Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework

Adopted in May 2020

Noting that the current Strategic Plan for Biodiversity 2011-2020 and its associated Aichi Biodiversity Targets[1], adopted by Parties to the Convention on Biological Diversity, and endorsed by the UN General Assembly[2] will come to an end in 2020.

Noting also Decision 14/34 of the Convention on Biological Diversity, setting out the process for the development of a post-2020 Global Biodiversity Framework, to be considered by Parties at the 15th meeting of the Conference of Parties; and welcoming the opportunities that have been provided to contribute to this process and the progress made to date, in particular the inclusion of some important and necessary coral reef indicators.

Recognising that coral reef ecosystems are found in more than 100 countries and whilst they cover only 0.2% of the seafloor, they support at least 25% of marine species and underpin the safety, wellbeing, food and economic security of hundreds of millions of people[3].

Recognising the unique vulnerability of coral reefs to anthropogenic impacts, including global threats from climate change and ocean acidification, as well as local impacts including from land-based pollution such as input of nutrients and sediments from agriculture, sea-based pollution, overfishing and destructive fishing practices and other activities[4].

Acknowledging, that retaining the integrity and resilience of coral reef ecosystems is a critical part of the solution for achieving the Sustainable Development Goals under the 2030 Agenda for Sustainable Development[5].

Noting with concern that Parties to the Convention on Biological Diversity (CBD) have not achieved Aichi Target 10[6], which sought, by 2015 to maintain the "integrity and functioning" of coral reefs.
Recalling that the 2019 International Panel on Biodiversity and Ecosystem Services (IPBES) global biodiversity assessment reported that live coral cover has declined by almost 50% since 1870 and that this decline is accelerating[7] and that coral reefs are at risk of ecosystem collapse by 2050[8][9][10], highlight an intesified need for urgent action to address this decline.

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[1] CBD Decision X/2 https://www.cbd.int/decision/cop/?id=12268

[2] A/RES/65/161 on the CBD https://www.cbd.int/undb/goals/undb-unresolution.pdf

[3] Coral Reef Life Declaration https://www.icriforum.org/sites/default/files/CORAL%20REEF%20LIFE%20Declaration.pdf

[4] UNGA Res. 66/288 "The future we want"
https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=Ehttps://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

[5] UNGA Res. 66/288 "The future we want"
https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=Ehttps://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

[6] CBD/SBSTTA/22/INF/10 https://www.cbd.int/doc/c/6db8/2029/d3de020ab5b7b039e9d665dd/sbstta-22-inf-10-en.pdf

[7] IPBES Summary for policy makers, 2019.
https://www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf

[8] IPCC 2018 -

Addendum: ICRI Recommended coral reef indicators

This document forms a part of the ICRI Recommendation "Inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework".

- The indicators recommended are those that are already suitable for use at the global scale.
- In addition, selected, prioritised indicators in development are recommended. It is acknowledged that this is not an exhaustive list of available indicators and should be kept under review.
- Reference to Goals and Targets relates to the structure presented in the Zero Draft of the Global Biodiversity Framework[1] published 13 January 2020.

Note on Baselines/ Reference years

- ICRI proposes to use 2020 as the reference year for measuring changes in area and integrity of coral reefs.
- It is important to note that using a 2020 baseline reference year represents an already altered state, where 50% of reefs have already been lost (IPBES, 2019). However, it will provide the strongest baseline for measuring changes and promoting the 2050 goals of increase in area and integrity closer to less altered states. Whatever date is chosen, there will be the issue of a shifting baseline. This must be acknowledged in how the results are reported.

Indicator	Relevant to Goal/ Target	Rationale for ICRI recommendation	Readiness	Currently included in Preliminary Draft Monitoring Framework?	Baseline/ Reference year
Live Coral Cover	Goal A Target 1	Critical: this is the most important coral reef indicator for use in national to global policy	Already in use at global scale	Included	The GCRMN report on the status of coral reefs will be published in 2020. This report will provide a global baseline for coral reef condition and give the most up-to-date assessment of quality and coverage of data compared to any earlier baseline date that might be selected.
Coral Reef	Goal A	This is a key metric for	Already in use at	Recommended	Sources of coral reef extent can be

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[1] CBD/WG2020/2/3

Extent		understanding the area and changing extent of coral reef ecosystems at national and higher levels	global scale	for inclusion	determined from a variety of existing data at regional and national scales. Initiatives are underway to develop a global extent layer.
Fleshy Algae Cover and Cover of key benthic groups	Goal A Target 1 Target 6	Fleshy algae are a dominant competitor to corals, indicating decline in coral reef health; algae- dominated reefs are the most likely alternative state for corals. Data on other key benthic groups is collected simultaneously with coral and algae cover, but with more variable methods (e.g. bare substrate, crustose coralline algae, cyanobacteria, other invertebrates, rubble, sand, seagrass, soft coral). Greater standardization of these will enable a more comprehensive assessment of reef health and status.	Already in use. Global analyses possible in the near future with additional standardization of methods and capacity development for use of this indicator in monitoring protocols.	Recommended for inclusion	The GCRMN Status report 2020.
Fish Abundance and Biomass	Goal A Target 1	Critical for understanding reef productivity, functioning of food webs, potential fisheries yields.	In use within many countries and multiple geographies. Efforts are underway to further standardize and collect data for global analyses.	Recommended for inclusion and further development	At present, data on fish biomass is being collected and reported on by many different agencies and organizations, at varied levels. There are persistent challenges in aggregating these for a global assessment. This is an important indicator and work needs to be accelerated to overcome current challenges.
[Percentage/	Target 2	Recommended as a measure of	Already in use	Recommended for inclusion	Determined from the World Database on Protected Areas.

area] of coral reefs included in [effectively managed] MPAs and OECMs		representativity of coral reefs as a key ecosystems.			
Index of coastal eutrophication	Target 4	Recommended to ensure that information on key pollution pressures on reefs and changes in pressure levels are measured. The ICEP methodology is based on the collection of water samples from rivers as they reach a coastline. Further studies would be needed to determine whether the ICEP could be used for coral reef nations or territories without major rivers.	Already in use (SDG indicator 14.1.1) but would need some adaptation for use in coral reef areas with no rivers. This could be possible by 2021	Included, and ICRI supports this as a useful coral reef related indicator	The ICEP is a new methodology that is not yet being used globally, and so there is no current baseline. In the interim, for SDG Target 14.1, chlorophyll-a concentration (surface waters) is to be used as a proxy indicator for eutrophication. This is already used as an indicator for eutrophication in some regions and is measured using remote sensing. Further work would be needed to determine whether this would be useful in the case of coral reefs.

Future indicators for priority development

These indicators are identified as important to be able to provide information on integrity and function of coral reef ecosystems and are currently at various stages of development with timelines within the next 5 years.

Red list of ecosystems (coral reef ecosystems): *Relevant to Goal A and Target 1*

The Red List of Ecosystems is a derived indicator that incorporates information from multiple metrics. The intention is that it provides a standardized assessment of how close an ecosystem is to collapse/disappearance. It incorporates elements of area and integrity, thus closely matching the wording for Goal A. This indicator has been applied at the regional scale and will be available for use at the global scale in 2-4 years. ICRI recommends the inclusion of this indicator for further development.

Hard coral genera richness: *Relevant to Goal A and Target 1*

This is an important indicator to use in the future for coral reef ecosystem integrity as it helps to improve understanding of coral community change and function. Methods are widely available, and data are already being collected. Global analyses will be possible in the near future once some additional standardization has been undertaken and capacity improved for data collection and analysis.

Hard coral identification to genus level is collected by professional scientists, NGOs and government agencies. Efforts are underway to make use of standardized data platforms and to ensure that these data can be made available for use in regional and global assessment processes. Additional capacity development and underwater training would help national parties measure this indicator.

Structural complexity of coral reefs: *Relevant to Goal A, Target 1, Target 6*

This indicates carbonate architecture and complexity available for recruit settlement and survival of juvenile corals and reef fish, and provides important information on the expected function of the system. It also provides important insights for Goal A. Methods are widely available and data are already being collected by existing monitoring efforts. Global analyses will be possible in the near future with some additional standardization and capacity development.

Baseline: Methods and data are sufficiently standardized for larger scale and regional analyses (see Graham and Nash 2013, Darling et al. 2017).

CATAMI Classification Scheme: *Relevant to Goal A, Target 1*

Collaborative and Annotation Tools for Analysis of Marine Imagery and video is a standard classification scheme for scoring marine biota and physical characteristics from underwater imagery. This provides a standardised approach for the transformation of underwater raw imagery to quantitative information useful for science and policy decisions.

The tool can provide a pathway to generate information at increasingly greater levels of detail over time to understand benthic habitats (from morphology to taxonomy) over time, whilst remaining comparable between sites. Currently used in Australia, but has potential to

be rolled out on a global scale. Reference: Althaus et al., 2015
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141039. The application of this classification system can also facilitate the standardization of coral reef map derived from remote sensing application allowing multi-sites and time-series comparison analysis.

Carbonate budgets: *Relevant to Goal A, Target 1, Target 6*

The indicator is used as a proxy for understanding the function of coral reefs and the impacts of climate change by determining if the reef is accreting, eroding or static. This is an example of an ambitious indicator that would be important to have on-line within 10 years.

Welcoming the commitment of G7 Environment Ministers to *"continue strengthening the conservation/protection of coral reefs…",[11]* and to promote and contribute to the work and the development of *"a new coral reef target as part of the post-2020 global biodiversity framework"[12]*.

Recalling the International Coral Reef Initiative (ICRI) decision at its 34th ICRI General Meeting that there is an urgent and continued need for action to address coral reef issues in the post-2020 Global Biodiversity Framework.

Recalling also the on going efforts to address threats to coral reefs including by ICRI and its Global Coral Reef Monitoring Network (GCRMN), Regional Seas Conventions and Action Plans, other relevant coral reef related regional initiatives and National Task Forces.

Noting that the Post-2020 Global Biodiversity Framework and any associated monitoring frameworks provide an important opportunity to deliver focused, strategic action to safeguard coral reef ecosystems from further decline and drive progress towards a future of living in harmony with nature.

The International Coral Reef Initiative:

1. Calls upon its members and other relevant stakeholders to ensure, in accordance with the Recommendations made in Annex 1:

    a. The explicit and prominent recognition of coral reef ecosystems within the text of the Global Biodiversity Framework, as unique, critically threatened ecosystems[13] that make: a disproportionate contribution to ecological, social and economic systems; and that intact, resilient coral reef ecosystems are an important part of the solutions to adapt to climate change and achieve the 2030 Agenda for Sustainable Development.
    b. The retention of language concerning the integrity and resilience of ecosystems within the text of the relevant goals and targets, to ensure the continued provision of coral reef ecosystem services.
    c. A balance between simplicity in expression of goals and targets to enable their effective communication, whilst also being SMART, urging immediate and focused actions for particularly vulnerable and important ecosystems such as coral reefs, through relevant language or biome (or ecosystem) specific sub-targets.
    d. The explicit inclusion of relevant coral reef indicators within any monitoring framework, to ensure detection of change in these critical ecosystems that will contribute to measuring progress against the targets and goals of the Global Biodiversity Framework. ICRI believes that if the goals and targets remain generalized, a monitoring framework will be a critical aspect to enable

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https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/

[9]IPCC, 2019 https://www.ipcc.ch/srocc/

[10] GEO6 https://www.unenvironment.org/resources/global-environment-outlook-6

[11] G7 Environment Ministers' Meeting Communique
https://www.elysee.fr/admin/upload/default/0001/04/7d84becef82b656c246fa1b26519567ce3755600.pdf

[12] G7 Environment Ministers' Meeting – Concrete Initiatives Outcome Document
https://www.elysee.fr/admin/upload/default/0001/04/3151e3f3f9440bbfc5496dbd57f0f0f5864c8051.pdf

[13] IPCC 2018 - https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-b y-governments/ and IPCC 2019 https://www.ipcc.ch/srocc/

specificity of the post-2020 Global Biodiversity Framework. It is essential that existing and potential indicators within ecosystem-specific monitoring frameworks are developed in a way that will allow measurement of target achievement for a number of key ecosystems at local, national and global scales. Coral reefs are flagship ecosystems with an established global monitoring framework, the ICRI Global Coral Reef Monitoring Network that could serve as an implementation model for other ecosystems under the Global Biodiversity Framework.

2.   Encourages Members who are also Parties to the Convention on Biological Diversity to reflect these recommendations (including Annex 1) when developing national negotiating positions in advance of the 15thmeeting to the Conference of the Parties of the Convention on Biological Diversity.

Annex 1: Detailed Recommendations relating to the inclusion of coral reef elements in the Global Biodiversity Framework and related monitoring frameworks

The actions set out in the operative paragraphs of this Recommendation can be ensured through the inclusion of the following specific recommendations in the further development of the Global Biodiversity Framework and its monitoring frameworks as set out below.

Note 1: The language of the Goals and Action Targets shown in bold italics is as presented in the Zero Draft of the Global Biodiversity Framework[14] published 13 January 2020. Noting that the wording may differ significantly in subsequent drafts, the recommendations made here may need to be reflected differently to retain their message and relevance.

Note 2: Additional details on indicators listed in this document are provided as an addendum "ICRI Recommended coral reef indicators".

A: Recommendations relating to the Goals

Several of the high-level Goals articulated in the zero draft of the Global Biodiversity Framework are relevant to coral reefs. ICRI believes Goal A (§10a) is particularly relevant for the outcomes desired for interventions and strategies relating to coral reefs and associated ecosystems.

> ***Goal A: "No net loss by 2030 in the area and integrity of freshwater, marine and terrestrial ecosystems, and increases of at least [20%] by 2050, ensuring ecosystem resilience"***

ICRI recommends the retention of this ecosystem conservation goal as a critical component within the Global Biodiversity Framework. ICRI stresses the importance of keeping this distinct from any long-term goals on conservation of species. Ecosystems are a critical component of biodiversity that any global framework must address and are particularly important at the intersection of the mandate of the CBD and the mandates of other frameworks related to climate and/or sustainable development. The key to the conservation of coral reefs on a global scale is to focus on ecosystem integrity, which is part of with, but goes beyond area-based and species-focused actions.

ICRI recommends that a 2050 timeline is appropriate for the stabilization/recovery of coral reefs (ambitious, yet potentially achievable). However, action is needed *immediately* as an urgent priority in order to achieve such a 2050 goal.

ICRI commends the inclusion of the references to "integrity" and "resilience" in the text of the ecosystem goal; these concepts are critical for coral reefs to ensure focus on the function of the ecosystem and the delivery of vital ecosystem services over time for both biodiversity and sustainable development;

ICRI recommends Parties to consider ways to enshrine the importance of particularly vulnerable ecosystems (such as coral reefs and associated ecosystems) in the Global Biodiversity Framework including by:
- Explicitly including a reference to critical, vulnerable and/or threatened ecosystems in the language of the goal itself; and

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[14] CBD/WG2020/2/3

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- Identifying, or developing an inventory of, specific vulnerable and/or threatened ecosystems at the highest possible level in the implementation and monitoring frameworks and ensuring that there are accompanying indicators; and
- Including a reference to critical, vulnerable and/or threatened ecosystems in the guidance from CoP15 to the financial mechanism (the Global Environment Facility).

Elements for monitoring frameworks relating to Goal A:

ICRI supports the use of "elements" (current terminology) in the draft preliminary monitoring framework to help prioritize the most vulnerable or threatened ecosystems.

ICRI recommends that the inclusion of ecosystem-specific indicators is *critical* to ensure that ecosystems, and in particular those identified as vulnerable or threatened (including coral reefs), do not get overlooked during implementation.

ICRI acknowledges and welcomes that several indicators for coral reef ecosystems that are already widely use (e.g. live coral cover) have been included in the draft preliminary monitoring framework.

ICRI notes that data currently collected at regional and global scales are not sufficient to measure all aspects of coral reef integrity, function and health. ICRI believes it is necessary to collectively identify those indicators that a) have clear links to the goal or target, b) have a basis in peer-reviewed literature, c) are feasible to use at local, national and international scales, and d) can be operationalized within a few years to be part of the monitoring frameworks.

ICRI recommends Parties to adopt additional indicators for the integrity and function of coral reef ecosystems, as described below (for information on readiness and baselines see the Addendum: "ICRI Recommended Coral Reef Indicators"):

- **Live coral cover**: Critical: this is the most basic indicator of coral dominance and to date the most widespread and important coral reef indicator used in national to global policy.
- **Coral Reef Extent**: This is a key metric for understanding the area and changing extent of coral reef ecosystems at national, regional and global levels.
- **Fleshy Algae Cover and Cover of key benthic groups**: Fleshy algae are a dominant competitor to corals, their increase and dominance relative to corals indicating decline in coral reef health; algae-dominated reefs are the most likely alternative state for coral reefs. It will be possible to include other key benthic groups using the same data sources
- **Fish Abundance and Biomass**: Critical for understanding reef productivity, functioning of food webs and fisheries yield.

In addition, ICRI advises the development of the following additional indicators to be prioritized as they provide insights into function and integrity. More information on these indicators is presented in the Addendum: "ICRI Recommended Coral Reef Indicators":
- **Red list of ecosystems (coral reef ecosystems)**
- **Structural complexity of coral reefs**
- **CATAMI Classification Scheme**
- **Carbonate budgets**

B: Recommendations relating to Action Targets

ICRI has identified Action Targets 1, 2, 4, 5, 6, 7, 8 and 11 (as presented in §12a and§12b of the zero draft) as having the most relevance to coral reefs. Specific recommendations relating to the target language and associated monitoring elements are included for Target 1, 2, 4 and 6 as follows.

> *Action Target 1:* *"Retain and restore freshwater, marine and terrestrial ecosystems, increasing by at least [50%] the land and sea area under comprehensive spatial planning addressing land/sea use change, achieving by 2030 a net increase in area, connectivity and integrity and retaining existing intact areas and wilderness".*

ICRI welcomes the inclusion of a target for conservation at ecosystem scale, including through interventions highlighted in this target.

ICRI commends the inclusion of the concepts of integrity and intactness in the text of the target as these are important to ensure the continued provision of ecosystem services from coral reef ecosystems.

ICRI strongly recommends that special attention should be paid to critical and vulnerable ecosystems within the supporting or explanatory text of Target 1 including, in particular, those areas or sites that are uniquely important for biodiversity and those that currently have high ecological integrity or intactness.

ICRI notes the important role that restoration must play but urges that any reference to restoration should be appropriate and achievable within the given timeframe for all ecosystems and perverse incentives for inappropriate restoration, that causes more harm than good, should be avoided.

Elements for monitoring frameworks relating to Target 1:
The inclusion of ecosystem specific indicators will be critical to ensure appropriate implementation. ICRI recommends the following indicators to be relevant for Target 1, (more information in the Addendum: "ICRI Recommended Coral Reef Indicators"):

- **Live coral cover**
- **Fleshy algae cover and cover of other key benthic groups**
- **Fish abundance and biomass**

In addition to these indicators, ICRI advises that it will be necessary to continue development of additional indicators to give further insights into function and integrity including the following:

- **Red list of ecosystems (coral reef ecosystems)**
- **Hard coral genera richness**
- **Structural complexity of coral reefs**
- **CATAMI Classification Scheme**
- **Carbonate budgets**

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Action Target 2: "*Protect sites of particular importance for biodiversity through protected areas and other effective area-based conservation measures, by 2030 covering at least [60%] of such sites and at least [30%] of land and sea areas with at least [10%] under strict protection.*"

ICRI agrees that area-based conservation measures, including protected areas and other effective area-based conservation measures (OECMs) are some of the key management actions to support the protection and recovery of coral reefs.

ICRI supports the view of many Parties at the second meeting of the Open-Ended Working Group that it is critical that this target be revised to include some of the qualitative language, particularly concerning management effectiveness and equity, as expressed in Aichi Target 11 and including the improvement of local ecological knowledge in the community for strengthening adaptive community-based management.

Elements for monitoring frameworks relating to Target 2:
ICRI recommends the inclusion of the following coral reef ecosystem indicator:

- **[Percentage/ area] of coral reefs included in [effectively managed] MPAs and OECMs:** This is an important and feasible metric that would provide information on the coverage and representativity of coral reefs within protected areas and OECMS. Whilst important, the inclusion of this indicator is not sufficient to provide information on the resilience or integrity of the coral reef ecosystems and indicators recommended under Target 1 are necessary to provide this. Further information about the indicator and associated baseline are provided in the addendum: "ICRI Recommended Coral Reef Indicators".

Action Target 4: "*Reduce by 2030, pollution from excess nutrients, biocides, plastic waste and other sources by at least [50%]*".

ICRI notes that pollution of many kinds, from both marine and terrestrial sources, is a significant threat to coral reefs. In particular, nutrient pollution from land-based sources is of high concern for many inshore coral reefs.

Elements for monitoring frameworks relating to Target 4:

- **ICRI supports** the inclusion of **the Index of Coastal Eutrophication (ICEP)** as an indicator for Target 4, with the expectation that it might be possible to use it for eutrophication levels on coral reefs in locations with rivers from 2021;

- **ICRI recommends** that the ICEP is further explored and developed to determine whether it could be applied to locations without major rivers, such as some of Small Island Developing States (SIDs) and atoll nations or territories; if feasible, this indicator could be phased in during the GBF decade.

Additional information including regarding baselines is included in the indicator addendum.

Action Target 6: "*Contribute to climate change mitigation and adaptation and disaster risk reduction through nature-based solutions providing by 2030 [about 30%] [at least XXX MT CO2=]*

of the mitigation effort needed to achieve the goals of the Paris Agreement, complementing stringent emission reductions, and avoiding negative impacts on biodiversity and food security".

ICRI notes that coral reefs have been identified as one of 5 key ocean-based ecosystems that can provide climate change adaptation (by creating coastal barriers to waves and storms)[15]. Ensuring the health and functioning of coral reefs is an important nature-based solution for coastal protection and disaster risk reduction including for small islands. Loss of coral reefs could increase risk to life and property for hundreds of millions of people (IPBES, 2019).

Elements for monitoring frameworks relating to Target 6:

ICRI commends the inclusion of the indicator "*Number of people with reduced vulnerability due to NBS (e.g. coastal protection from mangroves, coral reefs)*" under Action Target 6 in the preliminary draft monitoring framework, however notes that this indicator could be difficult to measure. In addition;

ICRI recommends the indicators listed below and also noted for Goal A and Target 1 are prioritised for development to be able to contribute to a monitoring framework and enable the provision of critical information on integrity and resilience of coral reefs at the ecosystem scale. Further information about the indicator and associated baseline are provided in the addendum.

- **Cover of key benthic groups**
- **Structural complexity of coral reefs**
- **Carbonate budgets**

C. Comment on Implementation mechanisms, capacity and mobilization of resources relating to coral reef elements

Resource mobilisation

Enhanced efforts will be needed to ensure that resource mobilisation and financing mechanisms will benefit coral reefs, including efforts relating to the implementation of monitoring; improved governance mechanisms; implementation of resilience-based management; and undertaking of management interventions with a view to achieving the goals, mission and vision of the Global Biodiversity Framework as they relate to coral reefs.

Capacity

ICRI notes that there are existing mechanisms relating to coral reef actions that should be mobilized to support the implementation of the Global Biodiversity Framework, including through streamlining and coordination to maximize the effectiveness of limited resources. Also, to build on the processes and capacities already in place, for example monitoring and assessment processes for the generation of important coral reef related indicators within any monitoring framework.

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[15] Hoegh-Guldberg et al., (2019). The ocean as a solution to climate change http://dev-oceanpanel.pantheonsite.io/sites/default/files/2019-09/19_HLP_Report_Ocean_Solution_Climate_Change_final.pdf

ICRI facilitates extensive work on coral reef monitoring through its role overseeing the Global Coral Reef Monitoring Network (GCRMN)[16], encouraging indicator uptake, developing and promoting best practice and strengthening local and global monitoring capacity and should be a key stakeholder in the implementation of any relevant monitoring frameworks. The GCRMN reports underpin analyses of data that help measure progress towards global targets relating to coral reefs under the Convention for Biological Diversity, Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES) and other fora and is therefore an important stakeholder in this future implementation as regards coral reef ecosystems towards 2030 Action Targets.

Innovation

ICRI recommends CBD Parties to ensure that the Global Biodiversity Framework is enabled to take up any outcomes emerging from the rapid progress being made to harness new and emerging technologies including:

- Developments that will make stepwise and possibly dramatic improvements to coral reef monitoring and facilitate improved policy decisions and management actions within the coming decade[17]. Examples include the increased use of robotics and Artificial Intelligence, high-resolution imagery (e.g. the Allen Coral Atlas; underwater robots developed by the Australian Institute of Marine Science).
- Developments in sequencing technologies and increasing the knowledge of the importance of genetic diversity to maintain healthy coral reefs.

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[16] gcrmn.net

[17] Obura DO, Aeby G, Amornthammarong N, Appeltans W, Bax N, et al. (2019) Coral Reef Monitoring, Reef Assessment Technologies, and Ecosystem-Based Management. Front. Mar. Sci. 6:580. doi: 10.3389/fmars.2019.00580

Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework

Addendum: ICRI Recommended coral reef indicators

adopted in May 2020

This document forms a part of the ICRI Recommendation "Inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework".

- The indicators recommended are those that are already suitable for use at the global scale.
- In addition, selected, prioritised indicators in development are recommended. It is acknowledged that this is not an exhaustive list of available indicators and should be kept under review.
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Note on Baselines/ Reference years

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- It is important to note that using a 2020 baseline reference year represents an already altered state, where 50% of reefs have already been lost (IPBES, 2019). However, it will provide the strongest baseline for measuring changes and promoting the 2050 goals of increase in area and integrity closer to less altered states. Whatever date is chosen, there will be the issue of a shifting baseline. This must be acknowledged in how the results are reported.

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[18] CBD/WG2020/2/3

Indicator	Relevant to Goal/ Target	Rationale for ICRI recommendation	Readiness	Currently included in Preliminary Draft Monitoring Framework?	Baseline/ Reference year
Live Coral Cover	Goal A Target 1	Critical: this is the most important coral reef indicator for use in national to global policy	Already in use at global scale	Included	The GCRMN report on the status of coral reefs will be published in 2020. This report will provide a global baseline for coral reef condition and give the most up-to-date assessment of quality and coverage of data compared to any earlier baseline date that might be selected.
Coral Reef Extent	Goal A	This is a key metric for understanding the area and changing extent of coral reef ecosystems at national and higher levels	Already in use at global scale	Recommended for inclusion	Sources of coral reef extent can be determined from a variety of existing data at regional and national scales. Initiatives are underway to develop a global extent layer.
Fleshy Algae Cover and Cover of key benthic groups	Goal A Target 1 Target 6	Fleshy algae are a dominant competitor to corals, indicating decline in coral reef health; algae- dominated reefs are the most likely alternative state for corals. Data on other key benthic groups is collected simultaneously with coral and algae cover, but with more variable methods (e.g. bare substrate, crustose coralline algae, cyanobacteria, other invertebrates, rubble, sand, seagrass, soft coral). Greater standardization of these will enable a more comprehensive assessment of reef health and	Already in use. Global analyses possible in the near future with additional standardization of methods and capacity development for use of this indicator in monitoring protocols.	Recommended for inclusion	The GCRMN Status report 2020.

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		status.		
Fish Abundance and Biomass	Goal A Target 1	Critical for understanding reef productivity, functioning of food webs, potential fisheries yields.	In use within many countries and multiple geographies. Efforts are underway to further standardize and collect data for global analyses.	Recommended for inclusion and further development	At present, data on fish biomass is being collected and reported on by many different agencies and organizations, at varied levels. There are persistent challenges in aggregating these for a global assessment. This is an important indicator and work needs to be accelerated to overcome current challenges.
[Percentage/ area] of coral reefs included in [effectively managed] MPAs and OECMs	Target 2	Recommended as a measure of representativity of coral reefs as a key ecosystems.	Already in use	Recommended for inclusion	Determined from the <u>World Database on Protected Areas</u>.
Index of coastal eutrophication	Target 4	Recommended to ensure that information on key pollution pressures on reefs and changes in pressure levels are measured. The ICEP methodology is based on the collection of water samples from rivers as they reach a coastline. Further studies would be needed to determine whether the ICEP could be used for coral reef nations or territories without major rivers.	Already in use (SDG indicator 14.1.1) but would need some adaptation for use in coral reef areas with no rivers. This could be possible by 2021	Included, and ICRI supports this as a useful coral reef related indicator	The ICEP is a new methodology that is not yet being used globally, and so there is no current baseline. In the interim, for SDG Target 14.1, chlorophyll-a concentration (surface waters) is to be used as a proxy indicator for eutrophication. This is already used as an indicator for eutrophication in some regions and is measured using remote sensing. Further work would be needed to determine whether this would be useful in the case of coral reefs.

Future indicators for priority development

These indicators are identified as important to be able to provide information on integrity and function of coral reef ecosystems and are currently at various stages of development with timelines within the next 5 years.

Red list of ecosystems (coral reef ecosystems): *Relevant to Goal A and Target 1*

The Red List of Ecosystems is a derived indicator that incorporates information from multiple metrics. The intention is that it provides a standardized assessment of how close an ecosystem is to collapse/disappearance. It incorporates elements of area and integrity, thus closely matching the wording for Goal A. This indicator has been applied at the regional scale and will be available for use at the global scale in 2-4 years. ICRI recommends the inclusion of this indicator for further development.

Hard coral genera richness: *Relevant to Goal A and Target 1*

This is an important indicator to use in the future for coral reef ecosystem integrity as it helps to improve understanding of coral community change and function. Methods are widely available, and data are already being collected. Global analyses will be possible in the near future once some additional standardization has been undertaken and capacity improved for data collection and analysis.
Hard coral identification to genus level is collected by professional scientists, NGOs and government agencies. Efforts are underway to make use of standardized data platforms and to ensure that these data can be made available for use in regional and global assessment processes. Additional capacity development and underwater training would help national parties measure this indicator.

Structural complexity of coral reefs: *Relevant to Goal A, Target 1, Target 6*

This indicates carbonate architecture and complexity available for recruit settlement and survival of juvenile corals and reef fish, and provides important information on the expected function of the system. It also provides important insights for Goal A. Methods are widely available and data are already being collected by existing monitoring efforts. Global analyses will be possible in the near future with some additional standardization and capacity development.
Baseline: Methods and data are sufficiently standardized for larger scale and regional analyses (see Graham and Nash 2013, Darling et al. 2017).

CATAMI Classification Scheme: *Relevant to Goal A, Target 1*

Collaborative and Annotation Tools for Analysis of Marine Imagery and video is a standard classification scheme for scoring marine biota and physical characteristics from underwater imagery. This provides a standardised approach for the transformation of underwater raw imagery to quantitative information useful for science and policy decisions.

The tool can provide a pathway to generate information at increasingly greater levels of detail over time to understand benthic habitats (from morphology to taxonomy) over time, whilst remaining comparable between sites. Currently used in Australia, but has potential to be rolled out on a global scale. Reference: Althaus et al., 2015 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141039. The application of this classification system can also facilitate the standardization of coral reef map derived from remote sensing application allowing multi-sites and time-series comparison analysis.

Carbonate budgets: *Relevant to Goal A, Target 1, Target 6*

The indicator is used as a proxy for understanding the function of coral reefs and the impacts of climate change by determining if the reef is accreting, eroding or static. This is an example of an ambitious indicator that would be important to have on-line within 10 years.

Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework

Adopted in May 2020

Noting that the current Strategic Plan for Biodiversity 2011-2020 and its associated Aichi Biodiversity Targets[1], adopted by Parties to the Convention on Biological Diversity, and endorsed by the UN General Assembly[2] will come to an end in 2020.

Noting also Decision 14/34 of the Convention on Biological Diversity, setting out the process for the development of a post-2020 Global Biodiversity Framework, to be considered by Parties at the 15th meeting of the Conference of Parties; and welcoming the opportunities that have been provided to contribute to this process and the progress made to date, in particular the inclusion of some important and necessary coral reef indicators.

Recognising that coral reef ecosystems are found in more than 100 countries and whilst they cover only 0.2% of the seafloor, they support at least 25% of marine species and underpin the safety, wellbeing, food and economic security of hundreds of millions of people[3].

Recognising the unique vulnerability of coral reefs to anthropogenic impacts, including global threats from climate change and ocean acidification, as well as local impacts including from land-based pollution such as input of nutrients and sediments from agriculture, sea-based pollution, overfishing and destructive fishing practices and other activities[4].

Acknowledging, that retaining the integrity and resilience of coral reef ecosystems is a critical part of the solution for achieving the Sustainable Development Goals under the 2030 Agenda for Sustainable Development[5].

Noting with concern that Parties to the Convention on Biological Diversity (CBD) have not achieved Aichi Target 10[6], which sought, by 2015 to maintain the "integrity and functioning" of coral reefs.
Recalling that the 2019 International Panel on Biodiversity and Ecosystem Services (IPBES) global biodiversity assessment reported that live coral cover has declined by almost 50% since 1870 and that this decline is accelerating[7] and that coral reefs are at risk of ecosystem collapse by 2050[8] [9] [10], highlight an intesified need for urgent action to address this decline.

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[1] CBD Decision X/2 https://www.cbd.int/decision/cop/?id=12268

[2] A/RES/65/161 on the CBD https://www.cbd.int/undb/goals/undb-unresolution.pdf

[3] Coral Reef Life Declaration https://www.icriforum.org/sites/default/files/CORAL%20REEF%20LIFE%20Declaration.pdf

[4] UNGA Res. 66/288 "The future we want"
https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=Ehttps://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

[5] UNGA Res. 66/288 "The future we want"
https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=Ehttps://www.un.org/ga/search/view_doc.asp?symbol=A/RES/66/288&Lang=E

[6] CBD/SBSTTA/22/INF/10 https://www.cbd.int/doc/c/6db8/2029/d3de020ab5b7b039e9d665dd/sbstta-22-inf-10-en.pdf

[7] IPBES Summary for policy makers, 2019.
https://www.ipbes.net/sites/default/files/downloads/spm_unedited_advance_for_posting_htn.pdf

[8] IPCC 2018 -

Welcoming the commitment of G7 Environment Ministers to *"continue strengthening the conservation/protection of coral reefs…",[11]* and to promote and contribute to the work and the development of *"a new coral reef target as part of the post-2020 global biodiversity framework"[12]*.

Recalling the International Coral Reef Initiative (ICRI) decision at its 34th ICRI General Meeting that there is an urgent and continued need for action to address coral reef issues in the post-2020 Global Biodiversity Framework.

Recalling also the on going efforts to address threats to coral reefs including by ICRI and its Global Coral Reef Monitoring Network (GCRMN), Regional Seas Conventions and Action Plans, other relevant coral reef related regional initiatives and National Task Forces.

Noting that the Post-2020 Global Biodiversity Framework and any associated monitoring frameworks provide an important opportunity to deliver focused, strategic action to safeguard coral reef ecosystems from further decline and drive progress towards a future of living in harmony with nature.

The International Coral Reef Initiative:

1. Calls upon its members and other relevant stakeholders to ensure, in accordance with the Recommendations made in Annex 1:

    a. The explicit and prominent recognition of coral reef ecosystems within the text of the Global Biodiversity Framework, as unique, critically threatened ecosystems[13] that make: a disproportionate contribution to ecological, social and economic systems; and that intact, resilient coral reef ecosystems are an important part of the solutions to adapt to climate change and achieve the 2030 Agenda for Sustainable Development.
    b. The retention of language concerning the integrity and resilience of ecosystems within the text of the relevant goals and targets, to ensure the continued provision of coral reef ecosystem services.
    c. A balance between simplicity in expression of goals and targets to enable their effective communication, whilst also being SMART, urging immediate and focused actions for particularly vulnerable and important ecosystems such as coral reefs, through relevant language or biome (or ecosystem) specific sub-targets.
    d. The explicit inclusion of relevant coral reef indicators within any monitoring framework, to ensure detection of change in these critical ecosystems that will contribute to measuring progress against the targets and goals of the Global Biodiversity Framework. ICRI believes that if the goals and targets remain generalized, a monitoring framework will be a critical aspect to enable

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https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/

[9]IPCC, 2019 https://www.ipcc.ch/srocc/

[10] GEO6 https://www.unenvironment.org/resources/global-environment-outlook-6

[11] G7 Environment Ministers' Meeting Communique
https://www.elysee.fr/admin/upload/default/0001/04/7d84becef82b656c246fa1b26519567ce3755600.pdf

[12] G7 Environment Ministers' Meeting – Concrete Initiatives Outcome Document
https://www.elysee.fr/admin/upload/default/0001/04/3151e3f3f9440bbfc5496dbd57f0f0f5864c8051.pdf

[13] IPCC 2018 - https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-b y-governments/ and IPCC 2019 https://www.ipcc.ch/srocc/

specificity of the post-2020 Global Biodiversity Framework. It is essential that existing and potential indicators within ecosystem-specific monitoring frameworks are developed in a way that will allow measurement of target achievement for a number of key ecosystems at local, national and global scales. Coral reefs are flagship ecosystems with an established global monitoring framework, the ICRI Global Coral Reef Monitoring Network that could serve as an implementation model for other ecosystems under the Global Biodiversity Framework.

2. Encourages Members who are also Parties to the Convention on Biological Diversity to reflect these recommendations (including Annex 1) when developing national negotiating positions in advance of the 15th meeting to the Conference of the Parties of the Convention on Biological Diversity.

Annex 1: Detailed Recommendations relating to the inclusion of coral reef elements in the Global Biodiversity Framework and related monitoring frameworks

The actions set out in the operative paragraphs of this Recommendation can be ensured through the inclusion of the following specific recommendations in the further development of the Global Biodiversity Framework and its monitoring frameworks as set out below.

Note 1: The language of the Goals and Action Targets shown in bold italics is as presented in the Zero Draft of the Global Biodiversity Framework[14] published 13 January 2020. Noting that the wording may differ significantly in subsequent drafts, the recommendations made here may need to be reflected differently to retain their message and relevance.

Note 2: Additional details on indicators listed in this document are provided as an addendum "ICRI Recommended coral reef indicators".

A: Recommendations relating to the Goals

Several of the high-level Goals articulated in the zero draft of the Global Biodiversity Framework are relevant to coral reefs. ICRI believes Goal A (§10a) is particularly relevant for the outcomes desired for interventions and strategies relating to coral reefs and associated ecosystems.

> _**Goal A**: "No net loss by 2030 in the area and integrity of freshwater, marine and terrestrial ecosystems, and increases of at least [20%] by 2050, ensuring ecosystem resilience"_

ICRI recommends the retention of this ecosystem conservation goal as a critical component within the Global Biodiversity Framework. ICRI stresses the importance of keeping this distinct from any long-term goals on conservation of species. Ecosystems are a critical component of biodiversity that any global framework must address and are particularly important at the intersection of the mandate of the CBD and the mandates of other frameworks related to climate and/or sustainable development. The key to the conservation of coral reefs on a global scale is to focus on ecosystem integrity, which is part of with, but goes beyond area-based and species-focused actions.

ICRI recommends that a 2050 timeline is appropriate for the stabilization/recovery of coral reefs (ambitious, yet potentially achievable). However, action is needed *immediately* as an urgent priority in order to achieve such a 2050 goal.

ICRI commends the inclusion of the references to "integrity" and "resilience" in the text of the ecosystem goal; these concepts are critical for coral reefs to ensure focus on the function of the ecosystem and the delivery of vital ecosystem services over time for both biodiversity and sustainable development;

ICRI recommends Parties to consider ways to enshrine the importance of particularly vulnerable ecosystems (such as coral reefs and associated ecosystems) in the Global Biodiversity Framework including by:
- Explicitly including a reference to critical, vulnerable and/or threatened ecosystems in the language of the goal itself; and

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[14] CBD/WG2020/2/3

- Identifying, or developing an inventory of, specific vulnerable and/or threatened ecosystems at the highest possible level in the implementation and monitoring frameworks and ensuring that there are accompanying indicators; and
- Including a reference to critical, vulnerable and/or threatened ecosystems in the guidance from CoP15 to the financial mechanism (the Global Environment Facility).

Elements for monitoring frameworks relating to Goal A:

ICRI supports the use of "elements" (current terminology) in the draft preliminary monitoring framework to help prioritize the most vulnerable or threatened ecosystems.

ICRI recommends that the inclusion of ecosystem-specific indicators is *critical* to ensure that ecosystems, and in particular those identified as vulnerable or threatened (including coral reefs), do not get overlooked during implementation.

ICRI acknowledges and welcomes that several indicators for coral reef ecosystems that are already widely use (e.g. live coral cover) have been included in the draft preliminary monitoring framework.

ICRI notes that data currently collected at regional and global scales are not sufficient to measure all aspects of coral reef integrity, function and health. ICRI believes it is necessary to collectively identify those indicators that a) have clear links to the goal or target, b) have a basis in peer-reviewed literature, c) are feasible to use at local, national and international scales, and d) can be operationalized within a few years to be part of the monitoring frameworks.

ICRI recommends Parties to adopt additional indicators for the integrity and function of coral reef ecosystems, as described below (for information on readiness and baselines see the Addendum: "ICRI Recommended Coral Reef Indicators"):

- **Live coral cover**: Critical: this is the most basic indicator of coral dominance and to date the most widespread and important coral reef indicator used in national to global policy.
- **Coral Reef Extent**: This is a key metric for understanding the area and changing extent of coral reef ecosystems at national, regional and global levels.
- **Fleshy Algae Cover and Cover of key benthic groups**: Fleshy algae are a dominant competitor to corals, their increase and dominance relative to corals indicating decline in coral reef health; algae-dominated reefs are the most likely alternative state for coral reefs. It will be possible to include other key benthic groups using the same data sources
- **Fish Abundance and Biomass**: Critical for understanding reef productivity, functioning of food webs and fisheries yield.

In addition, ICRI advises the development of the following additional indicators to be prioritized as they provide insights into function and integrity. More information on these indicators is presented in the Addendum: "ICRI Recommended Coral Reef Indicators":
- **Red list of ecosystems (coral reef ecosystems)**
- **Structural complexity of coral reefs**
- **CATAMI Classification Scheme**
- **Carbonate budgets**

B: Recommendations relating to Action Targets

ICRI has identified Action Targets 1, 2, 4, 5, 6, 7, 8 and 11 (as presented in §12a and§12b of the zero draft) as having the most relevance to coral reefs. Specific recommendations relating to the target language and associated monitoring elements are included for Target 1, 2, 4 and 6 as follows.

> *Action Target 1: "Retain and restore freshwater, marine and terrestrial ecosystems, increasing by at least [50%] the land and sea area under comprehensive spatial planning addressing land/sea use change, achieving by 2030 a net increase in area, connectivity and integrity and retaining existing intact areas and wilderness".*

ICRI welcomes the inclusion of a target for conservation at ecosystem scale, including through interventions highlighted in this target.

ICRI commends the inclusion of the concepts of integrity and intactness in the text of the target as these are important to ensure the continued provision of ecosystem services from coral reef ecosystems.

ICRI strongly recommends that special attention should be paid to critical and vulnerable ecosystems within the supporting or explanatory text of Target 1 including, in particular, those areas or sites that are uniquely important for biodiversity and those that currently have high ecological integrity or intactness.

ICRI notes the important role that restoration must play but urges that any reference to restoration should be appropriate and achievable within the given timeframe for all ecosystems and perverse incentives for inappropriate restoration, that causes more harm than good, should be avoided.

Elements for monitoring frameworks relating to Target 1:
The inclusion of ecosystem specific indicators will be critical to ensure appropriate implementation. ICRI recommends the following indicators to be relevant for Target 1, (more information in the Addendum: "ICRI Recommended Coral Reef Indicators"):

- **Live coral cover**
- **Fleshy algae cover and cover of other key benthic groups**
- **Fish abundance and biomass**

In addition to these indicators, ICRI advises that it will be necessary to continue development of additional indicators to give further insights into function and integrity including the following:

- **Red list of ecosystems (coral reef ecosystems)**
- **Hard coral genera richness**
- **Structural complexity of coral reefs**
- **CATAMI Classification Scheme**
- **Carbonate budgets**

<u>Action Target 2:</u> "Protect sites of particular importance for biodiversity through protected areas and other effective area-based conservation measures, by 2030 covering at least [60%] of such sites and at least [30%] of land and sea areas with at least [10%] under strict protection."

ICRI agrees that area-based conservation measures, including protected areas and other effective area-based conservation measures (OECMs) are some of the key management actions to support the protection and recovery of coral reefs.

ICRI supports the view of many Parties at the second meeting of the Open-Ended Working Group that it is critical that this target be revised to include some of the qualitative language, particularly concerning management effectiveness and equity, as expressed in Aichi Target 11 and including the improvement of local ecological knowledge in the community for strengthening adaptive community-based management.

Elements for monitoring frameworks relating to Target 2:
ICRI recommends the inclusion of the following coral reef ecosystem indicator:

- **[Percentage/ area] of coral reefs included in [effectively managed] MPAs and OECMs:** This is an important and feasible metric that would provide information on the coverage and representativity of coral reefs within protected areas and OECMS. Whilst important, the inclusion of this indicator is not sufficient to provide information on the resilience or integrity of the coral reef ecosystems and indicators recommended under Target 1 are necessary to provide this. Further information about the indicator and associated baseline are provided in the addendum: "ICRI Recommended Coral Reef Indicators".

<u>Action Target 4:</u> "Reduce by 2030, pollution from excess nutrients, biocides, plastic waste and other sources by at least [50%]".

ICRI notes that pollution of many kinds, from both marine and terrestrial sources, is a significant threat to coral reefs. In particular, nutrient pollution from land-based sources is of high concern for many inshore coral reefs.

Elements for monitoring frameworks relating to Target 4:

- **ICRI supports** the inclusion of **the Index of Coastal Eutrophication (ICEP)** as an indicator for Target 4, with the expectation that it might be possible to use it for eutrophication levels on coral reefs in locations with rivers from 2021;

- **ICRI recommends** that the ICEP is further explored and developed to determine whether it could be applied to locations without major rivers, such as some of Small Island Developing States (SIDs) and atoll nations or territories; if feasible, this indicator could be phased in during the GBF decade.

Additional information including regarding baselines is included in the indicator addendum.

<u>Action Target 6:</u> "Contribute to climate change mitigation and adaptation and disaster risk reduction through nature-based solutions providing by 2030 [about 30%] [at least XXX MT CO2=]

of the mitigation effort needed to achieve the goals of the Paris Agreement, complementing stringent emission reductions, and avoiding negative impacts on biodiversity and food security".

ICRI notes that coral reefs have been identified as one of 5 key ocean-based ecosystems that can provide climate change adaptation (by creating coastal barriers to waves and storms)[15]. Ensuring the health and functioning of coral reefs is an important nature-based solution for coastal protection and disaster risk reduction including for small islands. Loss of coral reefs could increase risk to life and property for hundreds of millions of people (IPBES, 2019).

Elements for monitoring frameworks relating to Target 6:

ICRI commends the inclusion of the indicator "*Number of people with reduced vulnerability due to NBS (e.g. coastal protection from mangroves, coral reefs)*" under Action Target 6 in the preliminary draft monitoring framework, however notes that this indicator could be difficult to measure. In addition;

ICRI recommends the indicators listed below and also noted for Goal A and Target 1 are prioritised for development to be able to contribute to a monitoring framework and enable the provision of critical information on integrity and resilience of coral reefs at the ecosystem scale. Further information about the indicator and associated baseline are provided in the addendum.

- **Cover of key benthic groups**
- **Structural complexity of coral reefs**
- **Carbonate budgets**

C. Comment on Implementation mechanisms, capacity and mobilization of resources relating to coral reef elements

Resource mobilisation

Enhanced efforts will be needed to ensure that resource mobilisation and financing mechanisms will benefit coral reefs, including efforts relating to the implementation of monitoring; improved governance mechanisms; implementation of resilience-based management; and undertaking of management interventions with a view to achieving the goals, mission and vision of the Global Biodiversity Framework as they relate to coral reefs.

Capacity

ICRI notes that there are existing mechanisms relating to coral reef actions that should be mobilized to support the implementation of the Global Biodiversity Framework, including through streamlining and coordination to maximize the effectiveness of limited resources. Also, to build on the processes and capacities already in place, for example monitoring and assessment processes for the generation of important coral reef related indicators within any monitoring framework.

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[15] Hoegh-Guldberg et al., (2019). The ocean as a solution to climate change http://dev-oceanpanel.pantheonsite.io/sites/default/files/2019-09/19_HLP_Report_Ocean_Solution_Climate_Change_final.pdf

ICRI facilitates extensive work on coral reef monitoring through its role overseeing the Global Coral Reef Monitoring Network (GCRMN)[16], encouraging indicator uptake, developing and promoting best practice and strengthening local and global monitoring capacity and should be a key stakeholder in the implementation of any relevant monitoring frameworks. The GCRMN reports underpin analyses of data that help measure progress towards global targets relating to coral reefs under the Convention for Biological Diversity, Intergovernmental Panel for Biodiversity and Ecosystem Services (IPBES) and other fora and is therefore an important stakeholder in this future implementation as regards coral reef ecosystems towards 2030 Action Targets.

Innovation

ICRI recommends CBD Parties to ensure that the Global Biodiversity Framework is enabled to take up any outcomes emerging from the rapid progress being made to harness new and emerging technologies including:

- Developments that will make stepwise and possibly dramatic improvements to coral reef monitoring and facilitate improved policy decisions and management actions within the coming decade[17]. Examples include the increased use of robotics and Artificial Intelligence, high-resolution imagery (e.g. the Allen Coral Atlas; underwater robots developed by the Australian Institute of Marine Science).
- Developments in sequencing technologies and increasing the knowledge of the importance of genetic diversity to maintain healthy coral reefs.

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[16] gcrmn.net

[17] Obura DO, Aeby G, Amornthammarong N, Appeltans W, Bax N, et al. (2019) Coral Reef Monitoring, Reef Assessment Technologies, and Ecosystem-Based Management. Front. Mar. Sci. 6:580. doi: 10.3389/fmars.2019.00580

Addendum to the ICRI Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework

Adopted at the 36th ICRI General Meeting (online), December 2021

Recognising the International Coral Reef Initiative (ICRI) decision at its 34th ICRI General Meeting that there is an urgent and continued need for action to address coral reef issues in the post-2020 Global Biodiversity Framework;

Noting that the Post-2020 Global Biodiversity Framework and its associated monitoring framework provide an important opportunity to deliver focused, strategic action to safeguard coral reef ecosystems from further decline and drive progress towards a future of living in harmony with nature;

Recalling the decision by ICRI in May 2020 to adopt the Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework and noting that this addendum forms a part of this Recommendation;

Welcoming the progress of the ICRI ad hoc Committee to engage with and contribute to the CBD Process in line with Decision 14/34 of the Convention on Biological Diversity;

Noting that the First Draft of the Global Biodiversity Framework includes a new target the focuses on restoration this addendum provides additional recommendations relevant to this particular issue;

Recalling the 2019 ICRI Resolution to update the 2005 ICRI resolution on artificial coral reef restoration and rehabilitation;

Noting the results of the 6th Status of the Coral Reefs of the World report (GCRMN, 2021), demonstrated a continuing decline of the state of coral reefs, combined with projections for continued impacts from climate change, restoration will comprise an important management option for the persistence of coral reefs;

The International Coral Reef Initiative: Calls upon its members and other relevant stakeholders to take into account the information provided as Appendix 1 to ensure:

1. The language of target 1 of the GBF calls for the retention and safeguarding of vulnerable ecosystems and the language of target 2 sets ambitions that drive restoration actions that are appropriate for coral reef ecosystems;
2. The adoption of an appropriate indicator within the monitoring framework of the Global Biodiversity Framework to ensure accountability and measurability in delivering progress against this target for coral reef ecosystems;

Appendix 1: Detailed recommendations with regards to Target 2 of the Global Biodiversity Framework

ICRI notes the need for an integrative approach to the management of interconnected ecosystems and recognises the beneficial impacts of co-locating ecosystem restoration efforts.

Explanatory note: The restoration of other ecosystems (associated ecosystems or those located from ridge to reef) has been demonstrated to have benefits for coral reefs (e.g. restoring forests

Recommendation on the inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework

Addendum: ICRI Recommended coral reef indicators

adopted in May 2020

This document forms a part of the ICRI Recommendation "Inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework".

- The indicators recommended are those that are already suitable for use at the global scale.
- In addition, selected, prioritised indicators in development are recommended. It is acknowledged that this is not an exhaustive list of available indicators and should be kept under review.
- Reference to Goals and Targets relates to the structure presented in the Zero Draft of the Global Biodiversity Framework[18] published 13 January 2020.

Note on Baselines/ Reference years

- ICRI proposes to use 2020 as the reference year for measuring changes in area and integrity of coral reefs.
- It is important to note that using a 2020 baseline reference year represents an already altered state, where 50% of reefs have already been lost (IPBES, 2019). However, it will provide the strongest baseline for measuring changes and promoting the 2050 goals of increase in area and integrity closer to less altered states. Whatever date is chosen, there will be the issue of a shifting baseline. This must be acknowledged in how the results are reported.

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[18] CBD/WG2020/2/3

Indicator	Relevant to Goal/ Target	Rationale for ICRI recommendation	Readiness	Currently included in Preliminary Draft Monitoring Framework?	Baseline/ Reference year
Live Coral Cover	Goal A Target 1	Critical: this is the most important coral reef indicator for use in national to global policy	Already in use at global scale	Included	The GCRMN report on the status of coral reefs will be published in 2020. This report will provide a global baseline for coral reef condition and give the most up-to-date assessment of quality and coverage of data compared to any earlier baseline date that might be selected.
Coral Reef Extent	Goal A	This is a key metric for understanding the area and changing extent of coral reef ecosystems at national and higher levels	Already in use at global scale	Recommended for inclusion	Sources of coral reef extent can be determined from a variety of existing data at regional and national scales. Initiatives are underway to develop a global extent layer.
Fleshy Algae Cover and Cover of key benthic groups	Goal A Target 1 Target 6	Fleshy algae are a dominant competitor to corals, indicating decline in coral reef health; algae- dominated reefs are the most likely alternative state for corals. Data on other key benthic groups is collected simultaneously with coral and algae cover, but with more variable methods (e.g. bare substrate, crustose coralline algae, cyanobacteria, other invertebrates, rubble, sand, seagrass, soft coral). Greater standardization of these will enable a more comprehensive assessment of reef health and	Already in use. Global analyses possible in the near future with additional standardization of methods and capacity development for use of this indicator in monitoring protocols.	Recommended for inclusion	The GCRMN Status report 2020.

		status.		
Fish Abundance and Biomass	Goal A Target 1	Critical for understanding reef productivity, functioning of food webs, potential fisheries yields.	In use within many countries and multiple geographies. Efforts are underway to further standardize and collect data for global analyses.	Recommended for inclusion and further development	At present, data on fish biomass is being collected and reported on by many different agencies and organizations, at varied levels. There are persistent challenges in aggregating these for a global assessment. This is an important indicator and work needs to be accelerated to overcome current challenges.
[Percentage/ area] of coral reefs included in [effectively managed] MPAs and OECMs	Target 2	Recommended as a measure of representativity of coral reefs as a key ecosystems.	Already in use	Recommended for inclusion	Determined from the World Database on Protected Areas.
Index of coastal eutrophication	Target 4	Recommended to ensure that information on key pollution pressures on reefs and changes in pressure levels are measured. The ICEP methodology is based on the collection of water samples from rivers as they reach a coastline. Further studies would be needed to determine whether the ICEP could be used for coral reef nations or territories without major rivers.	Already in use (SDG indicator 14.1.1) but would need some adaptation for use in coral reef areas with no rivers. This could be possible by 2021	Included, and ICRI supports this as a useful coral reef related indicator	The ICEP is a new methodology that is not yet being used globally, and so there is no current baseline. In the interim, for SDG Target 14.1, chlorophyll-a concentration (surface waters) is to be used as a proxy indicator for eutrophication. This is already used as an indicator for eutrophication in some regions and is measured using remote sensing. Further work would be needed to determine whether this would be useful in the case of coral reefs.

Future indicators for priority development

These indicators are identified as important to be able to provide information on integrity and function of coral reef ecosystems and are currently at various stages of development with timelines within the next 5 years.

Red list of ecosystems (coral reef ecosystems): *Relevant to Goal A and Target 1*

> The Red List of Ecosystems is a derived indicator that incorporates information from multiple metrics. The intention is that it provides a standardized assessment of how close an ecosystem is to collapse/disappearance. It incorporates elements of area and integrity, thus closely matching the wording for Goal A. This indicator has been applied at the regional scale and will be available for use at the global scale in 2-4 years. ICRI recommends the inclusion of this indicator for further development.

Hard coral genera richness: *Relevant to Goal A and Target 1*

> This is an important indicator to use in the future for coral reef ecosystem integrity as it helps to improve understanding of coral community change and function. Methods are widely available, and data are already being collected. Global analyses will be possible in the near future once some additional standardization has been undertaken and capacity improved for data collection and analysis.
> Hard coral identification to genus level is collected by professional scientists, NGOs and government agencies. Efforts are underway to make use of standardized data platforms and to ensure that these data can be made available for use in regional and global assessment processes. Additional capacity development and underwater training would help national parties measure this indicator.

Structural complexity of coral reefs: *Relevant to Goal A, Target 1, Target 6*

> This indicates carbonate architecture and complexity available for recruit settlement and survival of juvenile corals and reef fish, and provides important information on the expected function of the system. It also provides important insights for Goal A. Methods are widely available and data are already being collected by existing monitoring efforts. Global analyses will be possible in the near future with some additional standardization and capacity development.
> Baseline: Methods and data are sufficiently standardized for larger scale and regional analyses (see Graham and Nash 2013, Darling et al. 2017).

CATAMI Classification Scheme: *Relevant to Goal A, Target 1*

Collaborative and Annotation Tools for Analysis of Marine Imagery and video is a standard classification scheme for scoring marine biota and physical characteristics from underwater imagery. This provides a standardised approach for the transformation of underwater raw imagery to quantitative information useful for science and policy decisions.

The tool can provide a pathway to generate information at increasingly greater levels of detail over time to understand benthic habitats (from morphology to taxonomy) over time, whilst remaining comparable between sites. Currently used in Australia, but has potential to be rolled out on a global scale. Reference: Althaus et al., 2015 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141039. The application of this classification system can also facilitate the standardization of coral reef map derived from remote sensing application allowing multi-sites and time-series comparison analysis.

Carbonate budgets: *Relevant to Goal A, Target 1, Target 6*

The indicator is used as a proxy for understanding the function of coral reefs and the impacts of climate change by determining if the reef is accreting, eroding or static. This is an example of an ambitious indicator that would be important to have on-line within 10 years.

Initiative Internationale pour les Récifs Coralliens
International Coral Reef Initiative

May 2020

Summary of the ICRI Recommendation for inclusion of coral reef ecosystems within the CBD Post-2020 Global Biodiversity Framework

Coral reef ecosystems are both critical and vulnerable, as highlighted through numerous recent landmark assessments such as the IPBES Global Biodiversity Assessment and the Special Reports of the International Panel on Climate Change (IPCC). For their small global coverage these ecosystems deliver disproportionate benefits to the global economy and food security. Coral reefs are an important part of the solution to achieve the 2030 Agenda for Sustainable Development. Now is the time to deliver focused, strategic action to safeguard coral reef ecosystems from further decline and drive progress towards a future of living in harmony with nature.

The International Coral Reef Initiative (ICRI), a global partnership organisation with almost 90 members, including over 40 countries, has adopted a Recommendation that strongly encourages Parties to the Convention on Biological Diversity (CBD) to prioritize coral reefs in the Post-2020 Global Biodiversity Framework.

In its Recommendation, ICRI:

1. Calls for prominent recognition of coral reef ecosystems within the text of the CBD Post-2020 Global Biodiversity Framework (GBF). ICRI agrees that the Global Biodiversity Framework should have goals and targets that focus on biodiversity at the ecosystem level. It is also important that the framework triggers actions that will enhance the integrity and resilience of these ecosystems, so they can continue to support human society into the future;

2. Emphasises appropriate timescales for the goals and targets. For example, 2050 would be an ambitious, yet potentially achievable timeline for the stabilisation and recovery of coral reef ecosystems, if immediate prioritization is achieved;

3. Encourages explicit inclusion of coral reef indicators within any monitoring framework. Even meaningful targets can fail to deliver if they are not accompanied by appropriate indicators. The Recommendation identifies a set of six coral related indicators for adoption and highlights a further five indicators for priority development, particularly helpful to provide improved information on ecosystem integrity, function, intactness, resilience. These are listed below.

Access to the ICRI Recommendation and supporting materials can be found here:
www.icriforum.org/post2020.
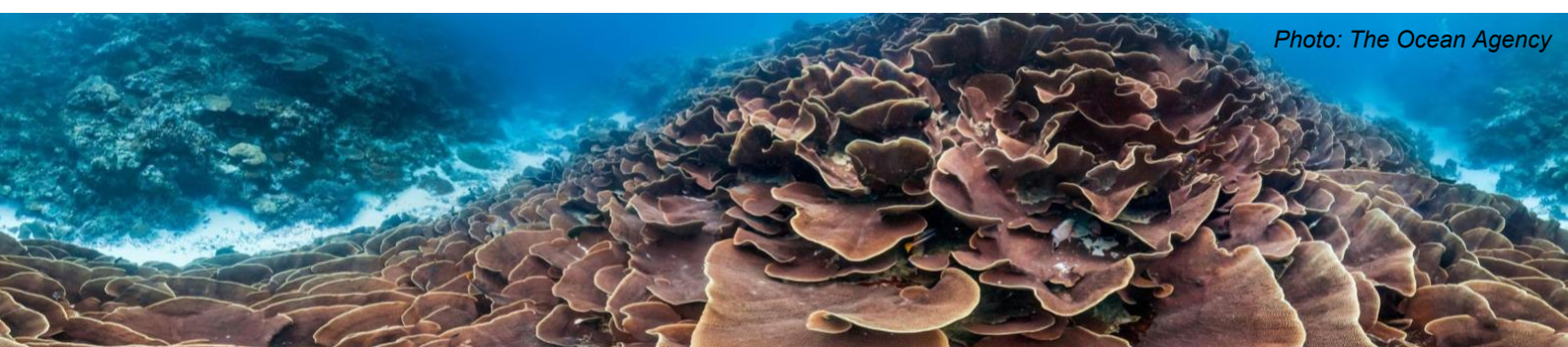
Contact: Francis Staub fstaub@icriforum.org

Photo: The Ocean Agency

Recommended indicators

(Note: reference to goals and targets relates to the structure of the Zero Draft of the GBF)

1	Live coral cover	*Relevant to Goal A and Target 1 - the most basic indicator of coral dominance and the most widely used indicator used in national to global policy*
2	Coral reef extent	*Relevant to Goal A - a key metric for changes in coral reef area*
3	Fleshy algae cover and cover of key benthic groups	*Relevant to Goal A and Target 1 and 6 - increases in fleshy algae indicate decline in coral reef health*
4	Fish abundance and biomass	*Relevant to Goal A and Target 1 - necessary to understand functioning and productivity of the reef*
5	[Percentage/ area] of coral reefs included in [effectively managed] Marine Protected Areas and Other Effective Conservation Measures	*Relevant Target 2 - gives information on the representativity of coral reefs included within area-based management*
6	Index of coastal eutrophication	*Relevant to Target 4 - nutrient pollution from land-based sources is of high concern for many inshore reefs*

Indicators for priority development

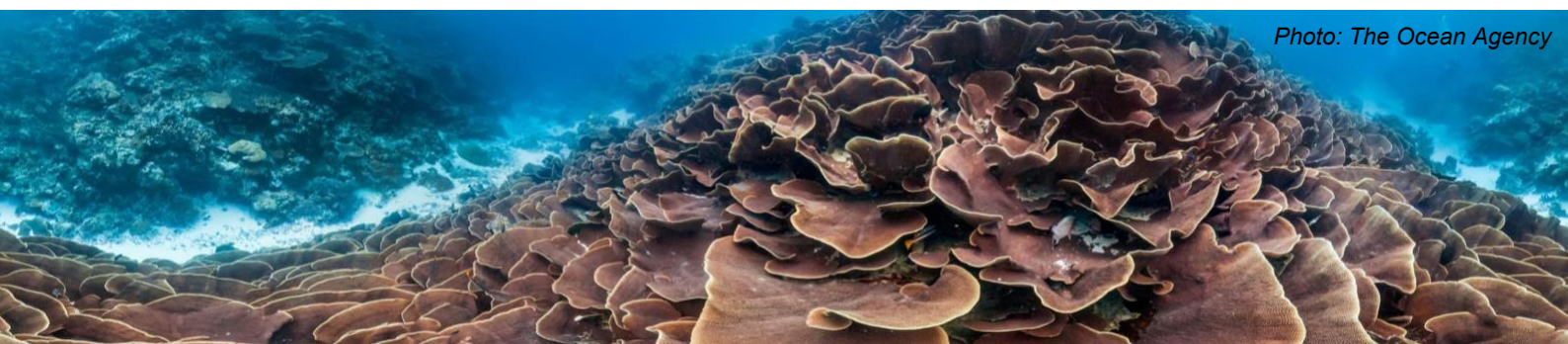| 7	Red list of ecosystems (coral reef ecosystems)	*Relevant to Goal A and Target 1 - how close an ecosystem is to collapse*
8	Hard coral genera richness	*Relevant to Goal A and Target 1 - helps understand coral community change and structure - relevant to integrity*
9	Structural complexity of coral reefs	*Relevant to Goal A and Target 1 and 6 - provides information on expected function of the system*
10	CATAMI Classification Scheme	*Relevant to Goal A and Target 1 - a standardised, progressive approach to understanding the benthic habitats*
11	Carbonate budgets	*Relevant to Goal A and Target 1 and 6 - a proxy for understanding function and impacts of climate change*

Photo: The Ocean Agency

Initiative Internationale pour les Récifs Coralliens
International Coral Reef Initiative

Addendum: ICRI Recommended coral reef indicators

This document forms a part of the ICRI Recommendation "Inclusion of coral reefs and related ecosystems within the CBD Post-2020 Global Biodiversity Framework".

- The indicators recommended are those that are already suitable for use at the global scale.
- In addition, selected, prioritised indicators in development are recommended. It is acknowledged that this is not an exhaustive list of available indicators and should be kept under review.
- Reference to Goals and Targets relates to the structure presented in the Zero Draft of the Global Biodiversity Framework[1] published 13 January 2020.

Note on Baselines/ Reference years

- ICRI proposes to use 2020 as the reference year for measuring changes in area and integrity of coral reefs.
- It is important to note that using a 2020 baseline reference year represents an already altered state, where 50% of reefs have already been lost (IPBES, 2019). However, it will provide the strongest baseline for measuring changes and promoting the 2050 goals of increase in area and integrity closer to less altered states. Whatever date is chosen, there will be the issue of a shifting baseline. This must be acknowledged in how the results are reported.

Indicator	Relevant to Goal/ Target	Rationale for ICRI recommendation	Readiness	Currently included in Preliminary Draft Monitoring Framework?	Baseline/ Reference year
Live Coral Cover	Goal A Target 1	Critical: this is the most important coral reef indicator for use in national to global policy	Already in use at global scale	Included	The GCRMN report on the status of coral reefs will be published in 2020. This report will provide a global baseline for coral reef condition and give the most up-to-date assessment of quality and coverage of data compared to any earlier baseline date that might be selected.
Coral Reef	Goal A	This is a key metric for	Already in use at	Recommended	Sources of coral reef extent can be

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[1] CBD/WG2020/2/3

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Extent		understanding the area and changing extent of coral reef ecosystems at national and higher levels	global scale	for inclusion	determined from a variety of existing data at regional and national scales. Initiatives are underway to develop a global extent layer.
Fleshy Algae Cover and Cover of key benthic groups	Goal A Target 1 Target 6	Fleshy algae are a dominant competitor to corals, indicating decline in coral reef health; algae- dominated reefs are the most likely alternative state for corals. Data on other key benthic groups is collected simultaneously with coral and algae cover, but with more variable methods (e.g. bare substrate, crustose coralline algae, cyanobacteria, other invertebrates, rubble, sand, seagrass, soft coral). Greater standardization of these will enable a more comprehensive assessment of reef health and status.	Already in use. Global analyses possible in the near future with additional standardization of methods and capacity development for use of this indicator in monitoring protocols.	Recommended for inclusion	The GCRMN Status report 2020.
Fish Abundance and Biomass	Goal A Target 1	Critical for understanding reef productivity, functioning of food webs, potential fisheries yields.	In use within many countries and multiple geographies. Efforts are underway to further standardize and collect data for global analyses.	Recommended for inclusion and further development	At present, data on fish biomass is being collected and reported on by many different agencies and organizations, at varied levels. There are persistent challenges in aggregating these for a global assessment. This is an important indicator and work needs to be accelerated to overcome current challenges.
[Percentage/	Target 2	Recommended as a measure of	Already in use	Recommended for inclusion	Determined from the World Database on Protected Areas.

area] of coral reefs included in [effectively managed] MPAs and OECMs		representativity of coral reefs as a key ecosystems.			
Index of coastal eutrophication	Target 4	Recommended to ensure that information on key pollution pressures on reefs and changes in pressure levels are measured. The ICEP methodology is based on the collection of water samples from rivers as they reach a coastline. Further studies would be needed to determine whether the ICEP could be used for coral reef nations or territories without major rivers.	Already in use (SDG indicator 14.1.1) but would need some adaptation for use in coral reef areas with no rivers. This could be possible by 2021	Included, and ICRI supports this as a useful coral reef related indicator	The ICEP is a new methodology that is not yet being used globally, and so there is no current baseline. In the interim, for SDG Target 14.1, chlorophyll-a concentration (surface waters) is to be used as a proxy indicator for eutrophication. This is already used as an indicator for eutrophication in some regions and is measured using remote sensing. Further work would be needed to determine whether this would be useful in the case of coral reefs.

Future indicators for priority development

These indicators are identified as important to be able to provide information on integrity and function of coral reef ecosystems and are currently at various stages of development with timelines within the next 5 years.

Red list of ecosystems (coral reef ecosystems): *Relevant to Goal A and Target 1*

The Red List of Ecosystems is a derived indicator that incorporates information from multiple metrics. The intention is that it provides a standardized assessment of how close an ecosystem is to collapse/disappearance. It incorporates elements of area and integrity, thus closely matching the wording for Goal A. This indicator has been applied at the regional scale and will be available for use at the global scale in 2-4 years. ICRI recommends the inclusion of this indicator for further development.

Hard coral genera richness: *Relevant to Goal A and Target 1*

This is an important indicator to use in the future for coral reef ecosystem integrity as it helps to improve understanding of coral community change and function. Methods are widely available, and data are already being collected. Global analyses will be possible in the near future once some additional standardization has been undertaken and capacity improved for data collection and analysis.

Hard coral identification to genus level is collected by professional scientists, NGOs and government agencies. Efforts are underway to make use of standardized data platforms and to ensure that these data can be made available for use in regional and global assessment processes. Additional capacity development and underwater training would help national parties measure this indicator.

Structural complexity of coral reefs: *Relevant to Goal A, Target 1, Target 6*

This indicates carbonate architecture and complexity available for recruit settlement and survival of juvenile corals and reef fish, and provides important information on the expected function of the system. It also provides important insights for Goal A. Methods are widely available and data are already being collected by existing monitoring efforts. Global analyses will be possible in the near future with some additional standardization and capacity development.

Baseline: Methods and data are sufficiently standardized for larger scale and regional analyses (see Graham and Nash 2013, Darling et al. 2017).

CATAMI Classification Scheme: *Relevant to Goal A, Target 1*

Collaborative and Annotation Tools for Analysis of Marine Imagery and video is a standard classification scheme for scoring marine biota and physical characteristics from underwater imagery. This provides a standardised approach for the transformation of underwater raw imagery to quantitative information useful for science and policy decisions.

The tool can provide a pathway to generate information at increasingly greater levels of detail over time to understand benthic habitats (from morphology to taxonomy) over time, whilst remaining comparable between sites. Currently used in Australia, but has potential to

be rolled out on a global scale. Reference: Althaus et al., 2015
https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0141039. The application of this classification system can also facilitate the standardization of coral reef map derived from remote sensing application allowing multi-sites and time-series comparison analysis.

Carbonate budgets: *Relevant to Goal A, Target 1, Target 6*

The indicator is used as a proxy for understanding the function of coral reefs and the impacts of climate change by determining if the reef is accreting, eroding or static. This is an example of an ambitious indicator that would be important to have on-line within 10 years.

in the watersheds co-located with coral reefs can reduce pressures from sedimentation; beneficial feedback loops regarding acidification in seagrass beds)[1]

ICRI welcomes a stand-alone target on restoration within the Global Biodiversity Framework, recalling that restoration, including passive methods of restoration such as the removal of pressures, will play an important role for coral reefs as a valid management option in areas when natural recovery is eroded, and that restoration can complement other actions to support reef resilience.

> *Explanatory note: This paragraph recalls the sentiments of text in the ICRI Resolution on Restoration (2019)* **"ICRI recognises** *that reef restoration is a valid management option in areas when natural recovery is eroded, and that restoration can complement other actions to support reef resilience". And the Recommendation on inclusion of coral reefs within the Post-2020 GBF (2020) "***ICRI notes** *the important role that restoration must play but urges that any reference to restoration should be appropriate and achievable within the given timeframe for all ecosystems and perverse incentives for inappropriate restoration, that causes more harm than good, should be avoided".*

ICRI acknowledges and welcomes the use of a numeric target within the restoration target.

> *Explanatory text: Recognising that there are technical challenges with restoration of coral reef ecosystems at scale, the expert consultation strongly supported the value of having a numeric element in any GBF target on restoration to ensure that progress can be measured and ensures sufficient ambition for all ecosystems. It is important to note that some ecosystems (such as coral reefs) may have particular vulnerabilities and long timelags for restoration success that may make achievement of a common numeric target difficult. This should not undermine continued and increased investment in restoration effort and innovation, to achieve longer term success beyond the timeframes of the GBF (ie. 2030 and 2050)."*

ICRI recommends that the language of the target comprises two elements and establishes ambition in (1) the desired action to be taken and (2) the outcome to be achieved;

> *Explanatory text: The expert consultation agreed that clearly articulating these two aspects of the target would help clarity in interpretation and the ability to define appropriate metrics.*

ICRI recommends that the target should pay attention to key ecosystems, such as coral reefs, by including reference to vulnerable ecosystems, or an appropriate alternative phrasing**.**

> *Explanatory Note: The current wording of the target focuses on "Priority ecosystems" there is no definition of this term in the glossary of terms developed with respect to the GBF - but there*

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[1] Andrés F. Suárez-Castro, Hawthorne L. Beyer, Caitlin D. Kuempel, Simon Linke, Pasquale Borrelli, Ove Hoegh-Guldberg. **Global forest restoration opportunities to foster coral reef conservation**. *Global Change Biology*, 2021; 27 (20): 5238 DOI: 10.1111/gcb.15811; Manzello DP, Enochs IC, Melo N, Gledhill DK, Johns EM (2012) Ocean Acidification Refugia of the Florida Reef Tract. PLoS ONE 7(7): e41715. https://doi.org/10.1371/journal.pone.0041715 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.004171; Camp EF, Suggett DJ, Gendron G, Jompa J, Manfrino C and Smith DJ (2016) Mangrove and Seagrass Beds Provide Different Biogeochemical Services for Corals Threatened by Climate Change. *Front. Mar. Sci.* 3:52. doi: 10.3389/fmars.2016.00052 https://www.frontiersin.org/articles/10.3389/fmars.2016.00052/full ; Lui et al. (2020) Influence of the seagrass Thalassia hemprichii on coral reef mesocosms exposed to ocean acidification and experimentally elevated temperatures https://static1.squarespace.com/static/580e3c475016e191c523a0e2/t/5dbf253452537379a67a2fc7/1572807991828/Liu+et+al.+2020+STOTEN.pdf

is reference in the indicator one pagers produced as information document CBD/WG2020/3/INF/3, although with a terrestrial focus: "Priority ecosystems – A recent study demonstrated that ecosystem restoration can be prioritised depending on factors such as biodiversity conservation and climate change mitigation (wetlands and forests) or minimizing costs (arid ecosystems and grasslands). Additional priorities may be converted areas within relatively intact tropical forests and shrublands in South America and Africa." There are some concerns that if there is a leaning to interpretation that focuses on climate mitigation this could exclude coral reefs. An alternative language to use could be "vulnerable ecosystems" - the term that was used in the language of Aichi Target 10, and in the current drafting of Target 1, component 1.2 but also not defined within the context of the GBF glossary. Another possibility is to use "priority AND vulnerable ecosystems". It is not proposed that ICRI recommend a preference in language but leave this to the deliberation of CBD Parties. The consensus of the expert participants was that language should be included, whether "vulnerable," "threatened," "priority" or some other term, that specifies that ecosystems should be prioritized based on their status, the term should be defined, and the definition should include coral reefs. One suggestion was to use the [IUCN Red List of Ecosystems](#) as a reference for assessing ecosystem risk levels and prioritisation.

ICRI Recommends that there is a clear link articulated between targets 1, 2 and 3 as well as how these contribute to the delivery of Goal A. ICRI reiterates that target 2 actions are implemented as an integrated part of a management approach that will reduce pressures and restore vulnerable ecosystems.

Explanatory note: For reference the current language of these targets in the 1st draft of the GBF are as follows:

Target 1. Ensure that all land and sea areas globally are under integrated biodiversity-inclusive spatial planning addressing land- and sea-use change, retaining existing intact and wilderness areas.

Target 2. Ensure that at least 20 per cent of degraded freshwater, marine and terrestrial ecosystems are under restoration, ensuring connectivity among them and focusing on priority ecosystems.

Target 3. Ensure that at least 30 per cent globally of land areas and of sea areas, especially areas of particular importance for biodiversity and its contributions to people, are conserved through effectively and equitably managed, ecologically representative and well-connected systems of protected areas and other effective area-based conservation measures and integrated into the wider landscapes and seascapes.

ICRI recommends the inclusion within the monitoring framework of an indicator to measure the integrity of the area under restoration. For coral reef ecosystems, this would be the "*Live Coral Cover in restored coral reef areas*". This proposed indicator is a composite indicator that combines information from the Live coral cover metric (already recommended by ICRI, an Essential Ocean Variable identified by the UNESCO Intergovernmental Oceanographic Commission's Global Ocean Observing System (GOOS) and widely implemented and included within the draft GBF monitoring framework), with the Restored Reef Areal Dimension (RRAD) indicator[2], which is recommended as a Universal Metric by the Coral Reef Consortium. This indicator provides an approximation of the overall reef area in which corals are planted and the area that restored corals have contributed to

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[2] **"Restored Reef Areal Dimension (RRAD)"** this is a quick approximation of the overall reef area in which corals are planted and the area that restored corals have spread over time. This metric is valuable as it provides guidance for reporting standardized project size and area of restored reef to gauge the overall impact and success of a restoration project. (See [Coral Reef Restoration Monitoring Guide](#))

increased live coral cover over time. This metric is valuable as it provides guidance for reporting standardized project size and area of restored reef to gauge the overall impact and success of a restoration project.

Indicator title	What does it measure? (in respect to ambitions of T2)	Are the Data and Metadata publicly available (if yes provide URL)	Has the method been peer reviewed? (provide link)	Is there a baseline?	Use at global and National scales?	Entity facilitating assessment/ reporting
Live coral cover in restored coral reef areas. Combining Live coral cover + Restored Reef Areal Dimension (RRAD)	Target 2: Component 2.1 Area of freshwater, marine and terrestrial ecosystems restored	Live coral cover: available on request CRC Coral Restoration Database (Appendix 3), and 2) An Evaluation Tool for Coral Restoration (modified from Lirman et al., 2017).	Coral Reef Restoration Monitoring Guide An Evaluation Tool for Coral Restoration (modified from Lirman et al., 2017).	Live Coral Cover baseline (GCRMN, 2021) Area under restoration - Could be constructed as of 2020; based on available data from the existing ICRI Coral Restoration database	Live coral cover used at multiple scales; RRAD is suitable for application at multiple scales	ICRI/ GCRMN/ CRC Potential tools: Allen Coral Atlas

Explanatory Note: this indicator provides valuable initial information on the action aspect of the target, but it is not sufficient to measure an outcome of improved ecological integrity or connectivity. Further guidance is available in the recent ICRI/UNEP publication "Coral Reef Restoration as a strategy to improve ecosystem services –A guide to coral restoration methods" and a minimum universal set of indicators for measuring progress of coral reef restoration efforts are presented in the Coral Reef Restoration Monitoring Guide.