



# Coral Reef Rescue Initiative

Overview of coral reef related initiatives and their measures of success and indicators of impact

October 2020

# Overview of coral reef related initiatives and their measures of success and indicators of impact

## Contents

1. Purpose and objectives of the report	3
2. Approach	4
2.1 Rationale for the approach	4
2.2 Assumptions and limitations	6
2.3 Strategy to select coral reef initiatives	7
3. Outcomes	7
3.1 Overview of relevant coral reef conservation initiatives	7
3.2 Overview of metrics used	10
3.3 Commonalities, differences, and gaps	10
3.4 Rationale and motivations for identifying and selecting metrics	13
4. Reflections	14
5. Key findings	17
6. Additional References	18
Annex 1: Review of coral initiatives relevant to CRRI countries	19
Annex 2: Mapping of other coral related initiatives (philanthropic, NGO, etc.)	37

*A report prepared by Emily Corcoran, independent consultant on behalf of WWF-Australia.*

*Contact: Carol Phua*

*Disclaimer: The contents in this report do not constitute a statement of policy, decision, or position on behalf of any of the identified countries or organizations.*

# 1. Purpose and objectives of the report

This report provides an overview of ongoing (and active) coral reef related initiatives and their measures of success and/or indicators used to measure their impact.

This is the first of three connected tasks that will contribute to development of a monitoring and evaluation strategy to support the implementation of the Coral Reef Rescue Initiative (CRRI). The initiative will implement a collaborative strategy that aims to improve the management and protection of selected seascapes while strengthening community resilience through diversified skills and livelihood opportunities to help build their economic capacity in the face of a rapidly changing climate.

One of the ambitions for the CRRI is to create an enabling policy environment for reef-resilient strategies at the local, national, regional, and global scale. Developing an appropriate and effective monitoring and evaluation strategy will be a critical component of the initiative to understand progress against its stated goals, but also to create accountability and relevance to national, regional, and global commitments, creating linkages through the policy hierarchy.

The terms of reference for this task were to produce an overview of ongoing (and active) coral reef related initiatives and their measures of success and/or indicators used to measure their impact:

1. Desk study to explore existing initiatives to understand the breadth of metrics that are in use by other initiatives (e.g. but not limited to ICRI, GCRMN, Mesoamerican reef report card, AGRRA, CRC restoration monitoring guidance, Vibrant Oceans); and where relevant, different conventions.
2. The overview should help identify commonalities, differences, gaps, and if possible, motivations for identifying and selecting measures.
3. The outcome will be used to inform the development of a core list of indicators for the CRRI.

The specific objectives of this task were to:

- Understand the breadth of metrics used to measure governance, ecological and social outcomes that are in use by other conservation initiatives.
- Identify commonalities, differences, gaps, and if possible, motivations for identifying and selecting these measures across initiatives.

The intention of this report is to contribute to the on-going work to develop a monitoring and evaluation strategy for the CRRI. Specifically, it is intended to inform the development of a list of potential core social, governance, ecological, and biophysical indicators for the initiative that will be undertaken as part of Task 2 of this consultancy.

The next section of the report provides an insight into the rationale for the approach taken, the assumptions made, and limitations of this approach. The outcomes of the task are reported in section 3 and supported with two additional annexes mapping relevant initiatives (see Annex 1: Initiatives relevant to national strategies; Annex 2: other relevant initiatives). Reflections on the process and lessons learned along the way are set out in section 4 with the intention that this can inform the subsequent tasks in this work stream and perhaps others. The final section provides a summary of the key findings.

## 2. Approach

### 2.1 Rationale for the approach

In order to develop a CRRRI monitoring and evaluation strategy that will contribute to enabling and informing a policy environment to support reef resilient strategies, it is necessary to understand the existing policy landscape. In this case, the policy priorities and commitments of the seven CRRRI countries: Cuba, Fiji, Solomon Islands, Indonesia, Philippines, Tanzania and Madagascar.

There is no one framework that provides a sufficient policy environment for addressing the range of ecological, social, economic, and governance aspects for establishing reef resilient strategies, but rather, this requires coherence across different policy frameworks, ranging from climate change, sustainable development, environment, management of land-based pollution, and the sustainable use of marine resources.

A useful and extensive analysis of the international coral reef policy landscape has recently been undertaken by UNEP (UNEP, 2019). This report highlighted the large number of commitments and policies relating to coral reefs that address the major threats faced by coral reefs. The majority of these policies, however, tend to be voluntary and without associated funding streams or capacity development, resulting in poor implementation and insufficient impact, evident in the continuing deterioration of the state of the world's coral reefs. This analysis and the follow up work that is expected to be considered by Member States at the 5th UN Environment Assembly in February 2021 is of relevance to the CRRRI from two perspectives:

1. From a high-level overview, it provides insight into the extent of the reporting commitments of the CRRRI countries and the opportunity for CRRRI to support these countries in being accountable to their commitments (where this aligns with CRRRI objectives);
2. It could also provide useful context when looking at the national scale policy framework and policy priorities around coral reefs and where there may be opportunities to improve synergies and coherence at that scale of implementation.

As part of the mechanism for implementation of the major policy frameworks (e.g. UNFCCC, CBD, Agenda 2030), countries have developed a range of national strategies and plans, policies, and associated processes such as:

- National adaptation plans
- National Climate Change Policies
- Climate vulnerability assessments
- Disaster Risk Reduction Policies
- National Biodiversity Strategies and Action Plans (and periodic National Reporting)
- National Development Plans

This task has used selected National Biodiversity Strategies and Action Plans (NBSAPs)—the national implementation vehicle of the Convention on Biological Diversity (CBD) as the entry point to help understand where and how coral reefs fit into national policy priorities. The CBD has the multiple objectives of the conservation, sustainable use, and equitable sharing of the genetic material from biodiversity. All seven of the CRR countries are Party to the convention and have published National Biodiversity Strategies and Action Plans, to set out how the convention will be implemented at a national scale as well as setting the priorities and targets for national level biodiversity policy. Since the adoption of Agenda 2030 and its associated Sustainable Development Goals (SDGs) in 2015, Parties to the CBD have been updating their NBSAPs to take a broader development perspective and incorporate the SDGs. In some cases links have also been made to national adaptation strategies and climate change policies.

A second step and to complement the initiatives that were identified through review of the NBSAPs, a review was undertaken to map out other relevant initiatives that are looking to address coral reefs or aspects relating to ocean resilience—looking at scope, geographical relevance, and where possible, investigating their metrics. This includes:

- The Resilient Reefs Initiative
- Healthy Reefs for Healthy People Initiative
- Green Fins
- Blue Prosperity Coalition
- Vibrant Oceans
- Pristine Seas
- Reef Resilience Network
- Global Coral Reef Monitoring Network
- Moorea Long Term Ecological Monitoring Program
- Rise Up for the Ocean
- Blue Manifesto



## 2.2 Assumptions and limitations

**Knowing what the CRRRI will be monitoring for:** The purpose of monitoring and evaluation is to track progress towards a particular desired outcome and be able to adjust interventions according to feedback i.e. adaptive management.

It is therefore important to have a clear set of objectives for a monitoring programme. Who is it servicing? What types of decisions need to be supported? What is the long-term vision for the sites being monitored?

The process to answer these questions, and develop monitoring and evaluation goals for the CRRRI is being addressed under a separate work stream and will be realised in the global strategy. For the purposes of this initial task, and to help identify the most useful information for informing subsequent steps, a number of assumptions were made about the types of monitoring objectives that may be considered for CRRRI.

It has been assumed that metrics will need to:

1. Provide meaningful information to CRRRI partners to help evaluate progress against the global strategy.
2. Satisfy the reporting requirements to funding bodies.
3. Contribute to the national strategies and priorities of the seven CRRRI Countries (Fiji, Indonesia, Philippines, Madagascar, Solomon Islands, Tanzania, Cuba) as they relate to climate, biodiversity, and sustainable development.
4. Facilitate these countries in responding to those global and regional commitments they are obligated to report under such Regional Seas Conventions and Action Plans, the CBD.
5. Align with indicators being used across WWF to ensure comparability within the organization.

**Bias in the policy entry point:** The approach uses the national CBD policy documents as a point of entry for identifying coral reef initiatives; however, this will provide a bias in the type of initiatives and therefore the metrics being used. An opportunity to review other policy documents including those related to national development planning, national climate change adaptation, and disaster risk reduction would provide insight relevant to the development and measurement of resilience strategies.

**Language:** This work was conducted in English and resulted in limiting searches to initiatives with information provided in English. Where information was found in other languages (e.g. Formal CBD documents for Cuba), Google Translate was used to help extract information.

## 2.3 Strategy to select coral reef initiatives

For each of the countries of interest, the following steps were taken to understand where each country sits within the policy landscape and identify key initiatives and metrics relevant to coral reefs:

- Review of their national priorities (based on published National Biodiversity Strategies) and major assessment processes.
- Identify engagement in Regional Seas conventions or action plans.
- Determine engagement in other regional international initiatives/organisations, in particular, where these are noted as contributing to national processes,
- Participation in global/ regional monitoring initiatives.
- Survey of the CRRI team to identify major private/ NGO initiatives.

## 3. Outcomes

The outcomes reported in this section refer back to the specific objectives of this task, but slightly reorganised providing:

1. An Overview coral reef initiatives identified
2. The breadth of metrics identified
3. Commonalities differences and gaps in the metrics
4. Insight into motivation of choices or challenges in use of metrics

It is worth noting that the national biodiversity strategies reviewed have different expiry dates. This is relevant to understand where each country might be in the planning processes and where there may be opportunities to align the CRRI monitoring priorities with the next generation of NBSAPs.

- The NBSAPs of Cuba, Tanzania, Solomon Islands, Indonesia expire in 2020, in line with the Aichi Targets
- Fiji's NBSAP expires in 2024
- Madagascar's in 2024
- Philippines' in 2028

### 3.1 Overview of relevant coral reef conservation initiatives

An overview of the identified coral reef relevant initiatives for each of the seven CRRI countries is presented in Table 1 with more detail presented in Annex 1. The table shows the initiatives that relate to national monitoring and assessment programmes identified in national biodiversity strategies as well as any regional or global initiatives that the countries are engaged in. The final column highlights

were the national biodiversity strategies make explicit links to strategies for other policy aspects, such as climate change or sustainable development.

Coral reef / ocean related initiatives that are being implemented through non-governmental organisations and funded through private / philanthropic organisations were also reviewed to understand their scope (thematic, temporal, and geographic). The information is summarised in Table 2 below and again, more detail relating to each of the initiatives and where possible information on metrics provided in Annex 2.

**Table 1:** Overview of national, regional, and global coral reef initiatives identified via the perspective of national strategies and policy commitments (full detail provided in Annex 1)

Country	National	Regional	Other	Explicit link to other policy frameworks
<b>Cuba</b>	National assessment of coral reef ecosystems (in response to NBSAP)	GCRMN Caribbean		NBSAP to climate change adaptation and mitigation; identified need to harmonise and integrate the NBSAP objectives to the country's development policies and strategies at all levels
<b>Tanzania</b>	National assessment of coral reef ecosystems (in response to NBSAP)  Tanzania Coral Reef Task Force  Zanzibar Coral Reef Monitoring Network	Nairobi Convention Coral Reef Task Force  GCRMN East Africa Node  <i>Indian Ocean Rim Association</i>	Vulcan Allen Coral Atlas (mapping)	NBSAP recognises linkages and interdependencies with National Strategy for Growth and Poverty Reduction (NSGPR), National Environmental Action Plan (NEAP 2013-2018), National Adaptation Programme of Action (NAPA, 2007); National Climate Change Strategy, (2012)
<b>Madagascar</b>	National assessment of coral reef ecosystems (in response to NBSAP)	Nairobi Convention Coral Reef Task Force  GCRMN South West Indian Ocean Islands node	IOC (Indian Ocean Commission Biodiversity Programme)	Link to National Action Plan for Adaptation; National Strategy for Integrated Coastal Zone Management
<b>Fiji</b>	National assessment of coral reef ecosystems (in response to NBSAP)  GCRMN Fiji node	SPREP (e.g. support for State of Conservation in Fiji 2013)	Vulcan Allen Coral Atlas (mapping)	Fiji's Green Growth Framework (makes the link between biodiversity and development)
<b>Solomon Islands</b>	National assessment of coral reef ecosystems (in response to NBSAP)  Solomon Islands Coral Triangle Initiative National Plan of Actions (under CTI)	Coral Triangle Initiative - Regional Cooperation Action Plan	NBSAP notes the importance of work by Foundation of the Peoples of the South Pacific (FSPI), CI, IUCN, World Fish Centre, WWF, TNC but not specific projects	Linkage made to the National Adaptation Plan of Action, Solomon Island climate change policy (and disaster risk reduction) to promote the synergies and links to the NAPA monitoring and evaluation for performance indicators
<b>Indonesia</b>	National assessment of coral reef ecosystems (in response	Coral Triangle Initiative	Reef Check Indonesia	Biodiversity mainstreaming is a key element of the National



	to NBSAP)  Coral Reef Rehabilitation and Management Program (Coremap)  Indonesia coral bleaching response plan	PEMSEA - Sustainable Development Strategy for the Seas of East Asia  East Asia Region GCRMN node	The Nature Conservancy (TNC): SIGAP (Inspiring Actions by Communities for Change), WWF-Indonesia	Development plan. Yearly alignment of IBSAP and development plans
<b>Philippines</b>	National assessment of coral reef ecosystems (in response to NBSAP)  The Sustainable Coral Reef Ecosystem Management Program (2012–2020)  The National Action Plan for Ecosystem Restoration and Species Extinction Prevention (NPAERSEP)  National Assessment of Coral Reef Ecosystems (NACRE)  Coral Reef Visualization and Assessment (CoRVA)	PEMSEA - Sustainable Development Strategy for the Seas of East Asia  Coral Triangle Initiative  East Asia Region GCRMN node		No clear link to other national policy documents, however in 2011 there was an effort for institutional mainstreaming for MEAs: <a href="#">the PBSAP wheel</a> Presidential directive to incorporate PBSAP into plans/ programmes of all relevant agencies

**Table 2:** Mapping of other coral reef related initiatives, looking at their intended scope (temporal, geographic and thematic - more detail presented in Annex 2)

Initiative title	Focus	Geographic scope	Coral reefs as the entry point	CRR1 country overlap	Timescale	Climate	Socio-economic	Nature
<a href="#">Resilient Reefs Initiative</a>	Resilience (reefs and people)	Site	Yes	No	4 years			
<a href="#">Healthy Reefs for Healthy People Initiative</a>	People and reefs	Region	Yes	No	Launched 2003 and ongoing			
<a href="#">Green Fins</a>	Tourism	Multiple (local - national - global)	Yes	Yes	Launched 2004 and ongoing			
<a href="#">Blue Prosperity Coalition</a>	Blue economy/ MSP	National	No	No (not yet)	Unclear - multi year			
<a href="#">Vibrant Oceans Initiative</a>	Ocean (Fisheries/ MPA)	Multiple (Local - National)	No	Yes	Launched 2014-ongoing			

<a href="#">Pristine Seas</a>	Environmental preservation	Site	No	No	Launched 2008 and ongoing			
<a href="#">Reef Resilience Network</a>	Capacity development	Multiple (Local, national, global)	Yes	Yes	15 years (ongoing)			
<a href="#">GCRMN</a>	Monitoring and assessment	Multiple (National - Global)	Yes	Yes	Established 1995			
<a href="#">Moorea Coral Reef Long-Term Ecological Monitoring</a>	Long-term monitoring	Site	Yes	No	Established 2004 and ongoing			
<a href="#">Rise up 4 the Ocean</a>	Campaign	Global	No		Launched 2020			
<a href="#">Blue Manifesto</a>	Campaign	Region	No	No	Launched 2020 with view to 2030			

### 3.2 Overview of metrics used

For each of the initiatives (whether they were policy plans, strategies, or assessments), information was sought that was related to the listing and description of metrics or indicators. These are compiled in Annex 1.

Metrics of success were sometimes clearly expressed, with links to methodologies for monitoring and data collection to support them. In many cases, however, it was not very clear. This collation serves as a starting point for understanding metrics that are actively in use for coral reef initiatives.

In taking this work further, it would be helpful to cross check how these indicators relate to the initial catalogue of social, economic, ecological, and governance indicators compiled to support the CRR.

### 3.3 Commonalities, differences, and gaps

Despite the range of initiatives and geographies, it is possible to start to see some common themes in terms of progress being made, challenges, and remaining gaps when it comes to monitoring and evaluation of coral reef related initiatives. These are summarised in figure 1.

Each of the seven CRR countries have multiple initiatives taking place relating to monitoring and assessment of different aspects of coral reef ecosystems and related social and economic aspects. The complexity of this monitoring landscape varies between the countries. It is not clear to what degree there is any alignment or coordination between various initiatives, but this highlights a potential perhaps for improving the information flow if there could be improved collaboration between initiatives and improved application of data and metadata standards for increased interoperability to enable data use for multiple purposes.

Another observation is that where initiatives operate in different countries or regions, there appear to be variations based on how the operation works, depending on the national context. For example, there are active GCRMN nodes in at least six of the seven CRR countries, with the Solomon Islands being the exception. How the GCRMN nodes integrate with the national processes seems to be more variable—in some countries this is clearer than others. There are also active regional initiatives that play an important role at the national scale, for example, the Coral Triangle Initiative and the Regional Coral Reef Task Force under the Nairobi Convention;

### **Commonalities**

- There appears to be a bias towards the use of ecological indicators for monitoring coral reef related initiatives. As indicated in the limitations under section 2, this could be due to the perspective taken in the search for initiatives.
- Where there are active GCRMN nodes there was commonality, although the current work to assess coral reef status at the global scale for the 2020 Status Report has shown aggregation is possible for only three ecological indicators at the global scale.
- Metrics tend to be selected to meet the specific reporting needs of the different initiatives. There are very few examples where the indicators are successfully being used at multiple scales. GCRMN and Green Fins are two examples.

### **Differences**

- International policy frameworks such as the CBD Strategic Plan and Aichi Targets are interpreted differently by different countries, depending on their priorities. As such, the metrics used are also different.
- Different countries have very different levels of investment and capacity for monitoring and assessment.
- Even where the same indicators are used, there may be differences in the data used or how it is calculated. Live coral cover for example is the most extensively used coral reef indicator; although here there are also possible variations of application (i.e. whether including both hard coral cover and soft coral cover or just hard coral cover).

## Gaps

- There appears to be a gap between metrics that are theoretically available and suitable for small scale application vs those that are possible (in terms of cost of data to support them over a sufficient time scale). Often the list of metrics identified in policy strategies is rather longer and more ambitious than the indicators that are used in assessments.
- Metrics identified in national policy documents/ strategies were rather high level e.g. for Cuba “status of coral reefs”; “Trend in condition of coral reefs” - but without articulating how this would be measured.
- In some cases, the indicators identified in the national policy documents were not assessed for the reports (both national reporting to CBD and the regional GCRM assessment) due to lack of monitoring data (e.g. Solomon Islands) - indicating geographic gaps in data.

It would be useful to understand which of the metrics identified as being used have identifiable data sources, or even better, a defined data flow from collection to compilation to assessment to management including the application of metadata standards. There are initiatives underway to tackle these challenges. It would also be useful to engage with representatives working in these areas to see the degree to which they are working together. E.g.:

- MERMAID – WCS / WWF initiative (standardised data collation)
- GCRMN – and the newly-adopted Implementation and Governance Plan

One thing that is currently missing is any kind of global database for coral reef monitoring data (rather like the WDPA, but for coral reef data).

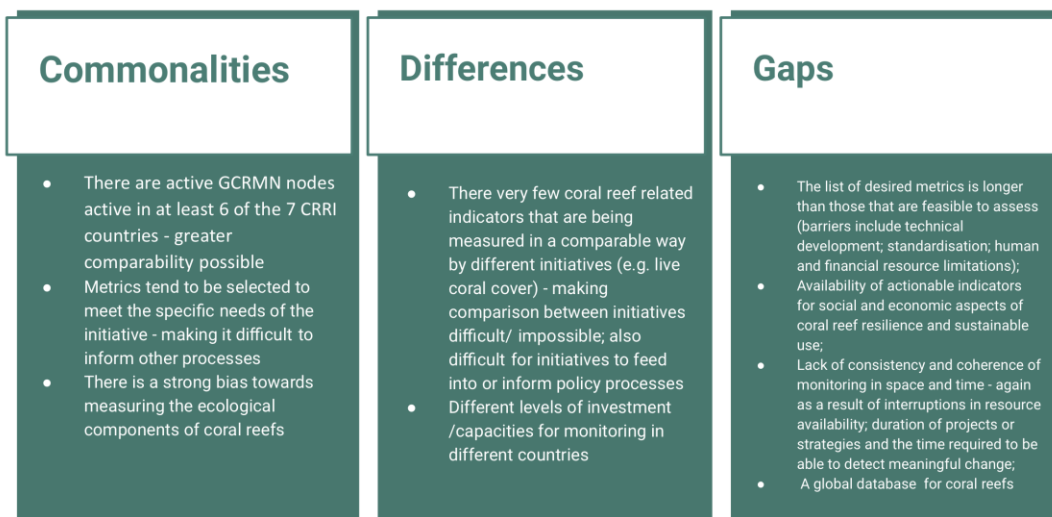


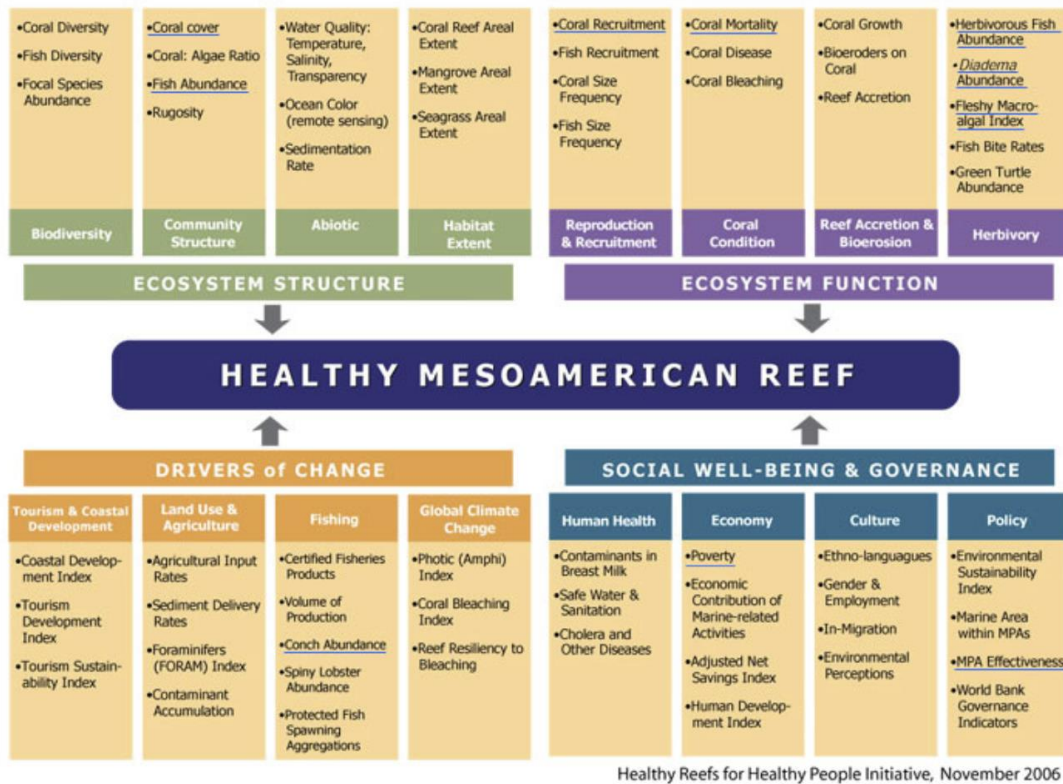
Figure 1: Summary of commonalities, differences, and gaps identified in the approaches to monitoring and identification of metrics for coral reef related initiatives.

### 3.4 Rationale and motivations for identifying and selecting metrics

The reality of what needs to be measured to inform the decisions versus what is possible to measure is not something that was easily accessed through reports. However, in initial conversations, the following examples of motivation for monitoring and rationale for indicator selection emerged:

- Monitoring is integral, not peripheral, and informs actions to progress towards articulated objectives
- Monitoring and the assessment outputs can facilitate communication with stakeholders at different levels
  - Site level to support behaviour change
  - National level to inform development of regulation and policy
  - Global scale to help national partners in fulfilling their international commitments
- Decisions on what to monitor are determined by
  - The objectives of the initiative
  - Financial and human resources (time and capacity / expertise) available to implement the monitoring protocol
  - An evaluation of the cost of obtaining data versus the value and relevance of information it provides in helping to reach the objectives

The work by the Healthy Reef Initiative on the Mesoamerican Reef Report Card is a good example where there is a clear framework (see Figure 2) that sets out the ambition for the desired scope of the information that is needed. There has then been a prioritisation to pick an initial list of 10 indicators to be measured and assessed. However, it is not clear what the motivation for selecting these indicators was.



- Fish Abundance
- Fleshy Macroalgal Index
- MPA Management
- *Diadema* Abundance
- Herbivorous Fish Abundance
- Coral Mortality
- *Conch* Abundance
- Coral Recruitment
- Poverty
- Coral Cover

Figure 2: Mesoamerican Reef Report Card Indicator Framework and the 10 priority indicators that are regularly assessed (source: <https://www.healthyreefs.org/cms/healthy-reef-indicators/>).

## 4. Reflections

The following reflections emerged during the preparation of this report and that may be useful in the further development of a monitoring and evaluation framework for the CRRI.

### Accessibility of information

In general, online discoverability of and access to information on national and regional policies / strategies and action plans are good. Access to associated assessments and reporting against these strategies is also good. Access to information becomes more difficult when trying to drill into these assessments and understand the details of the indicators that have been used, how they are



calculated, and the underlying data that has been used. In some cases, the information is available, but rather hidden and takes time to find it or requires a request to the organisation responsible.

Discoverability and access to information and documentation relating to the monitoring and assessment of current / active NGO initiatives in these countries were not easy to find. Much of the online information found, however, was rather generic and it was time consuming to drill down to find useful project information or again, required a request to the organisation. In one case, the monitoring parameters were confidential as it is used to support an accreditation scheme.

### **Linking data and assessments**

This task raised questions about how to create a clear and transparent link between policy ambition, action, monitoring, and assessment. This brings together challenges relating to data (standardisation, data archiving, management, data flow); definition and consistency in the use of metrics; and reporting (including ensuring an understanding of the evolution of assessment and linking assessment to data).

For this overview, you can see that there are sometimes differences between the metrics that are identified in the policy documents, with those that are assessed, perhaps due to insufficient data or inadequate data. Another observation was that in many cases, it was not possible to access the data or information used for calculating the indicators, impacting reproducibility, comparison over time, and transparency.

An example of challenges relating to data management, access, and archiving was identified when researching the Western Indian Ocean countries. It appears there have been attempts to address this on a project basis resulting in pieced together platforms and a lack of institutional coherence. From a 2017 IOC report: “*Within the **information system component**, an online platform developed by The Nature Conservancy (TNC) has been created and used extensively (<http://www.refresilience.org/groups/network/indian-ocean-commission/>) together with an online reporting form for coral reef bleaching ([www.cordioea.net/WIO-bleaching-2016](http://www.cordioea.net/WIO-bleaching-2016)). A new coral reef database (BD-RECIF) has been developed, building on the Coral Reef Monitoring Database (COREMO) and the Coral Reef Information System (CRIS).*”

A sentence from an article discussing data access to support national assessment was particularly striking “*In the national workshop we shall also have the chance to convince WWF to contribute some of their information to the national report which in the Zanzibar workshop was identified as a major gap*”. (source: <https://medium.com/@ioc.biodiversity/tanzania-coral-reef-task-force-is-working-443f48361da0>).

There were also good examples of progress. In one example from the Philippines, it was possible to access and explore the data for coral reef extent at a sub-national scale thanks to the CoRVA platform.

A more geographically distant example is from OSPAR—a Regional Seas Convention in the North East Atlantic ([www.ospar.org](http://www.ospar.org))—not warm water coral reefs, but over the past 10 years have been investing in developing a [data management](#) and flow, including archiving and interoperability to ensure use of common data and metadata standards to help improve the usefulness of the data collected under the Convention, primarily for the Contracting Parties and [regular, repeatable assessment](#) at the regional scale, but also for use in European or other global assessments.

It would be helpful to understand some of these challenges associated with data availability, accessibility, and comparability better in order to identify appropriate solutions for use within the CRRRI protocols: what are the bottlenecks (technology, financing or capacity) and at what stage of the monitoring and assessment process these occur?

### **Do the selected indicators give the information that is needed?**

Another question is how well does the information provided by the metrics used in these initiatives match the information needed by the decision makers to implement the policies. Some interesting work was undertaken by Burke et al. (2020) to look at the information needs for people working in area-based management, spatial planning, and other areas of relevance to coral reef management. This showed that only 50% of the data needs of various decision makers with responsibility for coral reef management were currently being met.

### **The question of which lens to use**

Different monitoring frameworks (DPSIR, MACMON, others) are used by different communities to structure the decision-making process and how to measure this. Which framework is used should be governed by who the monitoring is intended for and the intended influence.

### **The challenge of sustainable funding for monitoring and assessment**

Many initiatives are project based over relatively short timescales required for understanding the social and ecological systems connected with coral reefs. This raises the question as to how CRRRI can be different. Is it possible to support existing mechanisms to get some of the monitoring information rather than create new mechanisms for the project?

### **Accounting for scale**

What is needed to be able to use monitoring data to support indicators at different scales?

### **Governance structures and assessment processes**

It is necessary to understand the national monitoring and assessment processes. From this initial work, it is clear that the approaches taken are very different in the seven CRRRI countries. There are different phases of monitoring, have different human and financial capacities, and have varying complexities and scales (in both ecological and social systems).

Trying to keep a broad enough perspective in researching information to be able to fulfil the full intended scope, this task focused on monitoring associated with coral reef ecosystems. However, there are many national policy priorities that are very interconnected with coral reefs and communities that are dependent on them. But it was too much within this short time window to be able to follow these connections.

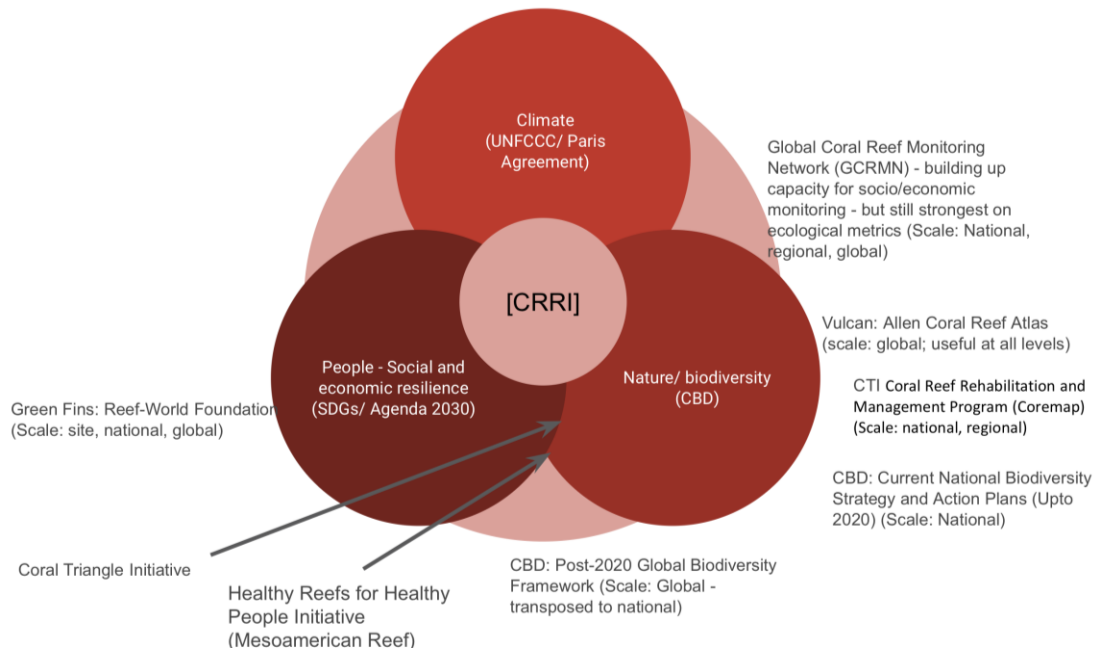
## 5. Key findings

The objectives of the CRRRI necessarily cuts across multiple policy areas: climate change, biodiversity, and socio-economic development. There is a recognised lack of coherence between these policy areas, in particular with regards to the metrics selected for their monitoring and evaluation to track progress and provide accountability.

There are a large number of metrics being used. However, in considering how to identify metrics from this long list, it is critical to keep focused on what it is that is needed in order to inform progress against given objectives. The monitoring framework must be integral to achieving these objectives, as well as being feasible and effective in terms of resource use and available capacity.

Linked to efficiency is the concept of collecting data in a way that can be used for many different purposes (collect once, use many times concept). This could be considered from two perspectives: firstly, exploring opportunities to share data between the different initiatives active within the CRRRI countries; and secondly, to identify how any data collected during the CRRRI could be used to support other initiatives, in particular, supporting national administrations in meeting their national, regional and global reporting obligations under their various commitments.

Several of the initiatives that have been mapped recognise the inherent link between the health of people, economies, and the health of the ecosystems on which they depend—all of which are impacted by climate change and the uncertainties of the impacts of climate change. However, it appears there continues to be a common challenge to be able ensure measurable indicators to inform all of these perspectives at multiple scales (see figure 3) in a feasible and meaningful way and will be a challenge to be overcome for the CRRRI.



**Figure 3:** Shows the three key policy areas being tackled by the CRRI and tries to show the balance of the monitoring of various initiatives looked at during this work. Ensuring that the CRRI monitoring strategy provides meaningful information relevant to each of these policy spheres.

## 6. Additional References

National Biodiversity Strategies and Action Plans (NBSAPs) and National Reports to the CBD were accessed via the CBD Clearing House Mechanism <https://www.cbd.int/chm/>

Burke et al., (2020) Data needs to support decision-making relevant to coral reefs: summary report. A collaboration of WRI, TNC, National Geographic Society and Vulcan Inc.

Obura, D.O. (2020) Getting to 2030 - scaling effort to ambition through a narrative model of the SDGs. Marine Policy 117: 103973.

UN Environment (2019) Analysis of Policies related to the Protection of Coral Reefs-Analysis of global and regional policy instruments and governance mechanisms related to the protection and sustainable management of coral reefs. Karasik, R., Pickle, A., Roady, S.A., Vegh, T. and Viridin, J. (Authors). United Nations Environment Programme, Nairobi, Kenya.

# Annex 1: Review of coral initiatives relevant to CRR countries

## Caribbean

Cuba		Description / relevant info	Explicit identification of indicators / metrics	Other measures of interest picked up in the report / results
Ocean region	Caribbean			
UN regional grouping	GRULAC			
<b>National priorities</b>	NBSAP 2016 - 2020 (CBD)	<p>National Target 10: as for Aichi Target 10</p> <p>Actions include:</p> <ul style="list-style-type: none"> <li>• Implement integrated coastal management / climate adaptation in 50% of wetland areas</li> <li>• Reduce pressures on reefs (respecting diving capacity and mooring system); ban spearfishing of parrot fish and “barberos” – as key species)</li> <li>• Regulate pressures on seagrasses</li> <li>• Integration of policies to address risk / danger from sea level rise</li> </ul>	<p>Reference to “SNAP coral reef monitoring indicators” (National Strategy for Protected Areas). List of SNAP indicators not discovered online.</p> <p>Number of delimited diving areas with mooring buoys in the SNAP</p> <p>Fishing for parrotfish and barbers is prohibited.</p>	
<b>National assessment of coral reef ecosystems</b>	5 <sup>th</sup> National Report to CBD		<p>Estado de salud de los arrecifes coralinos;</p> <p>Tendencias en la situación de los arrecifes de coral</p>	
<b>Relevant regional seas</b>	Caribbean Environment Programme (Cartagena Convention)			<p>Draws data from the Caribbean coral reef monitoring network under the GCRMN (Caribbean). See next entry.</p> <p>Draws on the AGRRA methods.</p>

<b>Other relevant international regional organisations engaged in monitoring</b>	GCRMN Caribbean (working with UNEP CEP; and SPAW Regional Activity Centre)		<b>Integrated monitoring guidelines here <a href="https://gcrmn.net/wp-content/uploads/2019/08/GCRMN-caribbean-guidelines-for-integrated-coral-reef-monitoring.pdf">https://gcrmn.net/wp-content/uploads/2019/08/GCRMN-caribbean-guidelines-for-integrated-coral-reef-monitoring.pdf</a></b>	<p>Focused on developing biophysical and socio-economic guidelines to ensure the collection of useful, comparable, and accessible data that can effectively reveal the status and trends of the Caribbean's coral reefs in the near future.</p> <p>Recent work to develop socio-economic monitoring. Assessment due 2020.</p>
<b>Engagement in global monitoring</b>	GCRMN	Via the GCRMN Caribbean		
<b>Other initiatives of relevance</b>				

## Western Indian Ocean

*Note: there are two major Large Marine Ecosystems in this region: Somali and Agulhas Currents. A Project ran at LME level until 2014. Now closed.*

<b>Tanzania</b>		<b>Description / relevant info</b>	<b>Explicit identification of indicators / metrics</b>	<b>Other measures of interest picked up in the report / results</b>
<b>Ocean region</b>	Western Indian Ocean			
<b>UN regional grouping</b>	Africa Group			



<b>National priorities</b>	NBSAP (CBD) 2015-2020	Aligns with the 2025 National vision  TARGET 10: By 2020, the multiple anthropogenic pressures on coral reef and vulnerable ecosystems impacted by climatic change are minimized.	18 indicators for Target 10 Listed page 105/106 of NBSAP Coral indicators for T14 relating to restoration(p111) Strengthen the implementation of programmes for protection and restoration of coral reefs and mangroves 14.2.1 Number of areas protected/ restored 14.2.2 Number of conservation campaigns	“By 2025, biodiversity and ecosystems are well protected, restored and used sustainably, ecosystem functioning maintained, so that they perpetually deliver sustainable intrinsic benefits for socio-economic development.”
<b>National assessment of coral reef ecosystems</b>	6 <sup>th</sup> National Report	Indicators used to assess National Target 10 fed into assessment of AT10	<ul style="list-style-type: none"> <li>● Abundance of fish in coral reefs and associated ecosystems increased</li> <li>● Vulnerable ecosystems identified</li> <li>● Number of management programmes developed</li> </ul>	
	Tanzania Coral Reef Task Force	Established (2002- ongoing) under the Western Indian Ocean (WIO Coral Reef Task Force). The Chair of the task force is the Director General of the National Environment Management Council (NEMC); technical issues managed by the Institute of Marine Science, Dar es Salaam (engagement with WWF on blast fishing).		Objective to support the development of local capacity in research, management, governance, and coordinate communication at the national level, and serve as a platform to share information on regional initiatives.  A Coral Reef Status Report is prepared and presented to the International Coral Reef Initiative General Meeting after every two years, (not discoverable online).
	Zanzibar coral reef monitoring network	Reference to the existence of this network, but no online information discovered.		

<b>Relevant regional seas</b>	Nairobi Convention	Nairobi Convention Coral Reef Task Force (est 2002; endorsed 2004) decision CP.3/2 Protection of coral reefs and associated ecosystems CPs were urged to establish national bodies to coordinate coral reef activities within each country and to develop national coral reef action plans or strategies where appropriate. Should be a regional action plan.		
<b>Other relevant international regional organisations engaged in monitoring</b>	GCRMN – East African Node	Coral reef monitoring in the Western Indian Ocean has been undertaken under the umbrella of the Global Coral Reef Monitoring Network (GCRMN) and the Nairobi Convention’s Coral Reef Task Force, since the late 1990s. Traditionally, the southwest Indian Ocean islands (SWIO node) and the mainland East Africa (EA) nodes of the GCRMN have operated independently, but these are now being integrated more effectively in a regional reporting mechanisms since 2015-16.	Hard coral cover Live coral cover Macro algae cover Fish abundance	GCRMN –WIO status report 2017 <a href="https://www.commissionoceanindien.org/wp-content/uploads/2019/02/Coral-reef-status-report.pdf">https://www.commissionoceanindien.org/wp-content/uploads/2019/02/Coral-reef-status-report.pdf</a>  Data archiving and data management identified as a challenge in the region. Project funded efforts to address this.
	Responding to bleaching in the WIO (CORDIO)		Bleaching monitoring guidelines <a href="https://cordioea.net/coral-bleaching/wio-bleaching-2016/">https://cordioea.net/coral-bleaching/wio-bleaching-2016/</a>	
<b>Engagement in global monitoring</b>	GCRMN	Via the national and regional Task forces		
<b>Other initiatives of relevance</b>	Allen Coral Atlas WIOMSA Indian Ocean Rim Association	Mapping of the Western Indian Ocean almost complete (June 2020)		

Madagascar				
Ocean region	Western Indian Ocean (Islands)	Description / relevant info	Explicit identification of indicators / metrics	Other measures of interest picked up in the report / results
UN regional grouping	Africa Group			
National priorities	NBSAP (CBD) 2015-2025	<p>OBJECTIVE 10: «By 2025, the multiple anthropogenic pressures on coral reefs and other vulnerable marine ecosystems impacted by climate change or ocean acidification are minimized, in order to preserve their integrity and functioning».</p> <p>Also linked to the National Action Plan for Adaptation and National Strategy for Integrated Coastal Zone Management.</p>	<p>Indicator 10.1.1. Knowledge of the status and trends of coral reefs, information is updated (Ministry in charge of biodiversity + Min of Fish)</p>	<p>Actions for the conservation of coral reefs through ecological restoration is a priority for the Ministry of Environment and Forests.</p> <p>Coastal pollution / sedimentation, unsustainable fishing (including recreational fishing), and coastal erosion are of major concern.</p> <p>Estimate required funds for objective 10 \$6 million.</p> <p>Major challenge to fulfill international obligations resulting from the lack of a National Biodiversity Policy (despite ratification to CBD; limited resources and ineffectiveness of implementation).</p>

<p><b>National assessment of coral reef ecosystems</b></p>	<p>6<sup>th</sup> National Report to the CBD</p>	<p>Produced February 2019. Available in French. Indicators used are listed.</p>	<p>Indicators used for Target 10:</p> <ul style="list-style-type: none"> <li>- Knowledge of the state and trend of coral reefs, up-to-date information</li> <li>- Pollution control strategy developed and implemented</li> <li>- Number of additional studies on coastal erosion carried out</li> <li>- Referential established on coastal erosion</li> <li>- Number of projects implemented to combat coastal erosion</li> <li>- Area of land protected and saved from coastal erosion</li> <li>- Area of eroded beaches rehabilitated annually through the use of local techniques.</li> </ul>	
<p><b>Relevant regional seas</b></p>	<p>The Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Areas of the Eastern African Region</p>	<p>Frame for multilateral cooperation in the WIO</p>		<p>Transcribed into national law (Law n ° 98-004 of 02/19/98)</p>

	GCRMN SWIO node	<p>Coral reef monitoring in the Western Indian Ocean has been undertaken under the umbrella of the Global Coral Reef Monitoring Network (GCRMN) and the Nairobi Convention's Coral Reef Task Force, since the late 1990s. Traditionally, the southwest Indian Ocean islands (SWIO node) and the mainland East Africa (EA) nodes of the GCRMN have operated independently, but these are now being integrated more effectively in a regional reporting mechanisms for 2015-16. (supported by the Marine Programme of the Indian Ocean Commission)</p>	<p>Coral cover Algal cover Fish community structure Bleaching impact</p>	<p>GCRMN –WIO status report 2017 <a href="https://www.commissionoceanindien.org/wp-content/uploads/2019/02/Coral-reef-status-report.pdf">https://www.commissionoceanindien.org/wp-content/uploads/2019/02/Coral-reef-status-report.pdf</a></p>
<b>Other relevant international regional organisations engaged in monitoring</b>	Indian Ocean Commission (1984)	IOC Biodiversity programme (funded by EU ended 2018)		Focus on marine ecosystem management and coral reefs in its member countries
<b>Engagement in global monitoring</b>	GCRMN	Via SWIO islands node		Report due end 2020
<b>Other initiatives of relevance</b>				

## South Pacific Ocean

<b>Fiji</b>		<b>Description/ relevant info</b>	<b>Explicit identification of indicators/ metrics</b>	<b>Other measures of interest picked up in the report/ results</b>
<b>Ocean region</b>	South Pacific			

<b>UN regional grouping</b>	Asia-Pacific Group			
<b>National priorities (NBSAP)</b>	NBSAP 2017-2024	Objective to ensure healthy functioning ecosystems to build resilience to climate change.  Monitoring data for coral reefs is considered to be reliable and consistent.  Main threats nutrient and sediment pollution from high impact logging in the smaller watersheds; on larger islands it is sediment and nutrient pollution from coastal development, agricultural chemical and mining waste run off.	Hard coral cover; Coral Diversity	Shift from coral dominated to algal dominated  Lack of controls on reef dredging for channels and coastal development—resulted in physical loss / removal of reef  Mangrove clearance of concern for reduction in reef-dependent communities  Tourism revenue from coral reefs
<b>National assessment of coral reef ecosystems</b>	CBD 5 <sup>th</sup> National Reports	Objective 9.1 relates to AT10: By 2014, family planning guides will incorporate how overpopulation threatens biodiversity and marine resources.	Monitoring of live coral cover, fish biomass density and diversity  Live coral cover is defined as area covered with living hard coral either in mono species or multi species colonies.  This indicator is a fundamental data type for most surveys and is widely available in Fiji and the wider Pacific region.  Hard coral cover / algal cover	Persistent stressors on the reef, including eutrophication, coastal development, coral and live rock harvesting, mangrove clearing, crown of thorns (COTS), and overfishing, all negatively impact live reef cover and the ability of reefs to recover from significant events.  <ul style="list-style-type: none"> <li>• Coral bleaching</li> <li>• Crown of thorns</li> <li>• Trade in live coral</li> <li>• Threat: Coral extraction</li> <li>• Coral farming</li> </ul>
	State of Environment Report – (Ref: Secretariat of the Pacific Regional Environment Programme (2016). State of conservation in Fiji – country report 2013. Apia, Samoa. SPREP.)	Identified 5 major drivers of change <ul style="list-style-type: none"> <li>• Population growth and demographic change</li> <li>• Globalisation and geography</li> <li>• Climate change and variability</li> <li>• Economic and technological development</li> <li>• Traditional and contemporary values, attitudes, lifestyles, and governance.</li> </ul>	State of and threats to coral reefs <ul style="list-style-type: none"> <li>• Coral reef extent</li> <li>• Coral reef fisheries</li> <li>• Population</li> <li>• Hard coral cover</li> <li>• Bleaching</li> <li>• Area under management</li> </ul>	Data from Reefs at Risk (2011) and GCRMN  Created a nice graphic showing: <ul style="list-style-type: none"> <li>• Reef condition</li> <li>• Reef health and resilience</li> <li>• Reef resource use</li> <li>• Factors affecting reef health</li> <li>• Management and governance</li> </ul> But not clear how these were calculated. Source: Bryant et al. 1998, Chin 2011



<b>Relevant regional seas</b>	SPREP	Support to a number of reports / assessments		
<b>Other relevant international regional organisations engaged in monitoring</b>	GCRMN	Moritz C, Vii J, Lee Long W, Tamelander J, Thomassin A, Planes S (editors). (2018) Status and Trends of Coral Reefs of the Pacific. Global Coral Reef Monitoring Network (supported by SPREP).	<ul style="list-style-type: none"> <li>• Live coral % cover (Trends)</li> <li>• Annual % coral cover</li> <li>• Annual % of macro algae cover (Trends)</li> <li>• % cover of other benthic cover (trends)</li> <li>• Trends in community composition</li> <li>• Fish biomass (Trends)</li> </ul>	Indicators discussed but not assessed: <ul style="list-style-type: none"> <li>• Number of tourists (could not be assessed)</li> <li>• Fishing</li> <li>• Area-based protection</li> <li>• Shoreline hardening</li> <li>• Harbours and ports</li> <li>• Water quality (nutrients)</li> <li>• Waste and marine debris</li> <li>• Sea level rise</li> <li>• Sea surface temp</li> <li>• Cyclones</li> <li>• COTS</li> <li>• Coral bleaching</li> </ul>
<b>Engagement in global monitoring</b>	Fiji node of GCRMN	2000-2002 – GCRMN Fiji node was established to coordinate a variety of data about current reef health from around the region (coordinator – Helen Sykes) (Lovell and Sykes, 2004)	<ul style="list-style-type: none"> <li>• Coral bleaching</li> <li>• Hard coral cover</li> <li>• Coral types (morphology)</li> <li>• Fish (Reef Check Surveys)– abundance</li> <li>• Macro invertebrates</li> <li>• Crown of Thorns</li> </ul>	Regular monitoring – assessment of reef conditions from 2002 <a href="https://www.marineecologyfiji.com/reef-conditions-somosomo-straits-taveuni-from-2002-onwards-fiji-coral-reef-monitoring-network-fcrm/">https://www.marineecologyfiji.com/reef-conditions-somosomo-straits-taveuni-from-2002-onwards-fiji-coral-reef-monitoring-network-fcrm/</a>
<b>Other initiatives of relevance</b>	Vulcan Allen Coral Atlas initiative	Mapping complete for Fiji. Ongoing work to ground truth / improve.	Mapping of coral reef extent	May have potential for informing other indicators in future

<b>Solomon Islands</b>		<b>Description / relevant info</b>	<b>Explicit identification of indicators / metrics</b>	<b>Other measures of interest picked up in the report / results</b>
<b>Ocean region</b>	South Pacific			
<b>UN regional grouping</b>	Asia Pacific			

<p><b>National priorities</b></p>	<p>NBSAP 2016-2020</p>	<p>NBSAP in itself is regarded as a capacity building action plan for implementing the CBD, UNFCCC, and UNCCD</p> <p>In the action plan it identifies coral reefs as one of the ecosystems to go through Payment of Ecosystem Services assessment in relation to Target 3.</p> <p>Connects levels of governance</p> <p>Recognition of customary practices along with the NBSAP</p>	<p>Target 6 indicator: Coral chemistry and growth patterns</p> <p>Target 12 Indicator: % cover of coral reef under protection or restored</p> <p>Target 4 actions include assessing the effect of land-based pollution on coral reefs; understanding the effects of climate change on coral reefs</p> <p>Other actions referenced include:</p> <ul style="list-style-type: none"> <li>• Ensuring that coral reefs are sufficiently represented in MPAs</li> <li>• Phasing out of dynamite fishing</li> <li>• Regulating coral mining</li> <li>• Regulating activity that impacts corals (e.g. boats/ tourist operations)</li> <li>• Protecting riparian / coastal vegetation to reduce nutrient / sediment impact on reefs</li> <li>• Manage natural infrastructure (incl. coral reefs) to protect from natural disaster</li> </ul> <p>Indicators related to Target 11 may also be relevant (climate change / biodiversity)—indicators set out in the National Adaptation Plan of Action Monitoring and Evaluation</p>	<p>Corals are mainly threatened by poor land use practices where water turbidity caused by logging, urbanization, mining, and large scale mono-crops have been suffocating those symbiotic coral building anemones.</p> <p>Human waste and climate change have compounded these threats. Invasive species such as the crown of thorns starfish is also posing some threat to coral. Some coral species of management concerns are, <i>Australogyra zelli</i>, <i>Australomussa rowleyensis</i>, <i>Nemenezophyllia turbida</i>, <i>Palauastrea ramose</i>, <i>Seriatopora aculeate</i>, <i>Seriatopora dendritica</i>.</p> <p>Some coral fish species are listed under the IUCN threatened list. This includes <i>Plectropomus leopardus</i>, <i>Negaprion acutidens</i>, <i>Vanderhorstia attenuate</i>, and <i>Paraxenisthmus springeri</i>.</p>
<p><b>National assessment of coral reef ecosystems</b></p>	<p>6<sup>th</sup> National Report (2019)</p>	<p>No detail provided on the assessment of indicators.</p> <p>Reference made to Kool, J., Brewer, T., Mills, M. &amp; Pressey, R. (2010). Ridges to Reefs Conservation for the Solomon Islands, ARC Centre of Excellence for Coral Reef Studies, James Cook University –but not freely available to download.</p>		
<p><b>Relevant Regional Seas</b></p>	<p>SPREP</p>			

<b>Other relevant international regional organisations engaged in monitoring</b>	Secretariat of the Pacific Community (SPC)			
	Coral Triangle Initiative	<p>Solomon Islands Coral Triangle Initiative National Plan of Action (NPOA) (2010)  <a href="http://www.coraltriangleinitiative.org/library/national-plan-action-solomon-islands">http://www.coraltriangleinitiative.org/library/national-plan-action-solomon-islands</a></p> <p>Commitment to the implementation of the regional cooperation action plan</p> <p>Under Ministry of Env, Conservation and Meteorology + Min of fisheries and Marine Resources.</p> <p>NPOA is to provide strategic direction for collaboration for gov and non-gov stakeholders to achieve a common goal</p>	<ul style="list-style-type: none"> <li>• Human Poverty Index (HPI)</li> <li>• Reef / shallow sea</li> <li>• Coral reef extent</li> </ul> <p>Report states inadequate data to estimate habitat</p>	<p>Goal: “Solomon Islands sustainably manages marine and coastal resources to ensure food security, sustainable economic development, biodiversity conservation and adaptation to emerging threats through community based resource management approaches supported by government agencies and other partners.”</p> <p>Action started 2009 for assessment of coral reefs</p> <p>Map of coral reef extent (Fig A2)</p>
<b>Engagement in global monitoring</b>		2018 Status and trends of coral reefs of the Pacific— Solomon Islands not included due to no time series monitoring data		
<b>Other initiatives of relevance</b>	Bismarck Solomon Seas Ecoregion (WWF-South Pacific / WWF-Indonesia)	In the Solomon Islands, WWF focuses on the Bismarck Solomon Seas		
	NBSAP notes the importance of work by Foundation of the Peoples of the South Pacific (FSPI), Conservation International (CI), The International Union for Conservation of Nature (IUCN), World Fish Centre (WFC), World Wide Fund			

	for Nature (WWF), The Nature of Conservancy (TNC)			
--	---	--	--	--

## South East Asia

Indonesia		Description / relevant info	Explicit identification of indicators / metrics	Other measures of interest picked up in the report / results
Ocean region	South East Asian Seas			
UN regional grouping	Asia Pacific			
<b>National priorities</b>	NBSAP (2015-2020)	<p>National Target 10 (similar to AT10) “Reduced level of anthropogenic pressure on coral reefs and other vulnerable ecosystems affected by climate change (AT- 10)”</p> <p>Links the NBSAP to SDGs</p> <p>Monitoring of the IBSAP is regulated under national law. Monitoring of environment is provided for under Law Number 32 Of 2009 on Environmental Protection and Management.</p> <p>Intended Task clusters to be set up as dedicated units or form part of the same team as the Clearing House Secretariat for Biodiversity.</p>	<p>Process indicators related to:</p> <ul style="list-style-type: none"> <li>• Number of reviews on climate change mitigation/ adaptation</li> <li>• Number of programmes on the same</li> </ul>	<p>Indonesian Biodiversity Clearing House as a medium of information and knowledge centre of biodiversity (<a href="https://balaikliringkehati.menlhk.go.id/en/">https://balaikliringkehati.menlhk.go.id/en/</a>)</p> <p><i>Note: There is a searchable table of indicators but I could not get it to work.</i></p>
<b>National assessment</b>	6th national report to the CBD	<p>Assessment of the progress of NT 10 implementation is assessed based on the indicators set out in IBSAP as well as indicators of other efforts that support the implementation of NT 10 activity groups. In general, for each NT 10 activity group assessed from several progress assessment indicators as part of IBSAP Action</p>	<p>NT 10 indicators:</p> <ul style="list-style-type: none"> <li>• The number of studies on climate change mitigation and adaptation</li> <li>• The number of programs on climate change adaptation and mitigation at national and regional levels</li> </ul>	

		Plan 3, i.e. “Maintenance and preservation of biodiversity”	Other indicators from efforts supporting the implementation of NT 10 relating to the Activity Groups and Action Plans above are: <ul style="list-style-type: none"> <li>• Changes in the condition of coral reefs in Indonesia</li> <li>• Efforts to manage climate impacts on community groups, coastal areas, and vulnerable small islands</li> <li>• Climate change studies by KKP and drafting of Indonesia Coral Bleaching Response Plan</li> </ul>	
	Coremap	Coral Reef Rehabilitation and Management Program (Coremap) in Indonesia cover 21 regencies in 11 provinces (3 phases up to 2020)  2014-2022 COREMAP CTI project funded by the World bank to institutionalise the coremap approach in 7 districts of 5 regions of Indonesia	World bank CTI Coremap indicators listed here:  <a href="https://projects.worldbank.org/en/projects-operations/project-detail/P127813?lang=en&amp;tab=map#key-details">https://projects.worldbank.org/en/projects-operations/project-detail/P127813?lang=en&amp;tab=map#key-details</a>  Coral Reef Health Index (launched 2017 as a new standard for managing coral reefs in Indonesia) with 2 main components <ul style="list-style-type: none"> <li>• Benthic biota (live coral cover, algae cover, sand/ rubble)</li> <li>• Fish biomass (biomass of target fish)</li> </ul> Elements including reef morphology and mortality may also be included.	Note: the World bank also has 2006 Coral health index see ref The World Bank 2006 <i>Measuring Coral Reef Ecosystem Health: Integrating Societal Dimensions</i> (Washington: The International Bank for Reconstruction and Development / The World Bank) p 65  The relation between this and the Indonesian version would be interesting to investigate  Kaufman L, Sandin S, Sala E, Obura D, Rohwer F and Tschirky J 2011 <i>Coral Health Index (CHI): measuring coral community health</i> (Arlington, VA, USA: Conservation International, Science and Knowledge Division) p 15
	Indonesia coral bleaching response plan	In 2016, the occurrence of coral bleaching in Indonesia took place at the west coast of Sumatra, the southern coast of Java, Bali, Lombok, NTB, southern Flores, South Sulawesi, and Maluku; those have been monitored jointly by the KKP, P2O LIPI, and the Indonesian Reef Check Network. The results of the evaluation of collaborative monitoring were followed up by drafting <a href="#">Indonesia Coral Bleaching Response Plan</a> for the first time in Indonesia (KKP, 2016). (document not found)		

<b>National assessment of coral reef ecosystems</b>		The Research Center for Management and Restoration of Fish Resources, Research and Development of Marine Affairs and Fisheries Agency conduct research on the ecosystem and species levels consisting of areas with important conservation values for mangroves, refugia fisheries, coral reefs, and rare marine life.	<ul style="list-style-type: none"> <li>• Coral reef health index</li> <li>• Coral cover</li> </ul>	Data collected by the Oceanographic Research Center (via The Indonesian Institute of Sciences (LIPI)). Since 1993, LIPI has been routinely monitoring the condition of coral reefs in Indonesia.
<b>Relevant regional seas</b>	COBSEA			
<b>Other relevant international regional organisations engaged in monitoring</b>	Coral Triangle Initiative	State of the Coral Triangle: Indonesia (2018) Cited CRITC Coremap data (2011; 2012)	<ul style="list-style-type: none"> <li>• Live coral cover</li> </ul>	
	PEMSEA - Sustainable Development Strategy for the Seas of East Asia	Identifies expected outcomes, indicators, and targeted actions and schedules for priority governance and management programs that contribute to the sustainable development of oceans and coasts and blue economy growth in the region over the next 5 years.  14 partner countries (including Indonesia)  Implementation 2018-2022  Takes CBD Aichi targets and SDGs into account  Expected outcome 1.1: The areal extent of healthy, resilient habitats (i.e., blue forests), including mangroves, coral reefs, seagrass, and other coastal habitats / areas is increased, resulting in ecological, social, and economic benefits to coastal communities.	Percentage of local governments implementing ICM programs with management plans for protecting, restoring, and conserving coastal habitats.  <ul style="list-style-type: none"> <li>• Coverage provided by coastal use zoning schemes / MSPs that delineate conservation areas for significant coastal and marine sites, habitats, and resources.</li> <li>• Published SOC reports with data / information on socio-economic and ecological benefits and impacts to coastal communities.</li> </ul>	



<b>Engagement in global monitoring</b>	East Asia Region GCRMN node	<p>Most recent assessment - Status of Coral Reefs of the East Asian Seas was 2018</p> <p>Governance via Japan Wildlife Research Centre and National Parks Board of Singapore</p> <p>Have been developing capacity for regional data analysis and coral reef monitoring (most recent in 2019)</p> <p>Not found to be mentioned in the NBSAP or 6th National Assessment</p>	Coral % cover Cover of macro algae and other key benthic organisms Coral bleaching COT occurrence	Monitoring via reef check method Data held in the region - active contact point
<b>Other initiatives of relevance highlighted in the 6th National report</b>	Reef Check Indonesia (>1,000 trained volunteers; 20 years engagement)	Community-based monitoring of coral reefs using the Reef Check method, and certifications on divers carrying out the Reef Check method (Reef Check EcoDiver Course) (Reef Check Indonesia, 2019). This activity is performed by the Reef Check Working Network Indonesia (JKRI), a network connecting communication among Reef Check implementers, observers, and volunteers in Indonesia.	Methods collect data on: <ul style="list-style-type: none"> <li>• substrate</li> <li>• &gt;invertebrates</li> <li>• &gt;fish</li> </ul>	JKRI is spread in 21 provinces, with EcoDiver instructors distributed within all Indonesian large islands except Papua (totalling at 100 instructors in 2006), and more than 1,000 volunteers involved throughout the 20 years of Reef Check activities in Indonesia. There are at least 15 newly certified instructors per year. EcoDiver Course Locations can be found in 14 sites across Indonesia, i.e. Aceh, Padang, Jakarta, Malang, Bali, Lombok, Labuan Bajo, West Kalimantan, East Kalimantan, South Sulawesi, Palu, Manado, Banda Naira, and Ternate.
	The Nature Conservancy (TNC): SIGAP (Inspiring Actions by Communities for Change)	An awareness-raising program, which helps communities in improving their understanding relating to mitigation and adaptation to climate change as well as sustainable management of natural resources. SIGAP is implemented as “conservation agreements” in 150 coastal villages and 100 terrestrial villages spread across Kalimantan, Sulawesi, and Papua area with a total implementation target of 600 villages by 2020.		TNC has also collaborated with the government in the preparation of local contents for primary schools in Raja Ampat, in which it has been adopted as the education curriculum at the regency level.
	WWF-Indonesia	A number of programmes are identified in the 6th assessment report		

Philippines				
Ocean region	South East Asian Seas	Description / relevant info	Explicit identification of indicators / metrics	Other measures of interest picked up in the report / results
UN regional grouping	Asia Pacific			
<b>National priorities</b>	NBSAP (2015-2028)	<p>Key conservation target: “By 2028, there will be no net loss in presence and area distribution of live coral cover, mangrove and seagrasses.” (other targets are relevant to coral reefs, but not specific)</p> <p>In 2011 there was an effort for institutional mainstreaming for MEAs</p> <p>Have mapped out the different international policy targets and established national targets (the wheel)</p> <p>Presidential directive to incorporate PBSAP into plans / programmes of all relevant agencies</p> <p>Target 6: The Sustainable Coral Reef Ecosystem Management Program (2012–2020) will help sustain the integrity of the environment; adapt to and mitigate climate change; reduce poverty and empower vulnerable communities; and implement a regional and national plan of action that strengthens climate change adaptation and resilience</p>	<ul style="list-style-type: none"> <li>• Presence and area distribution of live corals, mangroves and seagrasses and their condition</li> <li>• % coral reefs protected</li> <li>• Extent (% cover)</li> </ul> <p>BMB will develop an Integrated Biodiversity Management Information System Portal and Implement a National Assessment of the coral reef environment: with distribution maps, density, coral cover, fish catch, income, bathymetry, database</p> <ul style="list-style-type: none"> <li>• Geophysical coral reef mapping 20-200m deep (bathymetry, substrate)</li> <li>• Coral reef contribution to total fishery production</li> <li>• No of species of coral (hard and soft coral)</li> <li>• % of fishers dependent on reefs</li> <li>• National red list assessment of habitat forming coral reef species</li> <li>• Reproductive patterns of at least 10 species of Philippine corals (linked to restoration)</li> <li>• % of reef sites rehabilitated and monitored using asexual reproduction (corals of opportunity)</li> <li>• Number of community-based coral reef evaluation teams (capacity)</li> </ul>	<p>DENR’s biodiversity budget represents approx. 1% of national budget</p> <p>Sustainable Coral Reef Ecosystem Management Programme – a priority program developed in 2013</p> <p>Effort to connect PBSAP targets into country’s commitment to SDGs</p> <p>Restoration strategies account for 47% of the total est. cost of the PBSAP; 40% to protection strategies</p> <p>M&amp;E: Each target will be assigned a reference sheet which contains the following information: a) indicator definition, b) data capture and analysis, c) data quality assessment, d) data analysis, review and reporting, and e) baselines, targets and performance values. Refer to Annex 6 for a sample reference sheet.</p>

	The National Action Plan for Ecosystem Restoration and Species Extinction Prevention (NPAERSEP)	Formulated in 2016 by DNER. Supplements the NBSAP. Charts direction for recovery and restoration of ecosystems, including coral reefs.		
<b>National assessment</b>	6th National report to the CBD (2019)	<p>National Assessment of Coral Reef Ecosystems (NACRE) (Dept. of Science and Tech) aims to map the distribution of coral communities in representative sites around the Philippines and assess these communities</p> <p>Coral Reef Visualization and Assessment (CoRVA)</p> <p>Manuals on Biodiversity Assessment and Monitoring System for Coastal Marine Ecosystems are available as guides</p> <p>Data gathered from the CoRVA and SHINE assessments, once reconciled, may be established as baseline data to measure progress towards zero net loss in the presence and area distribution of live coral cover by 2028. However, additional efforts are still needed to cover other sites in the country.</p>	<p>Presence and area distribution of live corals, [mangroves and seagrasses] and their condition</p> <p>Extent of coral reefs (PDF map submitted as part of assessment - results of CoRVA here <a href="http://202.90.159.82/corva/">http://202.90.159.82/corva/</a>)</p> <p>Based on expert opinion); monitoring considered partial</p> <p>NACRE metrics:</p> <ul style="list-style-type: none"> <li>• Hard coral cover</li> <li>• Biodiversity</li> <li>• Resilience to threats like bleaching</li> <li>• Changes in coral reef structure</li> <li>• Projections of future states of coral reefs</li> </ul>	<ul style="list-style-type: none"> <li>• Coral Mortality Index (the ratio of dead coral cover to the sum of hard and dead coral cover - recognising that some habitat is unsuitable for coral reef recruitment and growth) (Gomez et al., 2004)</li> <li>• Live coral cover (sum of hard and soft coral) had been used previously, but hard coral cover felt to be a more useful metric to inform policy as it focuses on reef-building corals</li> <li>• Identify ambition to use other types of indicators that look at reef rugosity for example</li> </ul>
<b>Relevant regional seas</b>	COBSEA			
<b>Other relevant international regional organisations engaged in monitoring</b>	PEMSEA - Sustainable Development Strategy for the Seas of East Asia	<p>Identifies expected outcomes, indicators, targeted actions, and schedules for priority governance and management programs that contribute to the sustainable development of oceans and coasts and blue economy growth in the region over the next 5 years.</p> <p>14 partner countries (including Philippines)</p> <p>Implementation 2018-2022</p>	<p>Percentage of local governments implementing ICM programs with management plans for protecting, restoring, and conserving coastal habitats.</p> <ul style="list-style-type: none"> <li>• Coverage provided by coastal use zoning schemes / MSPs that delineate conservation areas for</li> </ul>	

		<p>Takes CBD Aichi targets and SDGs into account</p> <p>Expected outcome:</p> <p>1.1 The areal extent of healthy, resilient habitats (i.e., blue forests), including mangroves, coral reefs, seagrass and other coastal habitats / areas is increased, resulting in ecological, social and economic benefits to coastal communities.</p>	<p>significant coastal and marine sites, habitats, and resources.</p> <ul style="list-style-type: none"> <li>Published SOC reports with data / information on socio-economic and ecological benefits and impacts to coastal communities.</li> </ul>	
	Coral Triangle Initiative			
<b>Engagement in global monitoring</b>	East Asia Region GCRMN node	<p>Most recent Status of Coral Reefs of the East Asian Seas was 2018</p> <p>Governance via Japan Wildlife Research Centre and National Parks Board of Singapore</p> <p>Have been developing capacity for regional data analysis and coral reef monitoring (most recent in 2019)</p>	<ul style="list-style-type: none"> <li>Coral % cover</li> <li>Cover of macro algae and other key benthic organisms</li> <li>Coral bleaching</li> <li>COT occurrence</li> </ul>	Monitoring via reef check method
<b>Engagement in global monitoring</b>				
<b>Other initiatives of relevance</b>				

## Annex 2: Mapping of other coral related initiatives (philanthropic, NGO, etc.)

Initiative	Type of initiative	Lead organisation / Partnership	Funding source	Scope of initiative	Metrics	Active in CRRI countries? (list)	Notes
<a href="#">Resilient Reefs Initiative</a>	Resilience (reefs and people)	<b>BHP Billiton Foundation/ Great Barrier Reef Foundation</b> UNESCO - World Heritage, TNC, Reef Resilience Network, Colombia GSSAP, Resilient Capitals Catalyst, AECOM	BHP Billiton Foundation's Environmental Resilience Global Signature Program	Over four years, this project will support five of the world's World Heritage-listed coral reef sites and the communities that depend on them, to identify and prioritize actions to give the reefs the best possible chance to survive and adapt in the face of great change, complexity and uncertainty.		No  Function in 5 World Heritage sites in Australia, Palau, Belize and New Caledonia	Identifies as the first integrated model for building the resilience of reefs and the communities they support.
<a href="#">Healthy Reefs for healthy people Initiative</a>	People and reefs	MAR Fund, WWF, The Summit Foundation, iLCP, Smithsonian, Perigee, OAK foundation, Mission Blue, Coral Reef Alliance, TNC, AGRRA, CI, WRI, WILD Foundation, and many others		Healthy reefs for healthy people - consider that the ecosystem includes the natural and social systems.	Drawn from the <i>Healthy Reefs for Healthy People Framework</i> , this attempts to address ecosystem structure, function, drivers of change and socio-economic aspects. Of the many indicators listed 10 are assessed.	No  Geographic focus in the Mesoamerican barrier reef	Transparent with good information available online regarding their indicators, monitoring framework  Launched 2003; has an established monitoring framework, defined indicators, and regular assessments
<a href="#">Green Fins</a>	Tourism	<b>Reef-World Foundation</b> Mix of corporate, philanthropic, and	Mixed sources including grants	We are working towards a future where environmentally friendly practices are standard	Metrics are confidential. Principle socio-economic indicators used focusing on process.	Indonesia Philippines	Monitoring is integral to achieving the Green Fins objectives of the initiative and a core part of their

		academic partners. Policy partner is UNEP.		across the marine tourism industry. It is implemented in each country by a national team composed of government staff (often in collaboration with NGOs). The approach is proven and replicable and has been adopted by 11 countries and around 600 individual marine tourism companies since its inception in 2004.			work.  Use metrics at multiple scales, site level to inform behaviour change in dive centres; national scale to address industry-wide issues and national policy development; global—to help partner governments respond to global commitments (e.g. CBD, ICRI)
<a href="#">Blue Prosperity Coalition</a> ( <a href="#">BlueProsperity.org</a> )	Blue economy / MSP	Waitt Institute, Waitt Foundation, Bren School UC Santa Barbara, Sea Sketch, National Geographic, Pristine Seas, Oceans 5, Dynamic Planet, WCS, Ocean Unite, UCLA IoES, Scripps, FSU, Environmental Law Institute, AELaw plc, emLab - UC Santa Barbra, NRDC, Atlas of Marine Protection, Rare, Global Island Partnership, Skylight, Global Fishing Watch, Micronesia Conservation Trust, VEPA, Oceano Azul Foundation	Waitt Foundation (intends to commit \$150 million to ocean conservation over 10 years)	Blue economy / marine spatial planning: Aiming to grow economies whilst achieving 30% marine protection. A coalition of partners engaging in a multi-year partnership with governments to designate and implement 30% marine protection and establish a blue prosperity plan. [growth/ prosperity/ sustainable management of marine resources and ecosystems].	Not accessible	Currently no project sites in CRR1 countries, but aim to partner with at least 12 countries over 10 years	Website mentions monitoring as an important component of their work
<a href="#">Vibrant Oceans Initiative</a>	Ocean (Fisheries / MPA)	<b>Bloomberg Philanthropies Rare, Oceana, WCS, Global Fishing Watch</b>	Bloomberg Philanthropies	Help people, communities, and marine ecosystems confront the ongoing threats from climate crisis, combined with new global challenges from COVID-19// [element to ensure coral	Focus on fisheries and marine protected areas	Fiji Tanzania Indonesia	Also based on 50 Reefs analysis

				survives effects of climate change led by WCS]			
<a href="#">Pristine Seas</a>	Environmental preservation	<b>National Geographic</b>	Founding source: Blancpain + Multiple - philanthropic sources: and other individual donors	Pristine Seas, a project launched in 2008 that combines exploration, research, and media to inspire country leaders to protect the last wild places in the ocean.	Focus around protected areas. Partner with Vulcan Technologies to ensure the long-term monitoring of marine protected areas, using Vulcan Technologies' Skylight system. Surveillance and enforcement of these protected areas are critical to their sustainability and effectiveness in safeguarding marine ecosystems.		
<a href="#">Reef Resilience Network</a>	Capacity development	<b>The Nature Conservancy Multiple - see <a href="https://reefresilience.org/contributors/">https://reefresilience.org/contributors/</a></b>	Mixed source - including philanthropic grants, government support	Global leader in capacity building of coral reef managers and practitioners	Process metrics - people reached, etc.	Madagascar, Fiji, Pacific Islands	
<a href="#">Global Coral Reef Monitoring Network</a>	Coral Reef monitoring and assessment	<b>ICRI</b> Steering committee	UNEP + governments of France, Monaco, Sweden, Australia	GCRMN works through a global network of researchers to provide the best available scientific information on the health of coral reef ecosystems for their management and conservation	Indicators used for 2020 Status report [Not yet published]  Just evaluated which indicators work and which cannot be used. Global assessment possible for <ul style="list-style-type: none"> <li>• Live coral cover</li> <li>• Fleshy algae cover (%) (partial assessment)</li> <li>• Fish abundance Requires data for Benthic cover (%) and fish (abundance and size) for at least a 2</li> </ul>	6 out of the 7	There is a desire to incorporate more social and economic indicators into the assessments, but there have been challenges in achieving this for the 2020 status assessment.  2020 status report to provide a baseline for 3 out of 6 of the ICRI recommended indicators for the CBD Post-2020 global biodiversity framework (live coral cover,

					<p>year consecutive monitoring period</p> <ul style="list-style-type: none"> <li>• Coral reef extent</li> </ul> <p>Other indicators can be assessed at the regional / sub regional scale</p> <ul style="list-style-type: none"> <li>• Bleaching</li> <li>• Recruitment</li> </ul>		fleshy algae cover, and coral reef extent).
<a href="#">Global Coral Reef Fund</a>	Tool: Financial mechanism	<p><b>UNDP</b></p> <p>Private philanthropy: Paul G. Allen Family Foundation, Prince Albert II of Monaco Foundation</p> <p>Financial Institutions: BNP Paribas, Althelia Funds</p> <p>United Nations' agencies: UNDP, UNEP, UNCDF</p>	Multiple - mixed finance	<p>The Global Fund for Coral Reefs will serve as a blended finance vehicle leveraging grants, debt, and other financial instruments to facilitate private return-based investments for coral reef conservation and resilience.</p> <p>The GFCR seeks to invest 500 million USD in coral reef conservation over a 10 year window (2020 - 2030).</p>	Not yet determined	Global	<p>In startup phase</p> <p>Very relevant to understand what the GCRF will be using as success metrics. Fund that aims to specifically support implementation of coral reef action.</p> <p>Would be good to have coherence / alignment where this is appropriate.</p>
<a href="#">Allen Coral Atlas</a>	Tool: monitoring	<p><b>Vulcan Inc.</b></p> <p>Arizona State University's Center for Global Discovery and Conservation Science, the National Geographic Society, Planet, the University of Queensland</p>	Paul G Allen Lyda Hill Philanthropies Paul M Angell Family Foundation	Initiative to map the worlds coral reefs. The Atlas aims to provide a high-resolution, up-to-date global image of the world's coral reefs, and detailed maps showing the composition and structure of five important reefs located throughout the world.	Coral reef extent	Global map of coral reefs by mid-2021	In development; supports delivery of ICRI Recommended Indicators
<a href="#">MERMAID (Marine Ecological</a>	Tool: data collection	<b>WCS</b> , WWF, Sparkgeo		Open source, Online / offline tool for coral reef data collection and	As a platform, the intention is that it can be configured		MERMAID is a tool to facilitate collection and



<a href="#">Research Management AID</a>				visualization: providing an open-source data platform for science and conservation	according to different monitoring protocols		availability of standardised data.
<a href="#">Coral Reef Watch</a>	Tool: Decision support (especially around bleaching, disease)	<b>NOAA</b>		global early-warning system of coral reef ecosystem physical environmental changes	Physical environmental parameters: Sea surface temperature degree heating weeks modeling of potential bleaching areas (alerts)	Global	
<a href="#">Sea Around Us</a>	Tool: Fisheries management	<b>University of British Columbia</b> UWA, Fishbase/Sealife Base, Pew Charitable Trusts, Paul M. Angell Family Foundation, Global Greengrants Fund, Vulcan Inc., Fisheries Economics Research Unit, Changing Ocean Research Unit, MAVA Foundation pour la Nature, OAK Foundation, Nereus		Research initiative assessing the impact of fisheries on the marine ecosystems of the world and offering mitigating solutions	Emphasize catch time series starting in 1950, and related series (e.g., landed value and catch by flag state, fishing sector, and catch type), and fisheries-related information on every maritime country (e.g. government subsidies, marine biodiversity)		Launched 1999
Moorea Coral Reef Long Term Ecological Monitoring <a href="http://mcrter.msi.ucsb.edu/data/variable/">http://mcrter.msi.ucsb.edu/data/variable/</a>	Long-term monitoring			The Moorea Coral Reef (MCR) LTER site, established in 2004, an interdisciplinary, landscape-scale program aiming to advance understanding of key mechanisms that modulate ecosystem processes and community structure of coral reefs through integrated research, education, and outreach.		No  The coral reef complex that encircles the 60 km perimeter of Moorea (17°30'S, 149°50'W), French Polynesia.	
<a href="#">Rise up 4 the Ocean</a>	Campaign	<b>Ocean Azul Foundation, Ocean Unite, Oak Foundation</b>		Campaign  RISE UP Blue call to action.			Question: Any target locations?

		<p>Oceana, Prince Albert II of Monaco Foundation, Ocean Institute of the Prince Albert I of Monaco Foundation, WWF, Rare, Seas at Risk, The Nature Conservancy, WCS, World Forum of Fish Harvesters and Fish Workers, NRDC, WAITT Institute, the ICCA Consortium, The Sasakawa Peace Foundation, The Ocean Policy Research Institute, the David and Lucile Packard Foundation, ICSF, Oceanario de Lisboa, High Seas Alliance, Conservation International, WAITT Foundation, Marine Conservation Institute, Monaco Blue Initiative, Monterey Bay Aquarium, Ocean Conservancy</p>		<p>Call for governments and businesses to take bold, fair actions to set the ocean on a course to recovery</p> <p>A series of 6 goals + priority actions (protect and restore); invest in net 0 carbon emission future; transition to circular / sustainable economy; empower / support coastal people; unite for stronger ocean governance; protect 30 by 30</p>			<p>How do they track implementation, measure success / impact? Monitoring and evaluation?</p>
<a href="#">Blue Manifesto</a>	Campaign	<p><b>Seas At Risk</b> Birdlife Europe, ClientEarth, Oceana, Surfrider Foundation Europe, WWF + 100 environmental organisations</p>		<p>Campaign - European focus</p> <p>Roadmap to a healthy ocean in 2030; concrete actions with set dates to “Turn the tide on the ever degraded and polluted ocean and coastlines” - Need a thriving marine and coastal ecosystem to support a climate resilient future.</p>			