related hazards mitigation

Examples of other marine habitats to be considered for this KPI: estuaries, oyster reefs, deep sea

When reporting under this KPI, “[other habitat]” should be replaced by the official denomination of the actual habitat protected or restored

1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Although the external frameworks reviewed do not provide directly actionable metrics regarding areas of marine habitats protected or restored, the GRI (304-3) does operate a distinction between protection and restoration initiatives, which can be used for the breakdown of a logic tree as follows:

**“Area protected”** is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:

- Fully Protected MPAs, i.e. with “no impact from extractive or destructive activities”
- Highly Protected MPAs, i.e. with “minimal impact from extractive or destructive activities”
- Both of them being at least Implemented, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))
“Area restored” is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”

1.2. QUALITATIVE REPORTING

Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

All users are encouraged to provide comments and supporting evidence.

To complement quantitative reporting, it is recommended to display and explain, if relevant:
- The breakdown between area protected and area restored
- The breakdown of area protected by Levels of protection (according to the MPA Guide)
- The breakdown of area protected by Stage of establishment (according to the MPA Guide)

To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
- The locations of areas protected / restored
- If the protection is permanent or non-permanent
- If the protected area is certified / eco-labelled
- Indirect contribution to positive outcomes (e.g. enabling technology that contributes to monitoring and enforcement of MPAs including [other marine habitat])
- Input / output metrics (e.g. number of restoration units, restoration potential per unit)

2. APPLYING RECOMMENDED METHOD

Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of the marine habitat area restored – renewed every year / base period by the same auditor to ensure consistency over time.

Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct and individual measurements at operation level, taking note of the marine habitat area effectively restored. For that purpose, aerial surveys by UAVs can be used for comparisons vs. base period.

Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average area of marine habitat restored per “unit of solution” (referred to as the restoration ratio) was established based on a sampling:

\[
\text{Restoration ratio} = \frac{\text{Avg area of [marine habitat] restored per "unit of solution"}}{\text{"Units" of solution deployed}}
\]

Note: In case of an estimation, the relevant “unit of solution” to be used is to be determined based on the specificities of each organisation’s operations (could be e.g. an actual number of individual devices or inputs, or groups of inputs, or a seeding distance covered). Furthermore, and as local conditions and constraints would impact the restoration ratio (either negatively or positively), it is recommended to base the sampling used to establish this ratio on a location-by-location basis.

The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
- Perform as detailed calculations as possible
- Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The MPA Guide: A framework to achieve global goals for the ocean (2021)
  - The MPA Guide Paper
  - Expanded Guidance for Level of Protection
  - Level of Protection Decision Tree
  - Expanded Guidance for Stage of Establishment

- IUCN guidelines for the management of Protected Areas
  - Guidelines for applying protected area management categories (2013)
  - Large-Scale Marine Protected Areas: guidelines for design and management (2017)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific GHG-related metrics that allow for the construction of a logic tree, encompassing all key components of GHG emissions and mitigation, with metric (PI2764) fully aligned with the “GHG emissions avoided or reduced” KPI selected for the Ocean Impact Navigator. This logic tree can be represented as follows:

- “GHG emissions avoidance” can be attributed to a “product replacement”, to be understood as in effective “substitution”, i.e. same use case, commercial segment and similar specs (e.g. zero-emission fishing vessels)
- Although “GHG emissions reduction” (vs. avoidance) is not set out in detail by IRIS, it is reasonable to assume that, when applied to the scope of the Ocean Impact Navigator, it can be attributed when it is the usage rather than the product that is changed – i.e. in the sense of a usage with less negative consequences (e.g. Wind Assisted Ship Propulsion (WASP) add-on technology)
- If applicable, report metric “GHG emissions avoided or reduced” next to “Carbon sequestered” and vs. “GHG emissions generated” to capture net GHG emissions mitigated

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain the breakdown of Total GHG emissions avoided and reduced by:
  - Type of mitigation mechanism: avoidance? reduction?
• Specific GHG emissions affected (in particular: CO₂, CH₄, N₂O)
• To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
  o If the product / service is certified / eco-labelled
  o Indirect contribution to positive outcomes (e.g. AI and robotic technologies eliminating poor decisions and accidents due to human errors, hence reducing shipping GHG emissions)
  o Input / output metrics (e.g. number of devices installed, GHG mitigation potential of one device)

2. CASE STUDY: AIR LUBRICATION SYSTEMS

2.1. DESCRIPTION

• Air Lubrication Systems (ALS) create a layer of air bubbles on the full flat bottom of a ship’s hull, reducing frictional resistance between the hull and the seawater
• The microbubbles are generated by air release units / blowers in the bottom of the hull
• ALS is marketed as able to reduce fuel consumption and associated GHG emissions by up to 10-15%
• ALS are suitable for both retrofits and newbuilds, for e.g. LNG carriers, bulkers, tankers or cruise vessels

2.2. APPLYING RECOMMENDED METHOD

• Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of GHG emissions avoided or reduced – renewed every year / reporting period by the same auditor to ensure consistency over time
• Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to perform individual measurements, specific to every ALS-equipped ship – built or retrofitted. A database, consolidating all ALS-equipped newbuilds and retrofits with their fuel consumption (before and after the retrofit when relevant), would need to be complemented by one assumption only: the potential level of GHG that newbuilds without ALS would have emitted vs. the actual performance of ALS-equipped newbuilds. A proxy for this parameter would be calculated by categories of ships, based on the key drivers of fuel consumption (e.g. vessel type, size and area of operation)
• Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. based on the key drivers of fuel consumption (e.g. vessel type, size and area of operation). As far as possible, this approach should strive to base calculations on categories / segments of the ship fleet, rather than applying an overall average. If there is no / low reliable granular data to be used, and not enough data to consolidate hypotheses based on categories of ships, it is still possible to estimate the KPI from the number of newbuilds and the number of retrofits over the period, multiplied by an average GHG emission mitigation per year per ship, provided this average mitigation was established based on a sampling

\[
\text{GHG Emissions Avoided or Reduced} = \sum \text{Newbuild vessels equipped with ALS} \times \frac{\text{GHG emissions per new conventional vessel (w/o ALS)}}{\text{Newbuild vessels equipped with ALS}} + \sum \text{ALS retrofits} \times \frac{\text{GHG emissions per operating conventional vessel (before ALS)}}{\text{ALS retrofits}} - \sum \text{GHG emissions per new vessel equipped with ALS} - \sum \text{GHG emissions per vessel retrofitted with ALS}
\]

• The complete calculation of the KPI could also be a combination of these various approaches (e.g. fuel consumption audited for newbuilds, and decrease in fuel consumption tracked / measured for retrofits), with two key principles:
  o Perform as detailed calculations as possible
  o Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool to understand, quantify, and manage GHG emissions (www.ghgprotocol.org)
  - Corporate Accounting and Reporting Standard
  - Global Warming Potential Values (2016)

- The American Carbon Registry (ACR) develops standards for categorising ways in which GHG emissions can be reduced, avoided, and sequestered across the operational footprint of organisations (www.americancarbonregistry.org)
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific GHG-related metrics that allow for the construction of a logic tree, encompassing all key components of GHG emissions and mitigation, with metric (PI9878) fully aligned with the “Carbon sequestered” KPI selected for the Ocean Impact Navigator. This logic tree can be represented as follows:

- Although “GHG emissions sequestered” is not set out in detail by IRIS, it is reasonable to assume it can be broken down into two different components:
  - “Nature-based carbon sequestration” (i.e. storing carbon in biomass, such as seagrass)
  - “Technology-based carbon sequestration” (i.e. carbon capture and storage solutions, s.a. plants using electricity to force carbon, calcium and magnesium to react and convert to limestone)
- Note: as stated by IRIS, this metric refers to GHG emissions sequestered during the reporting period, not during the lifetime or a carbon sink, be it artificial or natural
- If applicable, report metric “Carbon sequestered” next to “GHG emissions avoided or reduced” and vs. “GHG emissions generated” to capture net GHG emissions mitigated

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain the breakdown of Total CO$_2$e sequestered into Nature-based sequestration vs. Technology-based sequestration, in line with IRIS recommendations on reporting on GHG emissions mitigation types (OI9839)
To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
- If the product/service is certified/eco-labelled
- Indirect contribution to positive outcomes (e.g. some carbon capture and storage solutions might return some slightly more alkaline water than used as an input, potentially helping to mitigate ocean acidification consequences in the vicinity of the plant)
- Input/output metrics (e.g. number of devices installed, sequestration potential of one device)

2. CASE STUDY: SEAGRASS-PLANTING UNDERWATER ROBOT

2.1. DESCRIPTION

- Seagrass cover 0.1% of the world’s seafloors, but are responsible for 11% of all organic oceanic CO₂ storage. Globally, 35% of all seagrass on Earth has been lost over the last 100 years
- Current restoration methods are time-consuming and resource-intensive (as largely done by hand, with teams of volunteers diving)
- Solution: laptop-controlled underwater robot planting seagrass seeds (and repelling crabs)
- The restoration of marine habitats s.a. seagrass hence contributes to the mitigation of GHG emissions, including from on-land sources

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** in a best-case scenario, the KPI should be certified by an independent company providing official carbon sequestration reviews – renewed every year/reporting period by the same auditor to ensure consistency over time
- **Measured:** in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct measurements as inputs into a recognised calculation tool as stated by IRIS (see section 3), insisting on the standardised and precise methodological guidance needed for the technical calculation of GHG emissions sequestration.
- **Estimated:** in case no audit is possible and no suitable calculation tool available, it is still possible to develop a proxy calculation tool, as a combination of input and output metrics, provided the reference metrics used for the calculation (e.g. carbon sequestration potential per unit of area, correction factor) were established based on a sampling:

![Diagram]

<table>
<thead>
<tr>
<th>GHG Emissions Sequestered</th>
<th>Carbon-sequestrating marine ecosystem total area (hectares)</th>
<th>Carbon sequestration potential per hectare</th>
<th>Correction factor</th>
</tr>
</thead>
<tbody>
<tr>
<td># of carbon-sequestrating devices</td>
<td>Carbon sequestration potential per device</td>
<td>Correction factor</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** A preliminary step to estimating the amount of carbon sequestered by the restored seagrass habitats would be to estimate the total area of seagrass actually restored thanks to the operations of the organisation (in the present case: seagrass seeds planted by the underwater robot). This specific step is illustrated in the Technical Appendix for the “Area of seagrasses protected or restored” KPI

**Note 2:** Carbon sequestration potential per hectare of seagrass (in the present case) is to be based either on actual measurements, or on up-to-date benchmarks from scientific literature

**Note 3:** The correction factor is to be established on a case-by-case basis, taking into account any relevant parameter that would impact the carbon sequestration efficiency of the solution (either positively or negatively), e.g. local conditions and constraints, type of species, date of restoration of the habitat (as it could take some time before it reaches its full potential as a carbon sink), etc.

As carbon sequestration is a field of study with ongoing debates and progress, it is also recommended to provide references to relevant literature on which assumptions and calculations are based on

The complete calculation of the KPI could also be a combination of these various approaches (e.g. utilisation rate measured, % efficiency estimated), with two key principles:
- Perform as detailed calculations as possible
- Report the assumptions, sources and methodologies used for such calculations
3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- Recognised calculation methodologies referenced by IRIS:
  - Verified Carbon Standard
  - Gold Standard
  - American Carbon Registry
  - AFOLU Carbon Calculator
  - Climate Action Reserve Standard
  - Plan Vivo Standard

- The **Greenhouse Gas Protocol (GHG Protocol)** is the most widely used international accounting tool to understand, quantify, and manage GHG emissions ([www.ghgprotocol.org](http://www.ghgprotocol.org)).
  - Corporate Accounting and Reporting Standard
  - Cross-Sector and Sector-Specific Calculation Tools
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific GHG-related metrics that allow for the construction of a logic tree, encompassing all key components of GHG emissions and mitigation, with metric (OI1479) fully aligned with the “GHG emissions generated” KPI selected for the Ocean Impact Navigator. This logic tree can be represented as follows:

- The GHG Protocol classifies GHG emissions into 3 scopes:
  - **Scope 1** relates to emissions from sources that are owned or controlled by the reporting organisation (e.g. transport-related activities in vehicles owned or controlled by the entity)
  - **Scope 2** relates to indirect GHG emissions from consumption of energy
  - **Scope 3** relates to all other indirect GHG emissions that result from the activities of the reporting organisation but are generated at sources owned or controlled by another organisation (e.g. purchase of materials, products or services, waste disposal, etc.)
- In the context of the “GHG emissions: total” (OI1479) metric, IRIS recommends the calculation and display of Scope 1 and Scope 2, with “Indirect emissions” (OI9604) referring to GHG emissions from the generation of electricity, heat, or steam that is imported and consumed by the reporting organisation
- Although this standpoint raises some questions (e.g. potentially hidden / not reported negative impacts in the value chain), it does make sense in the Ocean Impact Navigator context as it provides a homogeneous frame for all reporting start-ups / organisations, and it is more realistically suited to start-ups data collection and reporting capabilities
- If applicable, report metric “GHG emissions generated” vs. “GHG emissions avoided or reduced” and “Carbon sequestered” to capture net GHG emissions mitigated
1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence.
- To complement quantitative reporting, it is recommended to display and explain the breakdown of:
  - Total CO₂e emitted into Direct emissions (Scope 1) and Indirect emissions (Scope 2)
  - Total CO₂e emitted into specific GHG emissions (in particular: CO₂, CH₄, N₂O)
- To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
  - GHG emissions sources split (any specific / key item? related to what GHG Protocol Scope?)
  - GHG emissions mitigation strategy explained, if any

2. CASE STUDY

2.1. DESCRIPTION

The “GHG emissions generated” KPI is applicable in the large majority of cases, as the GHG emissions of an organisation are a matter of interest if they are low as well as if they are high. For this reason, virtually any start-up could be a case study for measuring GHG emissions generated, with a methodology that would not differ from one start-up to another.

2.2. APPLYING RECOMMENDED METHOD

- **Certified:** In a best-case scenario, the KPI should be certified by an independent audit company providing official carbon footprint reviews, based on a detailed assessment of all items of GHG Protocol Scopes 1 and 2, renewed every year / base period by the same auditor to ensure consistency over time.
- **Measured:** In case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct measurements as inputs into a recognised calculation tool, such as the GHG emissions Calculation Tools developed by the GHG Protocol.
- **Estimated:** In case no audit is possible and no calculation tool suited to be used as is, it is still possible to develop one’s own calculation tool, based on the GHG Protocol Scope segmentation and accounting and reporting guidance.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool to understand, quantify, and manage GHG emissions ([www.ghgprotocol.org](http://www.ghgprotocol.org)).
  - Corporate Accounting and Reporting Standard
  - Cross-Sector and Sector-Specific Calculation Tools
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- To ensure consistency among KPIs and as the calculation scheme suggested by the IRIS Taxonomy for GHG emissions mitigation provides an efficient working structure (avoidance and reduction, as sequestration is not applicable in the present case), the following logic tree should be considered for Nitrogen Oxides and Sulphur Oxides:

- **Note:** as NOx and SOx emissions have at least partly shared origins and compounding impacts on ecosystems, ocean’s health and human health, both are to be reported under the present KPI – but displayed with two different metrics (NOx on one hand, SOx on the other).
- Following the guidelines for GHG emissions, it is reasonable to assume that, when applied to the scope of the Ocean Impact Navigator, avoidance and reduction should be understood as follows:
  - “NOx / SOx emissions avoidance” can be attributed to a “product replacement”, to be understood as in effective “substitution”, i.e. same use case, commercial segment and similar specs (e.g. through engine components design modification)
  - “NOx / SOx emissions reduction” can be attributed when it is the usage rather than the product that is changed – i.e. in the sense of a usage with less negative consequences (e.g. in the case of an add-on technology or a retrofit operation)

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is recommended to display and explain the breakdown of NOx / SOx emissions mitigated into NOx / SOx emissions avoided, and NOx / SOx emissions reduced
- To complement either quantitative or qualitative reporting, users may wish to describe and explain
the points listed hereabove, as well as e.g.
- If the product / service is certified / eco-labelled
- Indirect contribution to positive outcomes
- Input / output metrics (e.g. number of devices installed, mitigation potential of one device)

2. CASE STUDY: SHIP SCRUBBER SYSTEMS

2.1. DESCRIPTION

- Scrubbers or Exhaust Gas Cleaning Systems (EGCS) are used to remove particulate matter and harmful components, such as NOx and SOx from the exhaust gases generated as a result of combustion processes in marine engines.
- New proprietary multi-pollutant scrubbers can remove a broad range of undesirable gases from any exhaust stream. Such systems can break down the pollutants and convert them into non-hazardous by-products, which are either released into the environment or transformed into usable products.

2.2. APPLYING RECOMMENDED METHOD

- **Certified: in a best-case scenario, the KPI should be certified by an independent company** providing an official audit of NOx / SOx emissions avoided or reduced – renewed every year / reporting period by the same auditor to ensure consistency over time.
- **Measured: in case no audit is possible** (e.g. for operational or financial reasons), it is recommended to perform individual direct measurements of NOx / SOx emissions (e.g. based on online analysers), specific to every scrubber-equipped ship – built or retrofitted. A database, consolidating all scrubber-equipped newbuilds and retrofits with their registered NOx / SOx emissions (before and after the retrofit when relevant), would need to be complemented by one assumption only: the potential level of NOx / SOx that newbuilds without scrubber would have emitted vs. the actual performance of scrubber-equipped newbuilds. A proxy for this parameter would be calculated by categories of ships, based on the key drivers of NOx / SOx emissions.
- **Estimated: in case of a lack of individual / sufficiently specific data**, a methodology based on published emissions factors for NOx (based on a suitable model for the combustion process), and an approximation of fuel consumption by categories of ships for SOx (based on the key drivers of SOx emissions, e.g. sulphur content of fuel and fuel consumption by vessel type, size and area of operation) could be used. As far as possible, this approach should strive to base calculations on categories / segments of the ship fleet, rather than applying an overall average. If there is no / low reliable granular data to be used, and not enough data to consolidate calculations based on categories of ships, it is still possible to estimate the KPI from the number of newbuilds and the number of retrofits over the period, multiplied by an average NOx / SOx emission mitigation per year per ship, provided this average mitigation was established based on a sampling.

Note: the levels of SOx and CO2 emissions are dependent on fuel oil consumption, whereas the level of NOx emissions is associated with combustion temperature, varying with e.g. engine load, fuel
injection timing and quantity. NOx emissions should hence be calculated based on the actual engine load or output, rather than speed – making it a complex metric to track, consolidate or estimate.

- The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations.

### 3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

-
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- Climate change is exacerbating ocean hazards faced by coastal areas, including flooding from sea level rise, storm surge, erosion, tide, and wave run up. These hazards pose a threat to people, their property, infrastructure, natural systems, food production and fresh water drinking supplies. This indicator captures the impact of interventions that can address these threats, and so help coastal communities adapt to the effects of climate change.

- Although the external frameworks reviewed do not provide directly actionable metrics regarding the length of coastline protected, this indicator is related to the IRIS indicator (PI2538) Length of Coastline Restored. However, it goes beyond this indicator to capture the potential to support the adaptation of coastal populations not only through restoration of ecosystems, but also through their protection. It also captures the benefits to coastlines accruing from the construction of physical barriers. These multiple dimensions of protection are reflected in a logic tree as follow:

  - Length protected by grey infrastructure could include e.g. seawalls, breakwaters, gabion, groins and sluices. However, where the protection is from grey infrastructure, further information should be provided in the comments to substantiate whether and how harms to marine ecosystems from the construction of these barriers are being mitigated.

  - Length protected by green-grey (hybrid) infrastructure includes measures combining the conservation and restoration of nature (including natural coastal buffers such as mangroves and seagrasses) with conventional approaches (such as concrete dams and seawalls).

  - Length protected by green infrastructure captures the contribution of management of ecosystems and nature-based solutions to the protection of coastlines. It includes coastal and marine ecosystems that are known to contribute to dissipate wave energy and reduce the impacts of flooding – in particular mangrove forests, reefs, seaweed, seagrass meadows, sand dunes and wetlands. Environmental management of these ecosystems captures three different types of activity:
WORK IN PROGRESS

- Protection or sustainable stewardship of coastal/marine ecosystems: Area [of ecosystem] protected is defined by the GRI (304-3) as “area that is protected from any harm during operational activities, and where the environment remains in its original state with a healthy and functioning ecosystem”. In line with the MPA Guide, it is reasonable to report two types of MPAs here:
  - Fully Protected MPAs, i.e. with “no impact from extractive or destructive activities”
  - Highly Protected MPAs, i.e. with “minimal impact from extractive or destructive activities”
  - Both of them being at least Implemented, if not Actively Managed (see Stages of establishment by the MPA Guide (2021))

- Sustainable cultivation of coastal/marine ecosystems: For instance, if the cultivation of seaweed for offshore aquaculture contributed to protection of the coastline, the length of shoreline benefitting from this protection should be reported.

- Restoration of coastal/marine ecosystems: Area restored is defined by the GRI (304-3) as “area that was used during or affected by operational activities, and where remediation measures have either restored the environment to its original state, or to a state where it has a healthy and functioning ecosystem”

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users should report qualitatively on this indicator. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim, including with explanation regarding the points listed above.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence.
- To complement quantitative reporting, it is recommended to display and explain:
  - The breakdown in length of coastline protected between physical barriers vs. environmental management
  - Where environmental management contributes to coastline protection, this should be further disaggregated to reflect the contribution of different ecosystems, and whether they are protected vs. restored vs. cultivated
  - The location of coastlines protected
- To complement either quantitative or qualitative reporting, users may wish to describe and explain:
  - Details of the interventions contributing to coastline protection (type of activity / type of ecosystem etc.)
  - Data evidencing the impact of the intervention on reducing the effects of ocean hazards on a shoreline (e.g. observed changes in the impacts of flooding, erosion etc. following implementation of the intervention)
  - Input / output metrics (e.g. area of kelp forest restored that is contributing to shoreline protection)

2. CASE STUDY: HYBRID BREAKWATER-OYSTER HABITATS

2.1. DESCRIPTION

- Breakwaters are partially submerged structures that break waves, and reduce (and even reverse) erosion of beaches
- Their impact is ensured through detailed hydrodynamic modelling that identifies the optimal location for the breakwaters to dissipate wave energy
- The breakwaters are made of stone and ecologically-enhanced concrete units and are designed and constructed to include ridges so that their form provides habitat space for diverse species – especially oysters, but also fin fish and other marine species
- The installation of the breakwaters is followed by live oyster installation to accelerate population by marine species. These oysters also provide other benefits e.g. enhancing biodiversity, filtration etc.
2.2. APPLYING RECOMMENDED METHOD

- In a best-case scenario, the KPI should be certified by an independent company providing an official audit of the length of shoreline protected by the breakwaters, based on a detailed assessment of the breakwater installation and their contribution to dissipating wave energy – renewed every year / base period by the same auditor to ensure consistency over time.

- In case no audit is possible (e.g., for operational or financial reasons), it is recommended to use direct and individual measurements, including the number of breakwaters installed and evaluation of the change in wave energy / coastal damage along the length of coastline.

- In case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g., based on the length of coastline along which breakwaters are installed – with assumptions about the contribution to coastal protection documented.

- Additional information that could be included in the comments and supporting evidence section could relate to:
  - Identification of this measure as green-grey infrastructure
  - Details of baseline and subsequent data on wave strength, wave damage, beach erosion etc.
  - Reporting on operational indicators, such as the number of breakwaters installed
  - Additional explanation of the benefits to ocean health afforded by the oyster habitat

- The complete calculation of the KPI could also be a combination of these various approaches, with two key principles:
  - Perform as detailed calculations as possible
  - Report the assumptions, sources and methodologies used for such calculations.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

This indicator is derived from a core indicator of the UNFCCC Adaptation Fund: Number of beneficiaries (direct and indirect). It seeks to measure the number of people who have received support from an intervention as a proxy for increasing adaptive capacity to respond to the impact of climate change.

- **Support** is defined as direct assistance from the intervention with the explicit intention of helping people deal with climate change impacts. It could include, for example, financial resources, assets, livelihood inputs, training, communications (e.g. early warning systems) or information (e.g. weather forecasting).

This indicator captures two types of people: those who are directly supported to adapt by the intervention, and those who are supported indirectly. This can be illustrated through a logic tree:

- **Targeted**: defined as whether people (or households) can be identified by the project as receiving direct support, can be counted individually and are aware they are receiving support in some sort.
- **Intensity**: defined as the level of support/effort provided per person, on a continuum but broad levels may be defined as:
  - a) **High**: e.g. house raised on plinths, cash transfers, training of individuals in communities to develop emergency plans, etc.
  - b) **Medium**: e.g. people receiving information services such as flood warning or weather forecast by text; people within catchment area of structural flood defences; people living in a community where other members have been trained in emergency flood response, etc.
  - c) **Low**: e.g. people falling within an administrative area of an institution (e.g. Ministry of local authority) receiving capacity building support.
1.2. QUALITATIVE REPORTING

- If quantitative reporting is not possible or as complementary information to quantitative reporting, users can report qualitatively under this KPI (if relevant), with explanation regarding the points listed hereabove, as well as additional information, per the section below.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- Where users report quantitatively, they should:
  - Disaggregate the data to reflect the breakdown between direct and indirect beneficiaries
  - Detail any assumptions made (e.g., estimates of the (non-targeted) population of an area benefitting from a (medium intensity) intervention e.g., ocean data used to deliver flood warning systems)
- Regardless of whether users report quantitatively or qualitatively, it is recommended to provide further information regarding:
  - Information about the type of person benefitting from the intervention (e.g., disaggregated by gender, young people, socio-economic etc.)
  - Operational data to substantiate the claim (e.g., number of training sessions held to facilitate effective use of ocean data that supports emergency flood responses)

2. CASE STUDY: EARLY FLOOD WARNING MOBILE APP

2.1. DESCRIPTION

- Coastal flooding is rising in frequency and intensity with climate change.
- Information and alerts from real-time, early warning flood systems can save lives, limit damage and reduce costs.
- To be effective, flood warning systems should integrate real-time data and predictive analytics, with communications and dissemination strategies that account for people’s access to technology, literacy, local languages etc.
- Solution: an early flood warning app integrating live hydro-meteorological data and forecasting alerting users to potential flooding, and providing updates on responses e.g., from local government or aid organisations.

2.2. APPLYING RECOMMENDED METHOD

- This technology represents a targeted, medium-intensity intervention that therefore indirectly supports people to adapt to the effects of climate change.
- Where possible, this indicator should be reported quantitatively through measurement. For instance, by deriving the number of active users of the App (with criteria for active use to be detailed in the Comments and Supporting evidence – e.g., counting the number of users who both have the App downloaded and who receive a flood alert for their local area).
- Additional details to be captured in comments and supporting evidence could include operational data that substantiates the impact e.g., the number of flood alerts issued; the number of downloads of the App etc., or wider data on the responsiveness or impact of flooding in communities where the App

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

- The Adaptation Fund (2026): Methodologies for reporting adjustment fund core impact indicators
Decision making

Use of ocean information products / services in decision-making to support climate adaptation and resilience (qualitative reporting)

1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- There is no unique quantitative metric associated with this indicator. This indicator should therefore be reported on qualitatively.

1.2. QUALITATIVE REPORTING

- This indicator is derived from indicator A6.1 in the Green Climate Fund’s M&E protocol and Climate Investment Fund Indicator PPCR B3.
- It is designed to capture the collection, analysis and application of ocean data to decision-making in climate-sensitive sectors at critical times by the government, private sector and men/women, and to support the resilience and adaptation of coastal communities and economies.
- Relevant supporting data points and evidence to substantiate the claim that an intervention contributes to this KPI should be provided in the comments, as outlined below.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- To evidence this indicator, users are recommended to provide at a minimum an explanation of the type of data and products / service, and their applications, including how this contributes to decision-making that supports climate adaptation or resilience.
- Specifically, users are encouraged to provide qualitative descriptions and – where possible – quantitative data points, for instance relating (but not limited) to:
  - Type of data gathered (e.g. sea level data; biodiversity data etc.)
  - Quantum and/or distribution of data gathered and/or generated (e.g. number of sensors deployed; geographic area covered by sensors etc.)
  - Products or services generated (e.g. prediction; optimisation capabilities etc.)
  - Number of users of data, products or solutions, disaggregated by type and sector (e.g. government, private sector industries, individuals, etc.)
  - Benefits arising from use of data, products or services (e.g. geographic area or value of assets benefitting from actions informed by use of data etc.)
  - Assessment of the data or products/services it enables vs. alternative solutions (e.g. accuracy; breadth; volume of information etc.)

2. CASE STUDY: Ocean weather forecasting

2.1. DESCRIPTION

- An ocean global sensor network aggregating data from sensors attached to buoys.
- This data is collated to generate detailed real time ocean data for customers, and analysed using big data to generate ocean weather forecasts.
2.2. APPLYING RECOMMENDED METHOD

- Reporting should elaborate on what ocean data is collected and how this data is leveraged as a live data platform or as forecast. It should in particular focus on describing the ways in which this data and forecasting capability is deployed by users to support insights or decision-making that supports climate adaptation and resilience.
  - **Type of data gathered and/or generated:** Identifying the data that is collected including wind, sea surface temperature, waves, currents, precipitation and barometric readings.
  - **Quantum and/or distribution of data gathered and/or generated:** Number of sensors deployed and number of data points collected by each sensor per day.
  - **Products or services generated:** Outlining the main offerings, including live ocean data and ocean weather forecasts.
  - **Number of users of data, disaggregated by type and sector:** Reporting on the number of customers disaggregated by type, e.g. government municipalities to accurately predict and monitor storm surges to support Disaster Risk Reduction (DRR) planning and implementation; and private sector users such as offshore wind operators leveraging forecast data to support safe and efficient operations.
  - **Benefits arising from use of data**
  - **Assessment of the data or tools it enables vs. alternative solutions:** Comparison of the accuracy of the company’s weather forecasts vs. other providers.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- There is no unique quantitative metric associated with this indicator. This indicator should therefore be reported on qualitatively.

1.2. QUALITATIVE REPORTING

- Food security is a multi-dimensional issue, that is achieved “when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life” (WFP, 1996). The challenge of food insecurity is being compounded by the effects of climate change. As such, action to enhance food security a key component of climate adaptation.

- Based on this widely accepted definition proposed by the WFP, food security encompasses 4 pillars:
  - Availability of food: Food availability addresses the “supply side” of food security and is determined by the level of food production, stock levels and net trade
  - Physical and economic access to food: An adequate supply of food at the national or international level does not guarantee household level food security: incomes, expenditure, markets and prices are key determinants of food security.
  - Utilization of food: Utilization is the way the body makes the most of various nutrients in the food. This is the result of good care and feeding practices, food preparation, diversity of the diet and intra-household distribution of food.
  - Stability of the prior three dimensions: Food security can be negatively impacted by if there is periodic inadequate access to food e.g., due to adverse weather conditions, political instability, or economic factors (unemployment, rising food prices).

- This indicator is designed to capture the contribution of ocean innovation and sustainable blue food to improving food security for both target populations and at the global level, in the context of climate change. Where an intervention impacts one or more of the four pillars of food security, this KPI should be included in reporting.

- Relevant supporting data points and evidence to substantiate the claim that an intervention contributes to this KPI should be provided in the comments, as outlined below.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- To evidence this indicator, users are recommended to provide at a minimum information and data to substantiate the impact. In particular, users should:
  - Identify the pillar through which the intervention contributes to food security, and highlight the causal chain through which impact is created.
  - Information about who is benefitting from enhanced food security, and the specific hazards or food vulnerabilities they face (e.g. based on geography)
  - Provide supporting (quantitative) data points that either reflect food security outcomes, or which relate to operational data (activities and outputs) that can be proxies for improving food security at the individual, household or community level, e.g.
    - The volume of sustainable blue food produced
2. CASE STUDY: NUTRACEUTICALS AND FOOD SUPPLEMENTS DERIVED FROM SEAWEED

2.1. DESCRIPTION

- Food insecurity is a major cause of malnutrition. The high cost of healthy diets coupled with persistent high levels of income inequality put healthy diets out of reach for around 3 billion people, especially the poor.
- Households of low socioeconomic status often depend on nutritionally-insufficient staple foods (such as rice, wheat, cassava, or maize) for the majority of their diet, as it is cheaper and more accessible than nutrient-rich foods.
- Solution: Nutraceuticals and food supplements derived from farmed seaweed.

2.2. APPLYING RECOMMENDED METHOD

- Reporting should elaborate on how the production of seaweed nutraceuticals and food supplements contributes to the volume and affordability of nutritional products (i.e. the availability of food) – including identifying the nutritional components that are present in the products and their relative proportions i.e. for vitamins, minerals, proteins, functional fibres, antioxidants etc.
- Reporting should also elaborate on the extent to which food insecure or low-income populations benefit directly from production, through elaborating on e.g. the locations, channels and price at which the product is sold.
- In terms of supporting data points, users could report on:
  - Volume of seaweed harvested
  - Volume of supplements / nutraceuticals produced (disaggregated by specific form of nutrition i.e. vitamin, mineral, protein, fibre etc.)
  - Land spared compared to land-based production of the nutritional ingredients
  - Fresh water spared compared to land-based production of the nutritional ingredients
  - Description of biodiversity benefits and contribution to overall health of marine ecosystems from seaweed aquaculture
- Users may also wish to include (public) data related to the wider conditions of food security in their relevant markets e.g.
  - Population share that is malnourished
  - Prevalence of stunting in children under five years of age

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific employment metrics that can be derived for the construction of a logic tree that can be represented as follows:

- **“Permanent employees: hired”** corresponds to IRIS metric (O13547):
  - It is calculated as the sum of all paid full-time and part-time employees hired during the course of the last reporting period
  - Temporary workers, including subcontracted employees or contracted employees with a predefined terms (e.g. fixed-term, project-based or seasonal contracts) should not be considered for the calculation of the present KPI, which aims to reflect efforts towards the creation of more stable and sustainable jobs
- **“Departed permanent employees”** corresponds to IRIS metric (O14499), i.e. the number of full-time and part-time employees that departed the organisation (for any reason) during the reporting period. It is to be taken into account in the calculation of the present KPI in order to display net jobs creation (rather than the compensation of employees turnover). As for hires, temporary workers should be excluded from the calculation

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- **To complement quantitative reporting** and as suggested by the GRI (401-1), it is recommended – if relevant – to display and explain the breakdown of new employee hires by:
  - Gender
  - Full-time vs. Part-time contracts
  - Employee category (management vs. non-management)
  - Age group (e.g. under 30 / 30-50 / over 50)
  - Region / Area (esp. people who reside in low-income areas)
• Community (esp. people from minorities or previously excluded groups)

• To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
  o Indirect contribution to positive outcomes (e.g. jobs creation up- or downstream in the value chain, in entities not controlled by the organisation)
  o Input / output metrics (e.g. recruitment campaigns in specific regions)
  o Jobs description: sustainability and fulfilment vs. average local working conditions?

2. CASE STUDY

2.1. DESCRIPTION

The “Net jobs created” KPI is applicable in all cases, as net employee hires of an organisation are a matter of interest be they high or low. For this reason, virtually any start-up could be a case study for measuring this KPI, with a methodology that would not differ from one start-up to another

2.2. APPLYING RECOMMENDED METHOD

• Regarding employment matters, the three levels of accuracy used for most of the KPIs of the Ocean Impact Navigator (i.e. certification, measurement and estimation) do not apply: HR management is based on regulations, hence jobs creations and terminations count has to be based on actual employment contracts
• As the present KPI should provide an indication of a social impact rather than of a workload, employees should be counted as unique individuals (be it in the case of full-time or part-time jobs) rather than as FTE (FTEs still being displayed and explained in the comment section)

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

-
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific women employment metrics that can be derived for the construction of a logic tree that takes into account, as follows, both management and non-management roles of women employed by the organisation (hence translating into two ratios to be displayed):

  - “Permanent employees: Female” corresponds to IRIS metric (OI2444):
    - It is calculated as the sum of all paid full-time and part-time (managing and non-managing) female employees as of the end of the reporting period
    - Temporary workers, including subcontracted employees or contracted employees with a predefined terms (e.g. fixed-term, project-based or seasonal contracts) should not be considered for the calculation of the present KPI, which aims to reflect efforts towards the creation of more stable and sustainable jobs
  - “Permanent employees: Total” corresponds to IRIS metric (OI8869), and is based on the same criteria, extended to both men and women employees
  - “Permanent managers: Female” can be calculated as the sum of full-time and part-time women employees in a management position

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting it is possible – if relevant – to display and explain complementary women employment ratios, by e.g.
  - Employee category (management vs. non-management)
  - Region / Area (esp. people who reside in low-income areas)
  - Community (esp. people from minorities or previously excluded groups)
Full-time vs. Part-time contracts

To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.

- HR strategy for gender equality
- Specific initiatives or events promoting gender equality

It is also encouraged to specify if the organisation employs C-level women managers

2. CASE STUDY

2.1. DESCRIPTION

The “Share of employees that are women” KPI is applicable in all cases, as women employment is a matter of interest be it high or low. For this reason, virtually any start-up could be a case study for measuring this KPI, with a methodology that would not differ from one start-up to another

2.2. APPLYING RECOMMENDED METHOD

- Regarding employment matters, the three levels of accuracy used for most of the KPIs of the Ocean Impact Navigator (i.e. certification, measurement and estimation) do not apply: HR management is based on regulations, hence jobs and positions count has to be based on actual employment contracts
- As the present KPI should provide an indication of a social impact rather than of a workload, employees should be counted as unique individuals (be it in the case of full-time or part-time jobs) rather than as FTE (FTEs still being displayed and explained in the comment section)
- What defines a management position might differ from one organisation to another, based on countries and regulations. As stated by IRIS: “The composition of management can vary based on an organisation’s stage and type. Generally, managers are responsible for setting objectives (setting goals for the group and deciding what work needs to be done to meet those goals), for organising (dividing work into manageable activities and selecting the right people to accomplish the tasks), for motivating and communicating (creating a team from the individuals through decisions on pay, promotion, and communications with the team), for measuring (establishing targets, interpreting and analysing performance), and for developing people”

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific training metrics that allow for the construction of a logic tree, encompassing the training of both people working for the organisation (“Employees”) and people outside of the organisation (“Individuals”). This logic tree can be represented as follows:

```
    People completing education / training
       /        \
  Employees trained                      Individuals trained
       /        \
  OI4229               PI2998

              Full-time employees trained
               |                  |
              Part-time employees trained

              Temporary workers trained
```

- “Employees trained” corresponds to IRIS metric (OI4229):
  o It is calculated as the number of individual employees who received training services through programs provided by the organisation during the reporting period.
  o In a less restrictive manner than for the “Net jobs created” KPI, Temporary workers including subcontracted employees or contracted employees with a predefined terms (e.g. fixed-term, project-based or seasonal contracts) are here considered in scope.

- “Individuals trained” corresponds to IRIS metric (PI2998), and refers to all individuals not already counted in the “Employees” category (e.g. clients and non-clients, grown-ups and children, paying or non-paying participants) that benefited from training and/or education programs provided by the organisation during the reporting period.

- Note 1: as stated by IRIS, should be considered here “not registrations for training, but rather those employees who completed a training session or series during the reporting period.”

- Note 2: in case of an employee or of an individual attending several training sessions / programmes, it is one unit only that should be taken into account for the calculation of the present KPI, as it is supposed to reflect how the organisation is contributing to the education of human societies, rather than how far it is able to develop the skills of one person.

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim.

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence.
- To complement quantitative reporting it is recommended – if relevant – to display and explain the breakdown of people trained by:
Employees vs. Individuals
• Gender
• Employee category (management vs. non-management)
• Age group (e.g. under 30 / 30-50 / over 50)
• Region / Area (esp. people who reside in low-income areas)
• Community (esp. people from minorities or previously excluded groups)

To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed hereabove, as well as e.g.
• If training are group-based or one-on-one advisory services
• If the training sessions are fee-based or free of charge
• If the training programmes lead to recognized certifications
• If the training programmes are based on recognized research literature and/or methodology
• Average number of training hours per participant
• Training categories, e.g. as suggested by IRIS: “(1) skills-based training to advance core job responsibilities (enhancing employees’ ability to do their jobs effectively); (2) skills-based training on cross-job functions (training beyond regular job responsibilities, enabling employees’ to advance in their professions); (3) training on literacy, communications, and other life skills; or (4) trainings related to diversity and inclusion”
• Training specific themes
• Total number of people trained since beginning
• Indirect contribution to positive outcomes (e.g. behavioural changes noticed after training)
• Input / output metrics (e.g. number of training programmes available)

2. CASE STUDY: PRIMARY SCHOOL EDUCATIONAL PROGRAMME

2.1. DESCRIPTION
• School programme aiming at educating kids about plastic and its reuse, reduction or recycling potential, while increasing awareness about plastic pollution and SDGs (esp. 12 and 14)
• Training sessions completed by events, books, DIY boxes and e-learnings
• Also, cleaning sessions organized with kids picking up plastic litter (e.g. on the beach), which is then collected (hence diverted from nature) by partnering companies

2.2. APPLYING RECOMMENDED METHOD
• Certified: in a best-case scenario, the KPI should be certified by an independent company providing an official audit of the number (and categories) of people who completed training / education programmes provided by the organisation – renewed every year / reporting period by the same auditor to ensure consistency over time
• Measured: in case no audit is possible (e.g. for operational or financial reasons), it is recommended to use direct measurements at individual level, registering in a centralised database every person who completed training / education programmes provided by the organisation
• Estimated: in case no audit is possible and no direct measurement can be performed, it is still possible to develop a proxy calculation method, e.g. as suggested hereunder, provided the average number of students per school was established based on a sampling:

![Diagram]

People completing education / training

Core

Individuals trained = # of schools × Average # of students per school

The complete calculation of the KPI could also be a combination of these various approaches (e.g. some schools with actual attendees listings, and some to be estimated), with two key principles:
• Perform as detailed calculations as possible
• Report the assumptions, sources and methodologies used for such calculations

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

- The IRIS taxonomy (2021, v5.2) provides specific wage-related metrics, with a “Minimum wage multiple” metric (OI6176) that is fully aligned with the “Entry-level wage vs. local minimum wage” KPI selected for the Ocean Impact Navigator. This metric can be represented as follows:

- “Average non-salaried wage” corresponds to IRIS metric (OI8791):
  - The word “salaried” could be perceived in different manners depending on countries and work legislations. What matters in this case is not the term per se, but the logic behind it: non-salaried workers are defined by IRIS as those workers who “are paid on a variable basis (e.g., hourly, daily, other specified time cycle, or other specified parameter). Non-salaried employees' earnings are contingent on the amount of time worked or specific tasks completed.”
  - For the calculation of this metric, should be considered all full-time, part-time and temporary non-salaried employees of the organisation

- “Local minimum wage” corresponds, as per IRIS glossary, to “the lowest wage permitted by law or by a special agreement (such as with a labour union). [...] A minimum wage differs from a living wage, which also takes into account external factors such as the local cost of living and number of dependents”

1.2. QUALITATIVE REPORTING

- Where quantitative reporting is not possible, users can still report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI. Additional supporting data points and evidence should then be provided in the comments to substantiate this claim

1.3. COMMENTS AND SUPPORTING EVIDENCE

- All users are encouraged to provide comments and supporting evidence
- To complement quantitative reporting, it is expected to display and explain the entry-level vs. local minimum wage ratio by Gender
- To complement quantitative reporting, it is recommended – if relevant – to display and explain the entry-level vs. local minimum wage ratio by:
  - Full-time vs. Part-time vs. Temporary employees’ contracts (for entry-level jobs)
  - Region / Area (esp. people who reside in low-income areas)
  - Community (esp. people from minorities or previously excluded groups)
To complement either quantitative or qualitative reporting, users may wish to describe and explain the points listed here above, as well as e.g.
- Indirect positive outcomes (e.g. improvement in local employees living standards)
- Input / output metrics (e.g. specific onboarding programs)

2. CASE STUDY:

2.1. DESCRIPTION

The “Entry-level wage vs. local minimum wage” KPI is applicable in all cases, as living standards are a matter of interest be they higher or not vs. local standard conditions. For this reason, virtually any start-up could be a case study for measuring this KPI, with a methodology that would not differ from one start-up to another.

2.2. APPLYING RECOMMENDED METHOD

- Regarding employment matters, the three levels of accuracy used for most of the KPIs of the Ocean Impact Navigator (i.e. certification, measurement and estimation) do not apply: HR management is based on regulations, hence wage measurement has to be based on actual employment contracts.
- Furthermore, IRIS provides specific guidance as per how organisations should use and report local minimum wage:
  - “Organisations can use a variety of timeframes to calculate the average non-salaried wage (e.g., hourly, weekly, daily, other specific time cycle) and should use the same time period for comparing wages to the local minimum. For example, if the minimum wage in a given area is based on an hourly rate, the average wage should also be hourly”
  - “Organisations should footnote the source of the local minimum wage used to calculate this ratio”
  - “Organisations are encouraged to narrow this calculation to specific geographies, industries, departments, positions, etc. and should provide footnotes detailing how the calculation was made”

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES
Particulate matter mitigation (qualitative reporting)

1. METHOD

1.1. QUANTITATIVE REPORTING: CALCULATION SCHEME AND GUIDELINES

• There is no unique quantitative metric associated with this indicator. This indicator should therefore be reported on qualitatively.

1.2. QUALITATIVE REPORTING

Reporting on particulate matter (PM) mitigation raises several challenges:

• PM covers a broad range of (hundreds of) very different chemical elements (e.g. from unburned nanoparticles of carbon to tiny drops of sulphuric acid)
• PM can result from human activities (e.g. fuel combustion) or from natural events (e.g. wildfires releasing large quantities of smoke containing PM2.5, hydrocarbons and NOx)
• Some PM are the consequence of climate change (e.g. wildfires, again) whereas some are actually contributing to climate change (e.g. black carbon deposits on ice and snow increase melting)
• PM can have either warming or cooling effects (impacting climate change), depending on the particles, and numerous PM have adverse effects on human health... although it is still discussed e.g. if it is the amount vs. the type of PM that is to blame
• Similarly to microplastics, there are primary PM (emitted into the atmosphere as PM already), and secondary PM (resulting from the decomposition of some larger materials combined with chemical reactions)
• Also, because the main areas impacted by PM – i.e. air quality, human health and climate change – are large-scale (if not global) systems, quantifying the impact of every single PM mitigation initiative would be a task far too complicated if considered at a start-up level
• For these reasons, the “Particulate matter mitigation” KPI is integrated to the Ocean Impact Navigator as a qualitative KPI, while encouraging the communication of specific data points, as explained hereunder
• As quantitative reporting is not possible, users are invited to report qualitatively on this indicator, by indicating that the solution creates positive impact for the present KPI, provided that the following conditions are met:
  o The targeted PM is clearly identified
  o The PM is recognised as a pollutant, or at least as a potential pollutant, by the scientific community
  o The reduction, the avoidance or the removal of the PM provides proven benefits to the ocean, marine ecosystems, biodiversity, climate change and / or climate-related hazards mitigation

1.3. COMMENTS AND SUPPORTING EVIDENCE

• All users are encouraged to provide comments and supporting evidence, regarding e.g.
  o The type of PM that is targeted, and in how far it is supposed to be present in the atmosphere
  o If it has proven, or debated, consequences on air quality; human health; climate change
  o If it is the subject of a specific regulation
  o The mitigation type of the product / service: reduction? avoidance? removal?
  o If the product / service is certified / eco-labelled
  o Tests / Scientific measurements performed (and expected outcomes based on these data points)
o Indirect contribution to positive outcomes (e.g. enabling technologies, such as green chemicals)
  o Input / output metrics (e.g. number of devices deployed, mitigation potential per device)

2. CASE STUDY

n.a.

3. MEASUREMENT METHODS AND OTHER USEFUL REFERENCES

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