環境省請負業務

# 平成29年度
# 国際サンゴ礁イニシアティブ及び地球規模サンゴ礁モニタリング
# ネットワーク東アジア地域解析推進調査業務
# 報　告　書

平成30年3月

一般財団法人　自然環境研究センター

# はじめに

サンゴ礁の保全の国際的な枠組みである国際サンゴ礁イニシアティブ（International Coral Reef Initiative）（以下、「ICRI」という。）は、日米コモンアジェンダから派生し、平成 6（1994）年の生物多様性条約第 1 回締約国会議においてその設立が公表された、政府機関、国際機関、NGO 等による自主的な取組みである。

ICRI は、サンゴ礁の現状に関する情報取集を目的として、世界のサンゴ礁研究者をつなぐ国際的な枠組みである地球規模サンゴ礁モニタリングネットワーク（Global Coral Reef Monitoring Network）（以下「GCRMN」という。）を構築している。

我が国は、東アジア地域におけるサンゴ礁保全に中心的な役割を果たしており、GCRMN が 2020 年に行う予定の地球規模解析に東アジアのデータを提供することを目指し、GCRMN 東アジア地域におけるサンゴ礁モニタリングデータの地域解析に貢献していくこととしている。平成 28 年度には、GCRMN 東アジア会合の開催を通じて、2020 年までの GCRMN 東アジア地域解析実施計画を策定したところである。

本業務は、東アジア地域におけるサンゴ礁生態系モニタリングデータの地域解析を推進するため、GCRMN 東アジア地域解析実施計画書に基づく第 1 期のパイロット解析の 1 年目として、各国データ収集、整理、解析を実施し、取りまとめるとともに、第 32 回 ICRI 総会に出席し、サンゴ礁生態系保全に関する国際的な情報交換を促進するものである。

# 概　要

平成6（1994）年に生物多様性条約第１回締約国会議においてその設立が公表された国際サンゴ礁イニシアティブ（ICRI：International Coral Reef Initiative）（以下、「ICRI」という。）は、サンゴ礁の保全の国際的な枠組みであり、平成17～19（2005～2007）年度は日本政府とパラオ共和国と共同で、平成26～27（2014～2015）年度には日本政府とタイ政府と共同でICRI事務局を務めている。

また、ICRIのもとに構築している世界のサンゴ礁研究者をつなぐ国際的な枠組みである地球規模サンゴ礁モニタリングネットワーク（Global Coral Reef Monitoring Network）（以下「GCRMN」という。）においては、シンガポールとともに東アジアで中心的な役割を果たしている。

本報告書は、平成 29 年度環境省委託事業として東アジアで推進しているサンゴ礁生態系モニタリングデータの地域解析と、第 32 回 ICRI 総会の開催についてまとめたものである。

第１章では、東アジアにおけるサンゴ礁モニタリングデータの地域解析の推進として、データ解析のために設置した特別チームによる会合について及び同チームによる東アジアの各国データの解析作業の実施についてとりまとめた。

第 1 章ではまた、パイロット解析の結果を検討するためにフィリピンで開催した GCRMN 東アジア会合については、その準備のために開催した事前打合せと合わせて内容をとりまとめている。

さらに、この章では解析結果の概要を述べるとともに、2014 年から 2017 年のサンゴの大規白化現象について東アジアの状況をまとめた東アジア地域レポートについても記した。

第２章では、ケニアで開催された第 32 回 ICRI 総会について、開催に関する情報と会議の内容及び会議の成果物である決議等をとりまとめて記載した。

尚、巻末には、会議での資料等の原文資料を添付している。

# Executive Summary

The International Coral Reef Initiative (ICRI) is an international framework for the conservation of coral reefs that was announced during the first ordinary meeting of the Conference of the Parties (COP 1) to the Convention on Biological Diversity (CBD) in 1994. Japan co-hosted ICRI Secretariat with Palau in Fiscal Year 2005-2006 and with Thailand in Fiscal Year (FY) 2014-2015.

Japan has also supported the Global Coral Reef Monitoring Network (GCRMN), which was established under the ICRI ambrella to link coral scientists around the world, to play central roles in the East Asian region working together with Singapore.

This report is a summary of the regional data analysis of the coral monitoring data in the East Asia and the 32th ICRI General Meeting under the project by the Ministry of the Environment in FY 2017.

The First Chapter describes the process and progress of the regional analysis of coral monitoring data in the East Asia region including a meeting of the Task Force team on the regional data analysis.

Tha First Chapter also summarized the preparatory meeting and the GCRMN East Asia Regional Meeting organized in Philippines to review and share the result of the pilot analysis of the regional data analysis.

The chapter included the summaries of the pilot analysis and the East Asia Regional Report on the Coral Bleaching from 2014 to 2017 in the region.

The Second Chapter describes the details of the logistics, contents of the discussion and outputs from the 32nd ICRI General Meeting held in the United Nations Nairobi Office in Kenya.
The original documents of the meeting, such as the recommendations and terms of references for the ad hoc committee were also included as apependices.

# 目　次

# 第１章　　東アジアにおけるサンゴ礁モニタリングデータの地域解析推進

本業務では、平成28年度に作成されたGCRMN東アジア地域解析実施計画書及びこれまでのICRIへの対応状況を踏まえて、東アジアにおけるサンゴ礁モニタリングデータの地域解析を推進した。そのためにまずパイロット解析として、GCRMN東アジア７カ国（フィリピン、シンガポール、タイ、ベトナム、香港、台湾、日本）を対象に、各国データの収集、整理、解析を実施することとした。

## １．データ解析特別チームによるデータ収集解析作業の実施

データ解析のために、シンガポール国立大学を中心にデータ解析特別チームを構築した。特別チームには、GCRMN 各国コーディネーターの協力を得てデータ収集及びデータ解析を進めるために、GCRMN 東南アジア及び北東アジアの地域（ノード）コーディネーターを事務局とした。また、国立研究開発法人国立環境研究所とも連携を図った。

地域解析を始めるに当り、解析特別チーム会合を開催して作業計画を策定し、作業計画に従ってデータの収集、整理及び解析を進めた。

### １） データ解析特別チーム会合の開催

開催に当り、資料準備、議事進行、議事録の作成、会場の確保、招聘する参加者との連絡調整、宿泊の手配、招聘旅費の支払等の招聘に係る事務、会場準備及び受付等の事務を行った。

尚、旅費は「国家公務員等の旅費に関する法律」に従って支給した。また、招聘する参加者の会合出席に際して謝金を支給した。

#### （１） 開催場所：シンガポール国立大学

データ解析特別チームのチームリーダーである Danwei Huang 准教授の在籍するシンガポール国立大学において、同准教授の所属する理学部会議室を使用した。

#### （２） 開催日程：2018 年 9 月 18 日（月）（１日間）

会合は 2017 年 9 月 18 日に開催した。開催スケジュールは以下のとおりである。

| 月日（曜） | 業　　務 |
|---|---|
| 9 月 16 日（土） | ➢　移動（往路）<br>17:55　成田発 |

| | |
|---|---|
| 9 月 17 日（日） | 00:20　シンガポール着 |
| 9 月 18 日（月） | ➢　データ解析特別チーム会合（国立シンガポール大学）<br>10:00 第 1 部開会、議論（全体計画・データ解析の現状）<br>12:00 昼食<br>13:30 第 2 部開会、議論（今後の作業計画・長期的展望）<br>16:30 閉会 |
| 9 月 19 日（火） | ➢　情報収集（シンガポール国立公園局）<br>Karenne Tun（GCRMN 東南アジア・ノードコーディネーター） |
| 9 月 20 日（水） | ➢　移動（帰路）<br>08:10　シンガポール発<br>16:20　成田着 |

### （3） 招聘者及び参加者

GCRMN 東アジア地域解析を行うための解析特別チームには、データ解析の専門家であるシンガポール国立大学の Danwei Huang 准教授をチームリーダーに、同准教授の研究室の研究者を作業グループとし、東アジア地域におけるサンゴ礁研究者の国際的な枠組みであるアジア太平洋サンゴ礁学会の会長である Loke Ming Chou 名誉教授をスーパーバイザーとして迎えた。また、データ解析及びデータベースの専門家である台湾学術院の Allen Chen 教授と国立環境研究所の山野博哉をアドバイザーとして、サンゴ礁モニタリングデータ等の統計解析の専門家である Vivian Lam（Ocean Park Conservation Foundation Hong Kong）及び Chou Yang Kuo（ジェームズクック大学：当時）を解析結果のレビューアー（評価者）としてチームに招いた。さらに、各国のデータ収集を担当する GCRMN 東南アジア地域コーディネーターの Karenne Tun と GCRMN 北東アジアコーディネーターの木村匡をコーディネーター兼事務局としてチームに加えた。

**■招聘者及び事務局リスト：招聘者９名、事務局１名**

| | 氏名 | 所属 | 国 |
|---|---|---|---|
| チームリーダー　Task Force Team Leader | | | |
| 1 | Danwei Huang | National University of Singapore | シンガポール |
| 解析作業グループ　Main Analysts | | | |
| 2 | Joy Wong | National University of Singapore | シンガポール |
| 3 | Samuel Chan | National University of Singapore | シンガポール |
| スーパーバイザー　Supervisor | | | |

| | | | |
|---|---|---|---|
| 4 | Loke Ming Chou | National University of Singapore<br>アジア太平洋サンゴ礁学会 | シンガポール |
| アドバイザー　Advisors | | | |
| 5 | Allen Chen | Academia Sinica, Taiwan | 台湾 |
| 6 | 山野　博哉 | 国立環境研究所 | 日本 |
| レビューアー　Reviewers | | | |
| 7 | Chao-Yang Kuo | James Cook University, Australia | 台湾 |
| 8 | Vivian Lam | Ocean Park Conservation Foundation Hong Kong | 香港 |
| コーディネーター　Coordinators | | | |
| 9 | Karenne Tun | GCRMN 東南アジア・ノードコーディネーター<br>National Parks, Singapore | シンガポール |
| 事務局 Secretariat | | | |
| 1 | 木村　匡（兼任） | 自然環境研究センター<br>（GCRMN 北東アジア・ノードコーディネーター兼任） | 日本 |

### （4） 議題

データ解析特別チーム会合では、平成 28 年度に作成した GCRMN 東アジア地域解析・実施計画書を確認し、参加者の今後の業務予定等を調整しながらデータ解析のための作業計画を策定した。会合での議題は以下の通りであった。

データ解析特別チーム会合　議事

1．開会
- 歓迎の挨拶

2．データ収集についての進捗と現状
- サンゴ礁モニタリングデータ東アジア地域解析事業の概要
- データ解析の現状・進捗

3．2017 年から 2018 年のパイロット解析の作業計画
- 作業計画（案）について
- 長期的展望

4．その他

5．閉会
- 閉会の挨拶

**（５） 議事概要**

【データ収集についての進捗と現状】

◆ サンゴ礁モニタリングデータ東アジア地域データ解析事業の概要

➢ 目的：東アジアにおけるサンゴ礁モニタリングを推進するとともにサンゴ礁についての最新の情報を共有すること。

➢ 目標１：東アジアのサンゴ礁動態の傾向を把握すること。

➢ 目標２：地域内で定期的に解析を行うメカニズムを確立すること。

➢ 目標３：事業を通して地域内の若い研究者の能力を育成すること。

➢ 対象：GCRMN の北東アジア 5 カ国及び地域（中国、香港、台湾、日本、韓国）及び東南アジア 9 カ国（ブルネイ、カンボジア、インドネシア、マレーシア、ミャンマー、フィリピン、シンガポール、タイ、ベトナム）

➢ 事業の概要

✧ 2017 年 ＜パイロット解析＞

- 対象国：北東アジア 3 カ国（香港、台湾、日本）、東南アジア 4 カ国（フィリピン、シンガポール、タイ、ベトナム）

✧ 2018 年 ＜パイロット解析結果の発表＞

- 於：第 4 回アジア太平洋サンゴ礁シンポジウム

＜GCRMN 東アジア地域会合＞

- 総合解析計画の共有
- フォローアップ・データ収集計画策定

＜フォローアップ・データ収集＞

- 対象国：ブルネイ、カンボジア、ミャンマー、中国、韓国、インドネシア、マレーシア
- データ収集のための国内調整（インドネシア、マレーシア）

✧ 2019 年 ＜総合解析＞

✧ 2020 年 ＜解析結果発表＞

- 東アジア地域報告書
- ICRI 総会
- 地球規模解析への情報提供
- 科学論文の作成

◆ データ解析の現状

➢ データ収集の現状

✧ シンガポール：底生生物についての最も長期間のデータがあるが、魚類のデータはない。

- ✧ 台湾：シンガポールに次ぐ長期的データがあり、底生生物と魚類データもある。
- ✧ ベトナム：底生生物データのみで魚類データはない。
- ✧ タイ：モニタリングデータの他にラインとランセクトによる調査研究データも集まっている。
- ✧ 日本：ラインとランセクトデータではなくスポットチェック法によるデータを提供できるが、全国レベルでそろっているのは 2004 年から 2016 年まで。1 カ所は 1983 年からのモニタリングデータがある。
- ✧ 香港：ラインとランセクトによるサンゴと海藻を含む底生生物データ
- ✧ フィリピン：大学や政府研究機関等による大量のデータがあるが、データ保持者の合意を取りつける必要がある。

➢ データのとりまとめ及び解析に関する課題

- ✧ データ収集のためのテンプレートの修正が必要。
- ✧ 海藻の分類情報が必要：栄養塩の指標となる海藻あるいは微細藻類が石灰藻に含まれているか確認が必要。
- ✧ サイト名や地点名と緯度経度情報の明確化：同じ名前が異なる緯度経度についている場合同じサイト／地点なのか確認が必要。
- ✧ サンゴの動態に係るかく乱要因を抽出すること：高緯度地域での台風、白化現象、水質汚染等。
- ✧ 正確で長期的なラインとランセクトデータが不足している：しばしば場所が変わっている。
- ✧ その他抽出された異常値を確認する。
- ✧ 他の 7 カ国のデータ収集を計画しているが、異なる複数の機関が大量のモニタリングデータを持つと思われるインドネシアやマレーシアでは、国内データをとりまとめるための国内調整（国内ワークショップ）が必要。
- ✧ 2018 年にはマレーシアかインドネシアのどちらかでデータ収集のための会合を 1 回開催する資金しかない：翌年以降に他の国でも同様の会合を開催するような他の資金も確認する必要がある。

➢ データの解析について

解析に関して以下のポイントに留意する；

- ✧ サンゴ被度が時間とともに減少している傾向があるか？
- ✧ 乱獲によってサンゴ被度が減少する傾向があるか？
- ✧ 海藻被度とサンゴ被度に相関があるか？
- ✧ ベースラインデータをどこにとるか？

- 1990 年代のデータが利用できるかもしれない。
- 1980 年代は破壊的な活動（サンゴ礁域でのダイナマイト漁や青酸カリ漁等）が急増したのでサンゴ礁にとっては不遇な 10 年間となっている。
- 1990 年代は保全管理努力が推進され始めたために良いベースラインデータとなるだろう。

➢ 解析方法

✧ 時系列分析を行う。

✧ 白化現象や台風の情報を得るために海水表面水温と長期的な気象データを抽出する。

✧ 平均水温の傾向と最高水温についての温度解析を行う。

✧ 主要なかく乱イベントで区切って取りまとめて解析する。

✧ 3～6m の浅い水深帯と 8～10m の深い水深のデータを比較する。

➢ 会議後の予定

✧ 日本、香港、フィリピンのデータを送る。

✧ データ収集用の表（テンプレート）を確定し、各国に配布する。

【今後の作業計画】

◆ 作業計画（案）について以下の作業計画が合意された

第 1 フェーズ：2017 年度（2017～2018 年） パイロット解析

| 年 | 予定 | 備考 |
|---|---|---|
| 2017 | 2 月：東アジア地域会合（@シンガポール）※<br>（実施計画策定）<br>3 月：データの収集<br>4 月：各国データの確認／解析方針検討<br>5 月：解析作業<br>6 月：解析作業<br>7 月：解析作業<br>8 月：解析特別チーム構築<br>9 月：解析特別チーム会合（@シンガポール）<br>（作業計画の策定）<br>10 月：解析作業<br>11 月：東アジア地域会合（@セブ・フィリピン）<br>（試行解析：結果の確認） | ※平成 28 年度事業 |

| | | |
|---|---|---|
| | 12 月：解析モデルの修正・解析 | |
| 2018 | 1 月：解析モデルの修正・解析<br>2 月：結果のとりまとめ<br>3 月：パイロット解析に関する東アジア地域報告書（案）の作成 | |

第 2 フェーズ：2018 年度（2018～2019）　フォローアップ・データ収集

| 年 | 予定 | 備考 |
|---|---|---|
| 2018 | 4 月：地域レポート（パイロット解析）<br>5 月：<br>6 月：APCRS での発表（@セブ・フィリピン）<br>東アジア地域ワークショップ（フォローアップ・データ収集）<br>7 月：データの収集<br>8 月：データの収集（ブルネイ、カンボジア、ミャンマー、中国、<br>9 月：データの収集　韓国）<br>10 月：国内調整（@インドネシアあるいはマレーシア）<br>11 月：データ整理・解析作業<br>12 月：データ整理・解析作業 | |
| 2019 | 1 月：　データ整理・解析作業<br>2 月：　データ整理・解析作業<br>3 月：　データ整理・解析作業 | |

第 3 フェーズ：2019 年度（2019～2020）　総合解析

| 年 | 予定 | 備考 |
|---|---|---|
| 2019 | 4 月：データ整理・解析作業<br>5 月：データ整理・解析作業<br>6 月：国内調整（@インドネシアあるいはマレーシア）<br>7 月：データ整理・解析作業<br>8 月：データ整理・解析作業<br>9 月：データ整理・解析作業<br>10 月：データ整理・解析作業<br>11 月：東アジア地域会合（解析結果のレビュー）<br>12 月：モデルの調整／再解析 | |
| 2020 | 1 月：　モデルの調整／再解析 | |

| | | |
|---|---|---|
| | 2 月： モデルの調整／再解析<br>3 月： モデルの調整／再解析 | |

第 4 フェーズ：2020 年度（2020～2021） 地域報告書の作成

| 年 | 予定 | 備考 |
|---|---|---|
| 2020 | 4 月：地域報告書の作成<br>5 月： 地域報告書の作成<br>6 月： ICRS における発表（@ドイツ）<br>7 月：<br>8 月：<br>9 月：<br>10 月：<br>（地域データベースの開発／GCRMN 地球規模解析へのデータ提供／学術論文の作成）<br>11 月： ICRI 総会での発表（@未定）<br>12 月： | |
| 2021 | 1 月：<br>2 月：<br>3 月： | |

## 2） 東アジア各国データの収集・整理・解析作業の実施

### （1） 各国データの収集

今回のパイロット解析では、対象を東アジア 7 カ国（フィリピン、シンガポール、タイ、ベトナム、香港、台湾、日本）を対象にしており、各国の GCRMN コーディネーターにサンゴ礁モニタリングデータの解析作業チームへの提供を依頼し、電子メール及び電話等により連絡調整を行った。

パイロット解析の対象とした東アジアの GCRMN 各国コーディネーター

| | 国 | コーディネーター | 所属 |
|---|---|---|---|
| 1 | フィリピン | Cleto Nanola | University of Philippines |
| 2 | シンガポール | Karenne Tun | National Parks Board, Singapore |
| 3 | タイ | Thamasak Yeemin | Ramkhamhaeng University |
| 4 | ベトナム | Vo si Tuan | Institute of Oceanography |
| 5 | 香港 | Put O. Ang | Chinese University of Hong Kong |

| | | | |
|---|---|---|---|
| 6 | 台湾 | Allen Chen | Academia Sinica, Taiwan |
| 7 | 日本 | 木村　匡 | 自然環境研究センター |

### （2） データの整理・解析作業の実施

各国コーディネーターがとりまとめるモニタリングデータは、シンガポール国立大学の解析作業グループへ送られ、チームリーダーの Danwei Huang 准教授の指導の下に解析作業グループがデータを整理し、解析を行った。

データの整理、解析には、Danwei Huang 準教授の研究室に所属する Joy Wang と Samuel Chan の２名の研究員が作業に当たった。

## ２． GCRMN 東アジア会合の開催

東アジア地域におけるサンゴ礁モニタリングデータの地域解析を進めるために、事前打合せを行った上で、GCRMN 東アジアの各国コーディネーター及び専門家を招聘して、GCRMN 東アジア会合を開催し、データ解析結果の確認と意見収集を行った。

### １） GCRMN 東アジア会合事前打合せ

GCRMN 東アジア会合事前打合せの実施に当たっては、招聘する参加者との連絡調整、宿泊先の手配、招聘旅費の支払等の招聘に係る事務を行った。また旅費は「国家公務員等の旅費に関する法律」に従って支給した。

#### （１） 開催場所：Hotel Marco Polo Plaza, Cebu（フィリピン共和国セブ）

GCRMN 東アジア会合の会場でもあるフィリピン共和国セブ島にある上記ホテルの会議室を借上げ、解析特別チームの作業グループとコーディネーター及びスーパーバイザーと会議の内容及び進行について打合せを行った。また、同時にホテル関係者とは当日の会場運営や宿泊手配、ケータリング等ロジ面の打合せ及び確認を行った。

#### （２） 開催日程：2017 年 10 月 7 日（土）（４時間）

| 月日（曜） | 業　　務 |
|---|---|
| 10 月 6 日（金） | ➢　移動（往路）<br>09:30　成田発　13:10　マニラ着<br>15:55　マニラ発　17:10　セブ着 |
| 10 月 7 日（土） | 10:00　事前打合せ<br>12:00　昼食<br>15:00　ロジ打合せ |
| 10 月 8 日（日） | ➢　移動（復路）<br>06:40 セブ発　07:55 マニラ着<br>1005 マニラ発　15:35 成田着 |

#### （３） 招聘者及び事務局：招聘者 5 名、事務局：3 名

| | 氏名 | 所属 | 国 |
|---|---|---|---|
| チームリーダー　Task Force Team Leader | | | |
| 1 | Danwei Huang | National University of Singapore | シンガポール |

| | | | |
|---|---|---|---|
| 解析作業グループ　Main Analysts | | | |
| 2 | Samuel Chan | National University of Singapore | シンガポール |
| スーパーバイザー　Supervisor | | | |
| 3 | Loke Ming Chou | National University of Singapore<br>アジア太平洋サンゴ礁学会会長 | シンガポール |
| コーディネーター　Coordinators | | | |
| 4 | Karenne Tun | GCRMN 東南アジア・ノードコーディネーター<br>National Parks, Singapore | シンガポール |
| 各国コーディネーター | | | |
| 5 | Cleto Nanola | University of Philippines | フィリピン |
| 事務局 Secretariat | | | |
| 1 | 木村　匡（兼任） | 自然環境研究センター<br>（GCRMN 北東アジア・ノードコーディネーター兼任） | 日本 |
| 2 | 鈴木　久美子 | 自然環境研究センター | 日本 |
| 3 | Stephen Beng | Nature Society<br>（GCRMN 東アジア会合では議事録の作成担当） | シンガポール |

**（4） 議題**：

事前打合せでは、11 月に開催する GCRMN 東アジア会合のロジ面の準備と議事等会議内容に関する事前の調整を行った。打合せの議題は以下の通りであった。

＜GCRMN 東アジア会合　事前打合せ　議事＞

1．開会

2．GCRMN 東アジア会合の議事・進行について

- 東アジア会合の議事案・進行について
- 招聘者について
- 解析作業の進捗状況について

3．GCRMN 東アジア会合のロジについて

- 会場・宿泊の手配
- お茶・ケータリング・食事等
- その他

4．閉会

（５） 議事概要：

【GCRMN 東アジア会合の議事・進行について】

- 東アジア会合の議事案

  東アジア会合での議事次第案を共有し、参加者との議論を経て修正し、議事次第の最終版を作成した。

- 招聘者について

  今回の事前打合せの参加者に加えて、データ解析特別チームメンバーであるアドバイザー2 名（日本及び台湾）、レビューアー2 名（香港及び台湾）の参加が確認された。

- 解析作業の進捗状況について

  解析作業を進めている解析特別チームの Danwei Huang 准教授から、データの収集具合や解析作業の進捗について報告があり、香港、フィリピン及びベトナムからのデータの提供が遅れている旨の説明があった。

【GCRMN 東アジア会合のロジについて】

- 会場の手配

  会場は、お茶及びケータリングのスペースも考慮し、20 名程度が入る小～中会議室を手配した。音響機材、プレゼン用機材はホテルからレンタルするよう手配した。

- お茶・ケータリング・食事等

  ホテルに付属のレストランからコーヒーと茶菓子を午前と午後に手配した。また、朝食及び昼食は同レストランに手配した。

- その他

  ホテルの周辺には手頃なレストランは少ないが、車で 20 分ほどのショッピングモールまでホテルからのシャトルバスが運行されており、夕食に利用できる旨を確認した。

２） GCRMN 東アジア会合

GCRMN 東アジア会合の開催に当り、資料準備、議事進行、議事録の作成、会場の確保、招聘する参加者との連絡調整、宿泊先の手配、招聘旅費の支払等の招聘に係る事務、会場準備及び受付等の事務を行う。尚、旅費は「国家公務員等の旅費に関する法律」に従って支給した。

（１） 開催場所：Hotel Marco Polo Plaza, Cebu（フィリピン共和国セブ）

フィリピン共和国セブ島にある上記ホテルの会議室を借上げた。

（2） 開催日程：2017 年 11 月 20 日（月）～21 日（火）（２日間）

| 月日（曜） | 業　　務 |
|---|---|
| 11 月 18 日（土） | ➢　移動（往路）<br>09:20　成田発　　13:35　マニラ着<br>18:15　マニラ発　19:30　セブ着 |
| 11 月 19 日（日） | 14:00　準備会合<br>16:00　会場設営 |
| 11 月 20 日（月） | ➢　GCRMN 東アジア会合（@Marco Polo Plaza, Cebu）<br>10:00 開会（全体計画・パイロット解析の結果）<br>12:00 昼食<br>13:30 再開（パイロット解析の結果・解析上の課題について）<br>17:00 終了 |
| 11 月 21 日（火） | ➢　GCRMN 東アジア会合（@Marco Polo Plaza, Cebu）<br>09:00 開始（今後の作業スケジュール）<br>12:00 昼食<br>13:00 再開（次年度以降の計画・その他）<br>14:00 閉会 |
| 11 月 22 日（水） | ➢　移動（帰路）<br>06:45　セブ発　　07:55 マニラ着<br>09:50　マニラ発　15:00　成田着 |

（3） 招聘者及び事務局：招聘者 13 名、事務局３名

| | 国 | 氏名 | 所属 |
|---|---|---|---|
| GCRMN 東アジア地域各国コーディネーター（7 名） | | | |
| 1 | 香港 | Put O. Ang | Chinese University of Hong Kong |
| 2 | 台湾 | Allen Chen | Academia Sinica |
| 3 | 日本 | 木村　匡 | 自然環境研究センター |
| 4 | フィリピン | Cleto Nanola | University of Philippines |
| 5 | シンガポール | Karenne Tun | National Parks Board |
| 6 | タイ | Thamasak Yeemin | Ramkhamhaeng University |
| 7 | ベトナム | Nguyen Van Long | Institute of Ocenography |
| 専門家（6 名） | | | |

| | | | |
|---|---|---|---|
| 1 | 日本 | 山野　博哉 | 国立環境研究所 |
| 2 | シンガポール | Loke Ming Chou | National University of Singapore |
| 3 | シンガポール | Danwei Huang | National University of Singapore |
| 4 | シンガポール | Samuel Chan | National University of Singapore |
| 5 | 台湾 | Chao-Yang Kuo | Academia Sinica |
| 6 | 香港 | Vivian Lam | Ocean Park Conservation Foundation Hong Kong |
| 事務局（4 名） | | | |
| 1 | 日本 | 大澤　隆文 | 環境省自然環境局自然環境計画課 |
| 2 | 日本 | 鈴木　久美子 | 自然環境研究センター |
| 3 | シンガポール | Stephen Beng | Nature Society |
| ※ | 日本 | 木村　匡 | 自然環境研究センター<br>（日本コーディネーター兼任） |

**（4） 議題**

GCRMN 東アジア会合では、パイロット解析の対象国 7 カ国の GCRMN 国内コーディネーター及び解析特別チームを招聘し、パイロット解析の結果を確認した上でサンゴ群集の変化の傾向等についての意見交換・議論を行った。会合の議題は以下の通りである。

＜GCRMN 東アジア会合　議事＞

1 日目：

1．開会
2．事業の概要
3．パイロット解析の結果の共有
4．議論
- いかに各国のコメントを結果に反映させるか
- 解析の再検討のスケジュール

2 日目：

1．サンゴ礁モニタリングデータの東アジア地域解析に向けた次のステップ
2．2018 年から 2020 年までの作業計画
3．その他（アジア太平洋サンゴ礁シンポジウムについて）
4．閉会

## （５） 議事概要

【事業の概要】

- 2017年度にパイロット解析を行った上で、2018～2019年に総合解析を行い、2020年にはGCRMNの地球規模解析にデータを提供するという全体計画についての確認をおこなった。
- パイロット解析の結果を共有し、データ提供国からのコメントを受けて解析結果の考察を行い、最終的なパイロット解析の結果を2018年6月にフィリピン（セブ）で開催されるアジア太平洋サンゴ礁シンポジウムで発表することについて、参加者は合意した。

【パイロット解析の結果の共有】

- 1980年代から現代までの大まかなサンゴ被度の変遷が示されたが、データの取得期間が国によって異なるため、最も長期的なモニタリングデータを提供した国（今回はシンガポール）のサンゴ群集の変化傾向が強く出てしまった。
- タイやシンガポールのような低緯度のサンゴ群集に比較すると、日本や台湾の高緯度域では、サンゴ被度の増減がより激しく、変化がダイナミックに見えた。
- サンゴ被度の変化を考察するためには、水温データやオニヒトデ、台風による破壊など、サンゴ群集へのかく乱要因についての情報が必要である。
- 課題としては；
  - 「データがない」と「0」の区別が不明確、
  - 香港、フィリピン、ベトナムのデータが未提出、
  - サイト、地点等位置情報の表現が国によって異なる（同じ名称を複数の緯度経度情報に付けている、等）、
  - サンゴと魚、サンゴと海草など比較できるサンゴ以外のデータが、台湾以外はあまり揃っていない等。

【いかに各国のコメントを結果に反映させるか】

- 未提出の国からデータを収集する。
- ブランクと0データなどの区分を明確にするため、データ自体を再チェックする。
- 国毎の傾向も解析してみる。
- サンゴ群集の動態の変化の理由を裏付けるかく乱要因等の情報を収集する。
- 各国ともできる限り長期的なデータを提供する。
- 開発との関係を比較するのであれば、保護区と非保護区で比較する。
  - その場合、各国は保護区のデータを追加する必要がある。

【解析の再検討のスケジュール】

- 2018 年 3 月にはレポートのドラフトを完成する。
- 2018 年 1 月にはサンゴ被度の変化の要因となるような背景情報を各国が作成して解析作業グループに提出する。
- 2018 年 6 月にはフィリピンのセブで地域ワークショップを開催し、データの収集を試みる。
- 2018 年の ICRI 総会でも結果を共有する。
- 2019 年の ICRI 総会や 2020 年の ICRS も重要なイベントなので発表を検討する。

【サンゴ礁モニタリングデータの東アジア地域解析に向けた次のステップ】

- データの著作権やデータ利用についての取り決め、合意等、対象国を増やすときには正式な書類等の手続きが必要。
  - カリブ海での事例があるので参照できる。
- 残りの 7 カ国、特に大量のデータを保持するインドネシアとマレーシアに対するデータ収集戦略を検討する必要がある。

【2018 年から 2020 年までの作業計画】

- 2018 年 6 月：アジア太平洋サンゴ礁シンポジウムにおけるパイロット解析の結果を発表する。
- 2018 年 10 月：インドネシアかマレーシアにおいて国内データをとりまとめるための地域ワークショップ国内会合を検討する。
- 2020 年の CBD-COP15 の前、2019 年末頃に CBD-SBSTTA が開催される可能性があるため、そこへのインプットができないか検討する。
- 地域解析の結果を 2020 年の GCRMN の地域レポートとして作成する。

【その他（アジア太平洋サンゴ礁シンポジウムについて）】

- フィリピン大学がホストし、2018 年 6 月 4 日～8 日にフィリピンのセブで開催する。
- ウェブサイトでプログラムを公開。オンラインで登録が可能。
- 現在、基調講演者の選定を行っている。
- シンポジウムの直前か直後に東アジア地域ワークショップを開催し、他の 7 カ国からのデータ収集を試みる。

## ３． 解析結果のとりまとめ

GCRMN 東アジア会合の結果を踏まえ、各国の意見を反映したデータ解析を実施し、解析結果を各国に確認した上でパイロット解析の結果を取りまとめた。

### １） 各国の意見の反映

東アジア会合の結果を受けて、ベトナム等のデータを追加し、解析を行った。解析を行う際には、各地点の位置情報について、同じ緯度経度を持つ複数の地点がある場合、調査を行った水深で区分することや、複数の緯度経度に同一の地点名が使われている場合には個々の地点を特徴付ける地形的／地理的特徴を付記して区分するなど、個々のデータの明確化を計った。

サンゴ群集の変化の要因となるオニヒトデや台風、高水温等のかく乱要因については、情報を収集し、とりまとめるために相当の時間と労力が必要であるため、パイロット解析については、各国のサンゴ群集の変動及びかく乱の様子などを簡単にとりまとめた国別事情（National Chapter）を各国コーディネーターが作成し、今後の考察に用い、また、次年度のアジア太平洋サンゴ礁シンポジウム(2018 年 6 月 4～8 日)での発表やGCRMN 東アジア地域ワークショップ（2018 年 6 月 9～10 日）における議論に備えることとした。

### ２） パイロット解析結果概要

東アジア 7 カ国のモニタリングデータの解析から、1980 年代の高いサンゴ被度から 1990 年代、2000 年代と 10 年毎に減少傾向が見られた。これは、オニヒトデの大発生や高水温による白化現象などのかく乱が 90 年代以降によく見られたためと思われた。また、1980 年代から東南アジア各地では経済成長にともなう沿岸開発、陸域開発が進んだことが、サンゴ被度の減少に影響しているのではないかと考えられた。また、シンガポールやタイ等の東南アジアに比較して、日本や台湾等高緯度地域のサンゴ礁／サンゴ群集ではより被度の増減が激しく、サンゴ群集が不安定であると思われた。これは、熱帯、亜熱帯地域に比較して、サンゴ群集の分布の北限域では、高水温や台風等のかく乱の他にも、冬期の低水温による白化現象など、より多くのストレスがあるために、サンゴ被度が大きく変動するのではないかと考察された。

一方、各国で蓄積されているモニタリングデータを解析する事によりサンゴ被度の動態が把握できるのに比べて、その要因となるかく乱要因についてのデータがほとんどないため、サンゴ群集の動態を解釈する事が難しい。今回のパイロット解析の結果から、今後、東アジアの他の 7 カ国を含めた総合解析を行う場合には、それらのかく乱要因に関するデータの抽出及び収集が重要な課題となることが示された。

また、今回のパイロット解析において、最も古いデータを提出したシンガポールのサンゴ群集の動態に全体の傾向が影響を受けたことから、より正確なサンゴ群集の地域における動態を把握するためには、各国ができる限り長期的なデータを提供することが必要となる。次年度以降に予定している総合解析では、より長期的で広範なデータの収集が課題となる。

尚、今回の結果は東アジアの一部の国のデータのみを使用した試行的なものであり、さらに対象国を追加して行う総合解析の結果とは異なるものと思われる。

## ４． 東アジア地域レポートの取りまとめ

平成 27～28 年度の東アジアにおけるサンゴ白化現象の状況について、東アジア各国の状況を照会し、東アジアレポートとして取りまとめた。

### １） 東アジア各国への白化現象の状況照会

2015 年から強いエルニーニョ現象／ラニーニャ現象が起こり、世界各地で異常高水温によるサンゴの白化現象が確認された。1998 年の大規模白化現象を上回り、これまでで最悪の被害を受けた大規模白化現象について、東アジアの状況を把握するため、GCRMN 各国コーディネーターに白化現象に関する情報提供の照会を行った。

紹介の対象とした GCRMN 東アジア各国コーディネーター

| | 国 | 氏名 | 所属 |
|---|---|---|---|
| GCRMN 北東アジア地域　各国コーディネーター（5 名） | | | |
| 1 | 中国 | Huang Hui | Chinese Academy of Sciences |
| 2 | 香港 | Put O. Ang | Chinese University of Hong Kong |
| 3 | 台湾 | Allen Chen | Academia Sinica |
| 4 | 日本 | 木村　匡 | 自然環境研究センター |
| 5 | 韓国 | Heung Sik Park | Korean Institute of Ocean Science and Technology |
| GCRMN 東南アジア地域　各国コーディネーター（10 名） | | | |
| 1 | ブルネイ | David Lane | University of Brunei Darussalam |
| 2 | カンボジア | Ouk Vibol | Fisheries Administration |
| 3 | インドネシア | Suharsono | Indonesia Science Institute |
| 4 | マレーシア | Affendi Yang Amri | University of Malaysia |
| 5 | ミャンマー | Zau Lunn | Fauna and Flora International |
| 6 | フィリピン | Cleto Nanola | University of Philippines |

| | | | |
|---|---|---|---|
| 7 | シンガポール | Karenne Tun | National Parks Board |
| 8 | タイ | Thamasak Yeemin | Ramkhamhaeng University |
| 9 | ベトナム | Nguyen Van Long | Institute of Oceanography |

### ２） 東アジア地域レポート概要

アメリカ海洋大気庁（NOAA）の海面表層水温の観測結果によると、2015 年から 2016 年にかけて、1949 年以降に発生した中で最大のエルニーニョ現象が起こり、それに伴った大規模なサンゴの白化現象が 2014 年から 2017 年にかけて世界各地で記録された。この大規模な白化現象は、1998 年と 2010 年に続く第 3 番目の世界規模の現象であり、その中でも最も長期にわたり、最も広い範囲のサンゴ礁に影響を与え、過去最大の被害をもたらした。

2014 年には、北太平洋のグアム・北マリアナ諸島、マーシャル諸島、ハワイ）及びメキシコ湾のフロリダで高水温による白化現象が確認された。

2015 年になると高水温域は南太平洋のソロモン諸島、パプアニューギニア、フィジー、サモア、キリバス、ライン諸島、フェニックス諸島など広い範囲にひろがり、また、インド洋のチャゴス諸島や東南アジアのインドネシアでも白化現象が見られた。さらに、紅海やカリブ海（パナマ、バハマ、タークス&カイコス諸島、ケイマン諸島、ドミニカ共和国、ハイチ、オランダ領ボネール島）、メキシコ湾（フロリダ）、ハワイ等にも広がった。

2016 年に入ると、インド洋（タンザニア、コモロ諸島、マダガスカル、マスカリーン諸島：レユニオン・モーリシャス・ロドリゲス、タンザニア、セイシェル、ケニア）や南太平洋（フレンチポリネシア、ニューカレドニア、フィジー、オーストラリア・グレートバリアリーフ、キリバス）において白化現象の報告が相次ぎ、特にオーストラリアでは死亡率が 75%を越えた地域もあるなど、大きな被害がもたらされた。東アジアでもインドネシアやタイ等で局所的な白化現象及びそれにともなう死亡が確認された。また、日本では琉球列島の南部で死亡率 50%を越える大規模な白化現象が確認された。2017 年も琉球列島の一部では高水温による大規模な白化現象が確認されたが、死亡率は低く、2016 年程の被害ではなかったと評価された。

## 第２章　　第 32 回 ICRI 総会への対応

フランス事務局による任期中最後の総会となる第 32 回 ICRI 総会が、2018 年 12 月にケニアのナイロビで開催された。環境省担当官に同行し、GCRMN 東アジアにおける活動についての発表を行うと共に、サンゴ礁生態系保全に関する国際的な動向についての情報収集を行った。

### １．第 32 回 ICRI 総会

第 32 回 ICRI 総会は、2018 年 12 月 7 日から 9 日にケニアにある国際連合ナイロビ事務局で開催された。フランス事務局による２回目の総会であり、事務局が掲げる行動計画の取りまとめが行われ、３つの決議文書が採択された。また、総会中に次期事務局をオーストラリアとモナコが担当することが決まった。

#### １）開催場所:国際連合ナイロビ事務局（ケニア）

フランス事務局の主催による第 32 回 ICRI 総会は、ケニアにある国際連合ナイロビ事務局において開催された。

#### ２）開催日程：2017 年 12 月７日（木）～９日（土）（３日間）

| 月日（曜） | 業　　務 |
|---|---|
| 12 月 6 日（水） | ➢　移動（往路）<br>00:30　羽田発　　07:20　ドバイ着<br>10:25　ドバイ発　14:35　ナイロビ着<br>19:30　プレイベント:サンゴ礁保全普及啓発映画『Chasing Coral』一般公開 |
| 12 月 7 日（木） | ➢　ICRI 総会<br>13:00　登録<br>14:00　開会（ハイレベルパネル・動議の発表・新メンバー紹介・ICRI/UN Environment 助成金事業・オーストラリア革新的なの取り組み）<br>18:00　終了 |
| 12 月 8 日（金） | ➢　ICRI 総会<br>08:30　開始（マングローブ及び海草生態系の保全・GCRMN）<br>13:00　昼食<br>14:00　再開：（GCRMN による現状把握と白化現象・IYOR） |

| | |
|---|---|
| | 18:00　終了 |
| 12 月 9 日（土） | ➢　ICRI 総会<br>08:30　開始（UNEA2 とサンゴ礁保全・SDG とサンゴ礁）<br>12:30　昼食<br>13:30　再開（オーストラリアの取組・新事務局・とりまとめ）<br>15:00　閉会 |
| 12 月 10 日（日） | ➢　移動（帰路）<br>06:50　ナイロビ発　22:50　ドバイ着 |
| 12 月 11 日（月） | 02:55　ドバイ発　　17:20　成田着 |

### ３） 参加者

ICRI は 59 の国メンバーと NGO やその他国際機関等に属する組織・団体メンバー32 からなる。総会には、20 の国及び組織・団体メンバーから合計約 70 名が参加した。

日本からは環境省自然環境局自然環境計画課の大澤隆文サンゴ礁保全専門官と一般財団法人自然環境研究センターの木村匡上席研究員が出席した。

**■第 31 回 ICRI 総会参加者**

| **政府メンバー：** | | |
|---|---|---|
| | **氏名** | **所属** |
| 1 | David Souter | オーストラリア / Australian Institute of Marine Science |
| 2 | Andrew Edge | オーストラリア / Department of Foreign Affairs and Trade |
| 3 | Russell Reichelt | オーストラリア / Great Barrier Reef Marine Park Authority |
| 4 | Ben Palmer | オーストラリア / Great Barrier Reef Marine Park Authority |
| 5 | Juana de Dios Murillo | コロンビア |
| 6 | Ernesto Gómez Díaz | キューバ |
| 7 | Ydalia Mercedes Acevedo Monegro | ドミニカ共和国 |
| 8 | Serge Planes | フランス / CRIOBE |
| 9 | Charlotte Moritz | フランス / CRIOBE |
| 10 | Xavier Sticker | フランス / ICRI |
| 11 | Nadia Deckert | フランス / ICRI |
| 12 | Pascal Colin | フランス / ICRI |
| 13 | Ludovic Schultz | フランス / ICRI |
| 14 | Aurelie Thomassin | フランス / ICRI |
| 15 | Mr. Hendra Yusran Siry | インドネシア |
| 16 | 大澤　隆文 | 日本 |
| 17 | 木村　匡 | 日本 |
| 18 | Judith Nyunja | ケニア |
| 19 | Heung Sik PARK | 韓国 |
| 20 | Mr Ab Rahim bin Gor Yaman | マレーシア / Ministry Of Natural Resources and Environment |
| 21 | Wilfrid Deri | モナコ |
| 22 | Didier Zoccola | モナコ |

| | | |
|---|---|---|
| 23 | Toe Toe Aung | ミャンマー |
| 24 | Anne-Claire Goarant | ニューカレドニア |
| 25 | Rilwan Yoosuf | モルディブ共和国 / Marine Research Centre |
| 26 | Anzul Banu Jhan | スリランカ |
| 27 | Jorid Fjeld Hammersland | スウェーデン |
| 28 | Niphon Phongsuwan | タイ |
| 29 | John Clorley | 英国 |
| 30 | Stephanie W. Aktipis | アメリカ合衆国 |
| 31 | Jason Philibotte | アメリカ合衆国 |
| 32 | Jennifer Koss | アメリカ合衆国 |
| 組織・団体メンバー： | | |
| | **氏名** | **所属** |
| 1 | Ben Honey | Blue Ventures |
| 2 | David Obura | CORDIO East Africa |
| 3 | Mishal Gudka | CORDIO East Africa |
| 4 | Theresa Fyffe | Great Barrier Reef Foundation |
| 5 | Rolland Baldeo | Grenada Coral Reef Foundation |
| 6 | Said Ahamada | Indian Ocean Commission |
| 7 | David OSBORN | International Atomic Energy Agency (IAEA) |
| 8 | Inger Andersen | IUCN |
| 9 | James Kairo | Kenya Marine and Fisheries Research Institute |
| 10 | Claudia Ruiz | MAR Fund |
| 11 | Dixon Waruinge | Nairobi Convention |
| 12 | Maria Rivera | Ramsar |
| 13 | Martha Rojas-Urrego | Ramsar |
| 14 | Lucie Labbouz | Regional Activity Centre for Specially Protected Areas and Wildlife |
| 15 | Jan Robinson | Science and Conservation of Fish Aggregations (SCRFA) |
| 16 | Warren Lee Long | Secretariat of the Pacific Regional Environment Programme (SPREP) |
| 17 | Mathilde Kraft | Secretariat of the Pacific Regional Environment Programme (SPREP) |
| 18 | Muhammad Khurshid | South Asia Co-operative Environment Programme (SACEP) |
| 19 | Petra MacGowan | The Nature Conservancy |
| 20 | Richard Vevers | The Ocean Agency |
| 21 | Stephanie Roach | The Ocean Agency |
| 22 | James Harvey | The Reef-World Foundation |
| 23 | Gabriel Grimsditch | UN Environment |
| 24 | Monika Macdevette | UN Environment |
| 25 | Sam Barratt | UN Environment |
| 26 | Mette Wilkie | UN Environment |
| 27 | Jerker Tamelander | UN Environment |
| 28 | Ole Vestergaard | UN Environment |
| 29 | Hazel Thornton | UN Environment World Conservation Monitoring Centre (UNEP-WCMC) |
| 30 | Peter Thomson | United Nations Secretary-General (UNSG) |
| 31 | Erin McCreless | University of California Sana Cruz |
| 32 | Caleb McClennen | Wildlife Conservation Society |
| 33 | Jared Bosire | WWF |

### ４） 議題

第 32 回 ICRI 総会は、フランス事務局として最後の総会に当たるため、最初に立案した行動計画のテーマ毎に議論が進められ、メンバーによる活動の発表を通して、その取り組みの進捗や成果が議論された。特に、フランス事務局が自国内でも推進している「気候変動に向けたサンゴ礁及び関連する生態系の対応についての普及啓発の推進」や「規制の強化によるサンゴ礁やマングローブ及び藻場に対する人為的な脅威の削減の推進」、ICRI 設立 20 周年を記念する国際サンゴ礁年（IYOR）に関連する「教育を通した保全の推進」については多くの発表が行われた。また、前回総会から懸案事項となっている地球規模サンゴ礁モニタリングネットワーク（Global Coral Reef Monitoring Network: GCRMN）の運営については、それに関連した行動計画テーマ４「より良い管理のためのサンゴ礁現状モニタリング」を含めて、活発な議論が行われた。

**第 32 回 ICRI 総会における議事**

**【第 1 日目：12 月 7 日（木)】**

- 開会
- ハイレベルパネル
- 議題の承認
- 新しいメンバー（ミャンマー）
- 事務局への資金提供（モナコ、フランス、US 及びスウェーデン）
- ICRI 事務局：現在の資金援助団体の資金提供プログラムについての検索可能なカタログ（UNEP-WCMC）
- ICRI 及び UN Environment 助成金プログラム 2017
- GCRMN 西インド洋レポートのラウンチ（IOC、CORDIO）
- オーストラリアからの新たな取り組みの提案

**【第 2 日目：12 月 8 日（金)】**

- 行動計画・テーマ３：「規制の強化によるサンゴ礁やマングローブ及び藻場に対する人為的な脅威の削減の推進」
- 行動計画・テーマ４：「より良い管理のためのサンゴ礁の現状監視」
- 行動計画・テーマ５：「教育を通した保全の推進」

**【第 3 日目：12 月 9 日（土)】**

- 行動計画・テーマ２：「サンゴ礁に関する国際的な要望への対応」
- 硬度計画・テーマ１：「気候変動に向けたサンゴ礁及び関連する生態系の貢献に

ついての普及啓発の推進」

- ICRI メンバーからの発表
- オーストラリアによる革新的取組について
- 次期事務局
- 会議の成果
- 閉会

**５） 議事概要**

今回の総会では冒頭のハイレベルパネルセッションに Peter Thomson 国連海洋特別大使と Inger Andersen 国際自然保護連合事務局長及び Martha Rojas-Urrego ラムサール条約事務局長を迎えた。総会の座長は Xavier Sticker フランス環境大使が務め、Monika Macdevette 国連環境計画生態系局長代理の歓迎の挨拶で始まり、Mette Wilkie 国連環境計画生態系局長の閉会の挨拶で締めくくられた。（参照：英文議事概要：付録５）

- 新メンバー

  ミャンマーが新しいメンバー（第 38 番目の政府メンバー）として承認された。また、フランスの海外領土であるニューカレドニアの ICRI 参加を巡って規約の改正が必要であるため、ワーキンググループが設置される。

- 事務局への資金提供（モナコ、フランス、US 及びスウェーデン）

  事務局から、ICRI 事務局及び事務局が実施する 2016-2018 行動計画に対して資金援助をした以下の国々に感謝の意が述べられた。また、アメリカの長期に渡る ICRI への資金提供にも謝意が表された。

  - モナコ：少額助成金プログラム（100,000 ユーロ）
  - フランス：ICRI 行動計画の実施及び小額助成金プログラム（500,000 ユーロ）
  - スウェーデン：ICRI 行動計画の実施（2017 年に 300,000 ユーロ）
  - アメリカ：国連環境計画サンゴ礁ユニットの国際的なサンゴ礁保全活動及び ICRI と連携した活動への資金提供（2017 年に 290,000 ユーロ）

- ICRI と国連環境計画の助成金プログラム 2017

  230 を越える応募があり、その中から 5 つのプロジェクトが選定され、それぞれのプロジェクトに対して US60,000 ドルが助成される。

  - ケニア：気候変動対策のためのマングローブの管理
  - マレーシア：海洋空間計画における気候変動に対するサンゴ礁のレジリアンスと脆

弱性の適応

- バヌアツ：伝統的な MPA のレジリアンスの強化
- カリブ海地域：メソアメリカン・リーフ地域におけるサンゴ礁の再生と緊急対策のための革新的な資金メカニズムと法的メカニズム
- ニューカレドニア：白化現象に対してサンゴ礁保全戦略を強化するための海中景観の遺伝子的アプローチ

230 を越える応募から 33 の優秀なプロジェクトが選抜され、将来的な資金提供者に対して広く配布するためのリストにまとめられた。ICRI メンバーも可能であれば協力することが強く奨励される。

- 行動計画テーマ１：サンゴ礁及び関連する生態系が気候変動対策に寄与することについての普及啓発の推進（参照：英文テーマ１議論要約：付録９）

このテーマの目的は、サンゴ礁とマングローブ及び海草藻場の持続的な管理のために、国際的な資金を抽出し地図化することでギャップを抽出し、将来的な資金提供につなげることである。

- ICRI 事務局は、2018 年の初め頃に準備が整い次第この活動の成果を配布する。
- ICRI メンバーに対し、これらの活動へ資金提供あるいは支援したプロジェクトがあれば追加報告として事務局に提出することを奨励する。
- 可能であれば、このデータベースの管理は ICRI 事務局の活動として継続し、次の事務局の行動計画に含められるべきである。
- さらに、第 32 回 ICRI 総会では、気候変動に対するレジリエンス強化のための自然のインフラとしてのサンゴ礁及びマングローブへの投資の推進に関する勧告が採択された（参照：付録６）。

- 行動計画テーマ２：サンゴ礁に関連する国際的な要望への対応

<u>目標１：第２回国連環境総会（UNEA2、2016 年５月）で採択されたサンゴ礁の持続的管理に関する決議の実行</u>

- ICRI は諮問委員会の設立を歓迎し、その第１回会合への参加を楽しみにしている。
- 可能であれば、その活動は次期 ICRI 事務局の行動計画に含まれるべきである。

<u>目標２：持続可能な開発目標（SDG）、特に目標 14（海洋資源の保護と持続的利用）の達成の推進。</u>

- 第 32 回 ICRI 総会は、2016-2018 行動計画を実行する ICRI メンバーを代表して、UNEP-WCMC の行った取り組みを讃える。

その他の国際的な活動

- オーシャンアクションコミュニティー：サンゴ礁。国連のオーシャンコンファレンスをフォローアップしたボランティアによる取り組み。

  総会は、ICRI の認知度を上げる意味でも、ICRI がフォーカルポイントの候補に挙がったことを前向きに記録する。

- サンゴ礁の生命宣言 Coral reef life declaration（参照：付録 13）。

  ICRI メンバーはこの宣言に関心を持ち、将来的に署名を検討する。

- 行動計画テーマ３：規制ツールの活用強化によるサンゴ礁と関連するマングローブ及び海草に対する人為的脅威の削減の推進（参照：英文テーマ３要約：付録 10）

目標１：サンゴ礁と関連するマングローブ及び海草藻場保全のための法的枠組み及び数値目標と効果的な取り締まりの推進

事務局はメンバーの関心をひくため、メンバーレポートを元にサンゴ礁及び関連する生態系保全のための国内法の枠組みについての要約を作成している。上記事項に関してメンバーからの情報提供を推奨する。

目標２：プラスティックマイクロビーズの化粧品への使用禁止を奨励する

総会では、第 31 回総会で採択されたマイクロビーズの化粧品への使用に関する勧告をフォローアップするために情報を更新した。SPREP 加盟国が行動への呼びかけに合意したことを受けて、他の地域でも同様の取り組みを奨励する。

目標３：浚渫やサンゴ礁構造の人工改変による直接の人的損害を削減するための法的規制や取り締まりの向上

標記に関して勧告が採択された（参照：英文原文：付録７）。

目標４：サンゴ礁や海草藻場の機械的な破損を制限するような係留装置の開発

「環境に配慮した海洋構造物」に関する特別委員会が設置された。

目標５：日焼け止めやその他の内分泌かく乱物質のサンゴ礁への影響に関連する問題をレビューすることと、サンゴ礁に影響を与えない日焼け止めの開発の奨励

- レポートの結論では、この事項に関してさらに科学的な研究が必要であるとされた。
- ICRI メンバーには、この分野に関してさらに研究が必要である事について、国内等の研究機関に周知することを奨励する。

- 優良事例の共有が奨励される。
- 第 32 回総会で告知された政策提言が完成したので、会議が終わればメンバーに共有する。

- 行動計画テーマ４：より良い管理のためのサンゴ礁の現状監視－地球規模サンゴ礁モニタリングネットワーク（GCRMN）（参照：英文テーマ４要約レポート：付録 11）

GCRMN の調整に関して：

- 第 32 回 ICRI 総会は、2016-2018 行動計画に基づいて 2017 年に設置された作業部会の活動を更新した。作業部会は、2018 年初旬に会合を開催することを計画している。この会合に関してはコンサルタントを雇って支援する予定である。
- オーストラリア海洋科学研究所（AIMS）はある程度の資金提供が受けられるのであれば GCRMN を強化するために国際コーディネーションを担当することを提案した。
- 国連環境計画の地域海プログラムの GCRMN への協力の重要性もここに強調する。

サンゴ礁の現状についての地域レポートの発行に関連して、全ての地域で素晴らしい進捗があることを言及しておく。

- 西インド洋レポートが第 32 回 ICRI 総会でラウンチした。
- カリブ海に関して、GCRMN カリブ海は 2020 年にカリブ海レポートを更新するため、標準化したデータ収集と解析を実施するための活動を始めた。
- 太平洋レポートは 2018 年にラウンチする予定である。
- 東アジアレポートは、日本の強いリーダーシップにより準備が進められている。第 32 回 ICRI 総会は、データの提供と今後の協力に関してこれらの国々や機関に感謝する。

白化現象の監視については、

- いくつかの国では（フランス、マダガスカル、コモロ諸島）、第 31 回 ICRI 総会で採択された、モニタリングの開発を含む白化現象についての勧告を実行していることを言及する。他の国々に対しても同様の取り組みを行うよう奨励する。
- GCRMN はこの活動に取り組むべきである（白化現象後のモニタリング）。

最後の GCRMN 世界レポートは 2008 年に発行された。この状況からすると、ICRI 総会は 2020 年までに新しい世界レポートが発行されることを期待する。

- 行動計画テーマ５：教育を通したサンゴ礁保全の推進と国際サンゴ礁年（IYOR）2018
  （参照：英文テーマ５要約レポート：付録 12）
  - 第 32 回総会は、「Chasing Coral」を制作した Ocean Agency の IYOR2019 に対する貢献とその高い専門技術を歓迎する。
  - 第 32 回総会はまた、Ocean Agency が ICRI のパートナーとして一般企業の巻き込みに貢献する事も歓迎する。
  - 第 32 回総会は、IYOR2018 はサンゴ礁だけに焦点を当てるのではなく、関連する生態系についてもその活動やキャンペーンに含むことを強調する。
  - ICRI メンバーに対しては、国内の IYOR 行動計画を開発し、また具体的な行動や事業を開発することにも目を向けるよう奨励する。

  第３回の国際サンゴ礁年はサンゴ礁と関連する生態系の普及啓発のための長期的なキャンペーンを進める場として捉えられるべきである。IYOR は普及啓発に加えて、民間部門や資金を集めるための新たなパートナーシップを強化する機会として利用すべきである。

- オーストラリア政府による革新的取り組み（英文プログラム：付録３）

  オーストラリア政府は、つい最近オーストラリア外務省が発表した「サンゴ礁の革新的取り組み」をデザインするための双方向ディスカッションを行った。ICRI メンバーは以下の点に注目した。すなわち、ICRI メンバーの中で興味がある者の間で革新的グループあるいはネットワークを構築すること、今回のような試みを継続することがサンゴ礁への革新的な手法あるいはブループリントを開発につながること、そして、個別の専門的な問題や課題が革新的なアプローチを開発するために役立つということ。オーストラリア政府は今後も継続してサンゴ礁の革新的取り組みについての情報をメンバーに提供する。

- 次期事務局

  第 23 回 ICRI 総会は、モナコとオーストラリアが次期共同事務局を担当したいという提案を歓迎する。追加のパートナー国も含めた詳細は、追って紹介される。

### ６） 総会の成果

３日間の総会を通した最終的な成果物として、以下の２つの勧告と１つの特別委員会の作業要綱が採択された。

勧告：

１） サンゴ礁に対する浚渫及び土砂廃棄による被害の軽減についての勧告（参照：原文は付録７）

２） 気候変動に対するレジリエンス強化のための自然インフラとしてのサンゴ礁及びマングローブに対する投資の推進についての勧告（参照：原文は付録６）

作業要綱：

３） 環境に配慮した海洋建造物に関するガイドラインの作成に関する特別委員会作業要綱（参照：原文は付録８）

**（１）サンゴ礁に対する浚渫及び土砂廃棄による被害の軽減についての勧告**

*（2017 年 12 月 9 日ケニア・ナイロビにおける第 32 回 ICRI 総会において採択）*

国際航路協会の第 108 報告の「サンゴ礁周辺の浚渫と航路建設」を認識し、

浚渫とサンゴ礁構造の人工改変による人為的な破壊は世界が注目する深刻な課題であることを認識し、

浚渫及びサンゴ礁構造の人工的な改変による人為的な破壊を軽減するための法規制及び取り締まりの向上に関する ICRI 行動計画のテーマ３におけるゴール３．３を再認識し、

国際サンゴ礁イニシアティブは、

政府が、サンゴ礁を破壊するであろう地域での浚渫や土砂廃棄の影響を防ぎ、最小限にし、代替措置をとるよう奨励し、

さらに ICRI メンバーには、海洋及び沿岸域における持続的な観光、特にクルージングでの持続的な活動を推奨するよう呼びかけ、

新しい港湾や水路の建設によるサンゴ礁への影響を回避し最小限化し、代替措置をとるようにするために、専門性や優良事例を共有することを決議し、

また、浚渫した土砂の廃棄によるサンゴ礁への影響を回避するための専門性や優良事例、教訓を共有することを決議する。

## （２）気候変動に対するレジリエンス強化のための自然インフラとしてのサンゴ礁及びマングローブに対する投資の推進についての勧告

*（2017 年 12 月 9 日ケニア・ナイロビにおける第 32 回 ICRI 総会において採択）*

沿岸域は、地球上で最も人口密度が高い地域であることを認識し、

沿岸域の地域社会とインフラストラクチャーは、気候変動によって悪化される豪雨や度重なる嵐の影響のリスクにさらされていることを考慮し、

また、科学者や保険産業界が、島嶼国にとってこのような事態に適応するためにはサンゴ礁やマングローブの再生がもっとも費用対効果が高いとしていることを認識し、

サンゴ礁が波浪エネルギーを 97%削減し、波のエネルギーが海岸線を直撃するために毎年多くの国で起こるような洪水による数千万から億ドルの被害を防いでいることを認識し、

マングローブは洪水による人間と土地への被害を年間 25%防いでいるとされていることを認識し、

ICRI が 2001 年に採択したサンゴ礁再生についての決議を再認識し、

沿岸域への投資価値の約 3%は、自然のインフラストラクチャーとして知られている、サンゴ礁やマングローブを含む沿岸生態系の保護や再生に使われていることを認識し、

沿岸域の人工及び自然のインフラストラクチャーの両方に世界中で使われている膨大な資金は、政府あるいは GEF や世界銀行などの多国籍機関、地域開発銀行から支出されていることを認識し、

国際サンゴ礁イニシアティブは、

生態系の健全性や気候変動のレジリエンスを向上させるサンゴ礁やマングローブの再生事業に対するこれまでの投資を讃え、

再生は、サンゴ礁やマングローブ林に対して脅威が認められた時だけに実施されるべきだ

と認識し、

特に気候変動の影響によるリスクに最もさらされている地域では、サンゴ礁の保全や再生を通した、沿岸の自然のインフラストラクチャーに対する投資を増加する要望があることを認識し、

特定のサンゴ礁やマングローブの保全や再生のための取り組みが必要なところを抽出し、この自然のインフラストラクチャーが最も効果的に気候変動に関するリスクを回避できる場所を選定することを奨励する。

また、サンゴ礁とマングローブの保全と再生のための革新的な資金調達メカニズムの開発に対する要望があることを認識し、

開発銀行や国際機関等が、自然のインフラストラクチャーや自然と人工のハイブリッドのインフラストラクチャーを、気候変動のリスクを軽減する費用効果の優れた持続的な解決策として支援するような資金調達の方法を開発することを奨励する、

また、政府がリスク削減の手法としての費用対効果を評価して、マングローブ林やサンゴ礁の保全や再生のような自然のインフラストラクチャーを考慮することを奨励する、

保険や融資業界に対して、リスク削減のためにマングローブやサンゴ礁の保全や再生を支援するためのレジリアンス・ボンド（債券）のような新たなツールの開発を奨励する、

ICRI メンバーに、サンゴ礁の健全性と気候変動のレジリアンスを向上させるための自然のアプローチの開発を奨励することを呼びかける、

また、自然のインフラストラクチャーのプロジェクトへ資金を調達するメカニズムを抽出するために、地元の地域社会と政府、及び国際機関や民間部門との間のパートナーシップを強化することを奨励する。

### （３）環境に配慮した「グリーン」海洋建造物（エコデザイン）に関する特別委員会の作業要綱

*（2017 年 12 月 9 日ケニア・ナイロビにおける第 32 回 ICRI 総会において採択）*

第 32 回 ICRI 総会における環境に配慮した「エコ」係留装置と「グリーン」海洋建造物についての発表及び ICRI 行動計画のテーマ３目的４（サンゴ礁や海草藻場への機械的な破壊を制限するための係留装置の開発の奨励）を受けて、環境に配慮した海洋建造物（エコデザイン）に関する特別委員会を設置する事を決定した。

主な目的は、ICRI メンバーにエコデザインの海洋建造物を開発するためのガイドラインを提供することである。委員会は、この分野に注目している他の取り組みと連携する。

特別委員会は以下の活動を実施する：

- 環境委配慮したグリーン海洋建造物についてのガイドラインを開発する。特に、最初は、環境に配慮した「エコ」係留装置に着目する、
- 情報サイトを作成するための様々な事例を収集する、
- ICRI ウェブサイトにそのためのページを作成する。

活動機関：本特別委員会は第 33 回 ICRI 総会において進捗報告を行う。
座長：ICRI 事務局
メンバー：フランス、イギリス、Reef World Foundation

## ２．サンゴ礁生態系保全についての国際的な動向

### ICRI の新しい方向性　～フランス事務局が ICRI に果たした役割～

#### １）資金調達に対する具体的な取り組み

2016 年から 2018 年の事務局を担当したフランス政府は、少額助成プログラムを積極的に推進したことで、スウェーデンやモナコなどからの資金提供を引き出した。これまで ICRI はサンゴ礁保全に対する国際的な方針や方向性だけを決め、その先の具体的な活動についてはメンバー国／組織の自主努力、あるいは世界銀行や GEF 等の外部資金提供団体のプロジェクト頼りであったのを、ICRI 独自が資金提供を行い、自ら策定した決議や方針を実行する力を備えるようにしたことは、ICRI に参加する開発途上国にとっても参加への大きなインセンティブになる。

#### ２）国連環境計画（UN Environment）との明確な連携

今回の総会を国連ナイロビ事務局で開催したことでも分かるように、フランス事務局は UN Environment との連携を強化してきた。これは、国際的な条約ではないために決議等に強い拘束力を持たない ICRI が、UN Environment の関係する UNEA や Ocean

Congress 等の海洋関連の国際的な動きと緊密に連携することや、UN Environment を仲立ちとして CBD やラムサール等と連携することで、自らの国際的な影響力を強めようという戦略と考えられ、これまでのところフランス事務局は、国連関係のネットワークの中で ICRI を可視的にすることにかなり成功しているのではないかと思われる。また、GCRMN に関して UN Environment が積極的に立て直しをはかり、ICRI 事務局の代りに常にリーダーシップを発揮していることからも、UN Environment が ICRI の共同経営者といえるほどに緊密な関係となったことを明確にしている。

### GCRMN の転換　～ボランティアによるネットワークから組織団体へ～

UN Environment が GCRMN を強力にサポートしている背景には、GCRMN が抱えるサンゴ礁モニタリングに関する膨大なデータに着目し、CBD の SBSTTA や IPCC 等へ科学的情報を提供できる強力な体制に育て上げようとしている目論見があると思われる。

これまでは GCRMN は、2008 年の世界レポートを発行するまで世界コーディネーターであった Clive Wilkinson 博士の個人的な熱意により、各国の研究者から生データを収集することはせず、各国からのサマリーレポートを取りまとめて世界のサンゴ礁の現状を分かりやすく描いてきた（「Coral Reefs of the World」）。ところが GCRMN の歴史が 20 年近くになると、各地でモニタリングデータが十分蓄積されてきた。そこで、当時 GCRMN を運営していた IUCN では、Jeremy Jackson 博士をアドバイザーとして地域における生データを取りまとめ、カリブ海レポート（2014）として影響力のある学術論文レベルの報告書を作成した。しかし、東アジアのように、地域内のサンゴ礁研究に歴史があり、多くの優秀な研究者を抱えている地域では、外部の研究者が地域内のデータを用いて学術論文や影響力のある報告書を作成してしまうことに強い反感と危機感を持っているため、地域の自主性を維持しつつ、自らがデータ解析を行いつつある。このような動きは大洋州（フランスが主導）やインド洋（CORDIO が主導）でも見られ、Wilkinson 博士の引退後地球規模のコーディネーションを失った GCRMN が、各地域に活動を分散して同時並行的にモニタリングのとりまとめを実施するような体制になっている。

そこで、UN Environment では、GCRMN の仕組みをこれまでのボランタリーな協力関係ではなく、もっと公式なものとして確立し、データの提供及びとりまとめを中央でコントロールできるような体制を模索している。実際には、現行の各地域の活発な動きを継続しつつ、中央集権体制を確立するためは地域との十分な議論が必要であり、第 32 回 ICRI 総会でも述べられているように、UN Environment は 2018 年の 4 月にバンコク事務所で GCRMN の運営についての会合を開催し、新たな GCRMN の体制及び運営についての議論が行われる予定である。

**新事務局オーストラリアの思惑　～気候変動とイノベーション～**

新しい ICRI 事務局をモナコと共同で引き受けるオーストラリアでは、昨年の異常高水温により大規模な白化現象が起こり、貴重な観光資源であり、サンゴ礁研究や保全管理の場としても重要なグレートバリアリーフが死亡率 60%という壊滅的な被害を受けた。しかし、グレートバリアリーフ海中公園局はこの大事件を逆手に取り、これまでなかなか進まなかったサンゴ礁保全のための陸域対策や気候変動対策をサンゴ礁保全に結びつけるべく、大きなかじ取りを行った。200 万豪ドル規模の国家予算を獲得し、グレートバリアリーフを回復させるための長期的で大規模な再生計画を始めた。ICRI 事務局を引き受けるのも、国内で目指す方向性を世界的に展開し、国内施策を国際的な流れの中に位置づけるという狙いもあると思われる。また、かつてはサンゴ礁研究及び保全管理の場として世界をリードしていたグレートバリアリーフの威信を取り戻すことも期待されている。

今回の総会でも盛んにイノベーション（革新的な）という視点で、陸域対策や気候変動対策にサンゴ礁保全を結びつけるための新しい考え方を生み出す新たな視点を紹介していた。オーストラリアが事務局を引き受ける次の 2 年の間に、サンゴ礁保全活動を一般に普及させる新機軸を見つけ出せことが期待される。

付録

## １．データ解析特別チーム会合・議事録

**Minutes for GCRMN East Asia Regional Data Analysis Task Force Team Meeting**

**Date:** **September 18, 2017**

**Venue:** **National University of Singapore (NUS)**

**Aim:** **To share progress and current situation of data collection and develop an action plan for pilot analysis of coral monitoring data in the East Asia Region**

**Organizers:** **Ministry of the Environment (MOE), Japan**

**National Parks Board (NParks), Singapore**

**GCRMN East Asia Region (Southeast and Northeast Asian Nodes)**

**Asia Pacific Coral Reef Society (APCoRS)**

**Participants:** **Task Force Team Leader: Danwei Huang (National University of Singapore)**

**Main Analyst: Joy Wong (National University of Singapore)**

**Samuel Chan (National University of Singapore)**

**Supervisor: Loke Ming Chou (National University of Singapore / APCoRS)**

**Advisors: Allen Chen (Academia Sinica, Taiwan)**

**Hiroya Yamano (National Institute of Environmental Studies, Japan)**

**Reviewers: Chao-Yang Kuo (James Cook University, Australia)**

**Vivian Lam (Ocean Park Conservation Foundation Hong Kong)**

**Coordinators: Karenne Tun (NParks, Singapore / GCRMN Southeast Asia Node)**

**Tadashi Kimura (Japan Wildlife Research Center (JWRC) / GCRMN East and Northeast Asia Node)**

**Agenda:**

1. **Opening**
2. **Progress and current situation on data collection**
3. **Work plan 2017-2018 for pilot analysis**
4. **Others**
5. **Closing**

**Minutes:**

**Project Overview**

Aim – To enhance coral reef monitoring and share the latest information on coral status

Countries involved: East Asia (China, Hong Kong, Taiwan, Japan, South Korea), Southeast Asia (Singapore, Thailand, Vietnam, Philippines, Malaysia, Indonesia, Myanmar, Brunei, Cambodia)

EA Branch Purpose: (I) Identify current situational trend, (II) Establish mechanism of regular assessment in the region, (III) Build capacity of younger scientists

**General Work Plan**

2017 – Pilot analysis

2018 – Pilot presentation for APCRS 2018 in **June 2018**

Targeted deadline for draft of pilot report on **March 2018**

Data: Singapore, Thailand, Vietnam, Taiwan (Current data) + Philippines, Hong Kong, Japan (To be obtained)

Follow-up data collection: Brunei, Cambodia, Myanmar, China, South Korea + Coordination meeting: Indonesia, Malaysia

2019 – Overall Analysis

2020 – Regional report for ICRS 2020, scientific paper published, database with systems for analysis with data input

**Current Status**

- Singapore: Longest dataset, benthic only, no fish data
- Taiwan: Next longest dataset, benthic + fish data
- Vietnam: Benthic only
- Thailand: Some transects aggregated

**Difficulties in data reporting/analysis**

- Headers altered in template returned
- Clarifications needed on macroalgae – to check if nutrient indicator algae or turf algae are included and CCA (crustose coralline algae) excluded
- Clarifications on site names and GPS coordinates – to check if similar names with different GPS coordinates are the same sites
- Identification of local disturbances – Typhoons for Northern lattitudes, Bleaching events, Pollution
- Lack of true permanently laid transects
- Identification of other anomalies in datasets

- Only sufficient funding for either Malaysia or Indonesia in the first year for a general meeting to train and build capacity – to check for other funding sources or hold general meeting in other country in the following years

**Analysis**

The following questions serve as a guideline for analysis –

Q1 Is there a trend of coral reef cover decline with time

- Requires overlap between time periods for site level data
- Check if trend is consistent with Bruno & Selig (2003)

Q2 Is the trend of coral reef cover decline due to overfishing?

- Requires fish data with benthic cover

Q3 Is the correlation between macroalgae cover and coral cover

- Requires benthic cover data

Q4 What is the baseline data

- Potentially using data from 1990s
- 1980s mark a bad decade for coral reefs due to large increase in destructive efforts (fishing, dynamite, cyanide, etc. on reefs)
- 1990s mark the start of improvement in management efforts representing a good baseline reef cover with management interventions

**Methods for exploration**

- Time-series analysis
- GAMMs
- Extract sea surface temperature and historical weather information to mark periods of bleaching and typhoons respectively
- Use of mean temperature trends and thermal maximums for temperature-based analysis
- Separate data into blocks between major disturbance events
- Compare data between shallow depths (3-6m) and deep depths (8-10m)

**To follow up**

- Submission of data by Japan, Hong Kong, Philippines
- Clarifications of data tables

## ２．GCRMN 東アジア会合・議事録

Global Coral Reef Monitoring Network (GCRMN) East Asia Regional Meeting
on
Regional data analysis of coral reef monitoring in East Asia

Meeting Minutes

| | |
|---|---|
| Date: | November 20-21, 2017 |
| Venue: | Taipei Room, Hotel Marco Polo Plaza, Cebu, Philippines |
| Aim: | To review the result of the pilot analysis for regional data analysis of coral reef monitoring in the East Asia region |
| Organizers: | Ministry of the Environment (MOE), Japan<br>GCRMN East Asia Region (Southeast and Northeast Asian Nodes)<br>Asia Pacific Coral Reef Society (APCoRS) |
| Participants: | GCRMN national coordinators:<br>- Cleto Nanola (Philippines)<br>- Thamasak Yeemin (Thailand)<br>- Karenne Tun (Singapore)<br>- Nguyen Van Long (Vietnam)<br>- Put O. Ang (Hong Kong)<br>- Allen Chen (Taiwan)<br>- Tadashi Kimura (Japan)<br>Regional experts:<br>- Loke Ming Chou (National University of Singapore / Asia Pacific Coral Reef Society)<br>- Danwei Huang (National University of Singapore)<br>- Samuel Chan (National University of Singapore)<br>- Hiroya Yamano (National Institute of Environmental Studies)<br>Regional resource persons:<br>- Chao-Yang Kuo (Academia Sinica, Taiwan)<br>- Vivian Lam (Ocean Park Conservation Foundation Hong Kong)<br>Secretariats:<br>- Takafumi Osawa (MOE, Japan)<br>- Karenne Tun (NParks, Singapore / GCRMN Southeast Asia Node)<br>- Tadashi Kimura (Japan Wildlife Research Center (JWRC) / GCRMN East and Northeast Asia Node)<br>- Kumiko Suzuki (JWRC)<br>- Stephen Beng (Nature Society, Singapore) |

Meeting Minutes:

**Day1 (November 20, 2017)**

**Opening**

**Opening address (Takafumi Osawa (TO), MOE Japan)**

Takafumi Osawa expressed gratitude to APCRS members, and encouraged everyone to continue to develop the good regional work over the next 2 days.

**Welcome speech (Prof Chou Loke Ming, APCoRS)**

Prof Chou reinforced the importance of this workshop, which will enable the network to use the pilot analysis to move forward regional coordination. He was pleased with the team of bright young people, and looked forward to a productive meeting with positive steps forward.

Tadashi Kimura made introductions to members of the network. Vivian Lam will be working for the Hong Kong Agriculture, Fisheries and Conservation Department soon.

**Approval of agenda**

**Project Overview**

**Karenne Tun / Tadashi Kimura: Presentation**

GCRMN is an operational network of ICRI and a Global and national coordinator.

A goodwill network for scientists to voluntarily contribute their expertise towards coral reef management strategies.

GCRMN East Asia – established in 2001, managed through 2 sectors: South East node and East and North East Node.

South East Node: Coordinated by Karenne Tun (Philippines, Vietnam, Cambodia, Thailand, Malsysia, Singapore, Indonesia, Myanmar, Brunei)

East and North East Node: Coordinated by Tadashi Kimura (South Korea, Japan, China, Taiwan, Hong Kong)

- To provide data/info to global reports, organize meetings @ICRC and GCRMN regional workshops

Tadashi Kimura provided a background on the APCRS symposiums: the inaugural meeting was held in Hong Kong in 2006, the second in Phuket in 2010, the following in Taiwan in 2014, and the next one will be held in Cebu in 2018.

The idea for formalizing the APCoRS was conceptualized in Hong Kong in 2006. The constitution was subsequently developed during the 2010 Phuket meeting, with an objective to strengthen and establish vision for the regional network

Regional Status Reports written in 2004, 2010, and 2014 are to be disseminated at APCRS. Dissemination will help share coral status with scientists and managers.

GCRMN (Global Coral Reef Monitoring Network) new phase:

GCRMN has been organized under ICRI since 1994.

An end to the global network coordination motivated a more regional focus.

The focus is also from a more scientific approaches, e.g. using mass data analysis. The objective of the network's scientific assessments and reef status summaries is to provide coral reef management options and recommendations. e.g. Caribbean

Regional Analysis of Coral Reef Monitoring

The Pilot Analysis

- Purpose: for the younger generation to take over and to build capacity of younger scientists in the region
- Duration:

  Phase I 2017-2018: 7 countries

  Phase II 18-19: 7 countries (Indonesia, Malaysia, Brunei, Cambodia, Myanmar, China, South Korea) – to organize a national workshop in either Indonesia or Malaysia in Phase III

  Phase III 19-20: finalize results in March 2020

  Phase IV: 2020
- Expected outputs:

Regional reports: pilot analysis and overall analysis, data sharing with global team for global analysis in 2020

Options: to write papers based on the pilot and final regional data analyses and also using the regional database of coral monitoring

**Discussion**

Allen Chen: asked if the group will be using the same format for reporting as time was short from now until Mar18.

Tadashi Kimura: replied that there was no need to print, delivery is for June 18, and that the focus is on the pilot study. He clarified that members don't need to write reports, and that only Danwei Huang, Tadashi Kimura and Karenne Tun are writing and submitting the report.

Danwei Huang suggests that he start with the draft, with trends and models of the analyses, then separate results into countries so that the country representatives can add the backgrounds.

Workshops planned in Phases 3 and 4: Tadashi Kimura asked if it would be too late to retrieve data during these workshops if they are all planned in p3/4, and suggested one workshop combining both, e.g. meet in Singapore, with both Indonesia and Malaysia representatives in attendance.

Put O Ang: suggested that another workshop session inviting Indonesia and Malaysia representatives to share would be more beneficial and not just a meeting.

Allen Chen: seconds Ang's suggestion to encourage other nations to contribute to the work done. He adds that by June18 Danwei Huang should have results.

Put O Ang: asked to clarify the objective of the workshop

Tadashi Kimura: clarified that it was meant as a national workshop

Put O Ang: suggested it to be a regional workshop instead. To arrange it for targeted people to keep the discussion group small and discussion points focused.

Karenne Tun: recommended that Malaysia Reef Check (Julian) is a good organization to invite.

Cleto Nanola: asked if there is a timeline for data collection

Danwei Huang: replied that the timeframe for data collection is an issue, and will discuss it later categorically by countries.

Tadashi Kimura: asked Cleto Nanola if he has space to organize the workshop.

Cleto Nanola: asked for more details on how the authorship of the product would be decided

upon, and if there were protocols for the use of data. He commented that most data belonged to MSI. He is currently working with data owned by his team. MSI has a different protocol.

Danwei Huang: replied that if published, data used is meant to be publicly available. If not published, negotiations would be needed. He doesn't mind who is in authorship, as each author should assume responsibility for their work. Acknowledgements need to be included. He added that people who have processed and contributed to data in a significant ways will be included.

Cleto Nanola: pointed out that biodiversity in the Philippines is rich across its archipelagic islands and asked if this data for Philippines would be included.

Danwei Huang: replied that they were unable to include all life-forms, and might be able to include only the lower denomination.

Tadashi Kimura: confirmed that Indonesia already has compiled data, and so do Malaysia through Reef Check, which would help kick start the workshop and save time.

**Sharing results of Pilot Analysis -1 Danwei Huang / Samuel Chan: Presentation**

Danwei Huang thanked everyone for their contributions and recognized the efforts of everyone to insert data into the template given. He also recognized Samuel's hard work.

He pointed out that starting out with 7 countries, they have so far received submissions from 5 countries, in order of when they were submitted: Singapore, Taiwan, Thailand and Japan.

He added that from discussions at the previous meeting, agreements were made through summary statistics and plots, where the group realized that they would have had to go with the lowest denominator, which in most data sets were coral cover, fish abundance/fish families, and algae. Discussions will continue over these 3 broad categories.

DW also noted from those summaries, starting with linear mix models, that those models were only powerful if there was data.

He hoped that the group will contribute more data to make this model more powerful which in turn would allow the group to be more precise with influences it makes.

Danwei Huang said there were interesting results to be shared and noted that there are also Local changes which are distinct from regional trends – need to talk to country coordinators to find out what the local context was which contributed to the deviation in trend. Several challenges remain:

Data completeness varies, categories different (as in the case of Algae), timeframe is different – how to better determine start and end of analysis, also relate to local disturbances (e.g. First half / second half of analysis) – effects can be wide ranging.

SC: Briefing on Data Compilation:

**Problems:**

1. Data sets not complete
   - should not be any blanks in data (NAs, blanks) – need complete data sets for Long-term data sets

2. Standardization of sites/locations
   - survey sites are definitions in the Caribbean project.
   - need to discuss what the scale is for data sets
   - need to separately analyze some of the data sets

- Singapore has the longest data sets, this presents a problem with varying time frames. With shorter time frames, the longer term trends won't be obvious.

Data sets graph: x-axis=year, y-axis=number of data sets

Cleto Nanola: Philippines has data and asked if they received it
Karenne Tun: only 5 countries and it stops at 1994.

Graph: Coral cover Y-count X-Hard Coral % (same for algae)
E.g. Taiwan uses NIA, Singapore uses everything.
For now, only Taiwan has complete fish and invertebrate datasets.
Combined Analysis – Coral/Algae:
Summarized all the means for all the countries together.

- Not very accurate as it contains mainly Singapore data; not much data from the past for other regions.

Combined Analysis – Coral (Y-axis = Hard Coral %, X-axis = Year)
Combined Analysis = Coral Taiwan/Singapore
Interactions – trends versus year
Taiwan: data up to 18m / SG: data up to 6m

- contributes to the diff in data
- e.g. Taiwan cover decreases

Danwei Huang: garbage in garbage out – he encouraged each country to assist in providing consistency with data.
Combined Analysis – Coral (2nd best)
Baseline = Japan
Add Singapore – decrease in cover etc.
Combined Analysis – Coral (Best)
Both models show general trend of decrease in cover
Combined Analysis – Algae
Singapore – slight increase
Combined TW/SG – Algae

- Slight increase over time, significant as algae doesn't grow deeper.

Combined ALL – Algae

- shows decrease in Taiwan cover

Combined Analysis – Fish

- e.g. Butterflyfish decrease / Rabbitfish increase

To standardize methods – don't have area coverage of each country.

**Further work:**

- Solving data issues
- Create separate long term data sets (affects analysis)
- Further analysis
- Other Countries (standardize and strengthen analysis)
- Mapping sites and spatial analysis (GIS platform – don't have GPS data)
- Need helps with what to call algae, site locations, etc.

Karenne Tun: algae data throws off coral data during seasonal differences eg monsoon. Incorporate seasonal trends for data accuracy.

Danwei Huang: subset data or months.

Karenne Tun: by seasons, break data by every 4 months

Refer to Combined Analysis – Coral Chart

Allen Chen: temporal effects should be able to be seen on charts, Singapore and Vietnam are quite stable, and Japan and Taiwan have bigger differences = need more data from the north

Samuel Chan: map then separate N and S

Put O Ang: data from one site. Including sites with low cover will affect trend analysis.

Samuel Chan: some sites repeated, some new sites added in = reason for long-term datasets – can further examine trends at those sites.

Model gives a starting value for each SITE

Chao Yang Kuo: suggest using other variables i.e. Light v depth

Danwei Huang: 0-15m = 7.5m differentiates shallow from deep? Split by site level?

Allen Chen: depth is a good variable

Put O Ang: different way to define depth – e.g. Hong Kong up to 3m thereafter light penetration equivalent to deeper depths.

Samuel Chan: need environmental factors. Need for the rest to calibrate in that case.

Danwei Huang: criteria must be broadly consistent. Summary too.

Tadashi Kimura: did not record typhoon but recorded bleaching data.

Samuel Chan: can't analyze separately.

Allen Chen: can look at time and frequency so as to decide if parts of the graph need to be cut for consistency?

Tadashi Kimura: for longer term data, some areas have older data.

Samuel Chan: better to send ALL data available.

Allen Chen: refer Combined Analysis-Coral/Algae – is a good example and exciting representation of living coral reef.

Danwei Huang: categorical factor to point out typhoon/bleaching events – indicator can justify response to bleaching

Vivian Lam: can do that for long term sites

Put O Ang: good to see sites where algae haven't taken over corals, should continue with longer term sites.

Karenne Tun: identify sites for better/poorer quality,

**Lunch time**

**Sharing results of Pilot Analysis -2 (Danwei Huang / Samuel Chan): Presentation**

**PROBLEMS:**

How long term should the data sets be?

Start with NCR data sets, if the sites have been surveyed recently, e.g.

Singapore same sites,

Philippines has for some sites but not all (most recent survey 2016),

Thailand have data of live and dead corals but not for species, rubbles and algae. The

sites have been resurveyed recently.

Need input for Indonesia and Malaysia

Samuel Chan: Asked each of the other countries how far back they had data for.

Earliest Data:

Hong Kong: 1986 general data only, earliest 1996-7 for one site

Taiwan: no survey before ReefCheck, other surveys not consistent – can try to acquire data for one site

Japan: one site since 1983 which has over 100 points – others from 2004, latest one 2017 just completed data collection, need time to compile but able to use data from 2016.

Samuel Chan: clarified that data from 2016-17 is good for use.

MACRO-ALGAE – what are the considerations?

Hong Kong: survey on macro-algae not turf algae. Macro-algae data is only available in spring and winter. Major macroalgae only occurs during winter.

Philippines: uses MA AA HA to categorize macro-algae,

Taiwan: classifies as NIA (nutrient indicator algae),

Japan: no classification

Samuel Chan concluded that the analysis will only use macro-algae data and will exclude turf algae. It will also exclude Japan.

Considerations for SITE level

(smallest scale constitutes site):

Singapore works with 2 long-term transects in 1 site, e.g. Considering an Island with transects located in E and W – these locations are considered to be 2 different sites; if transects on same side then it is considered as 1 site.

Japan uses a timed-swim method: 15min swims over 25sqm area - only hard substrates are surveyed (sandy areas not included) = coral cover represented as a percentage of hard substrate area only.

Danwei Huang: will take the data for what it is

Samuel Chan: data should be similar to that of line transects ~ eg. What is the scale for surveys done within a Group of islands?

Vivian Lam: Do we want to use resolution by location. e.g. Singapore has 15 sites separated into 2 general areas. Should the sites be grouped?

Hong Kong: has 18 sites grouped by high and medium coral cover.

Trend: N/NE high cover, S/SW low cover

Allen Chen: maybe Pearl River can be the cutting point

Taiwan: has 2 groups: NE 1 group, and the rest of island 1 group. Seeing trend based on human disturbance. Location 3 groups

Philippines: has 2 groups: NE and SW

Japan: has 2 groups by Reef and Non-reef, containing 24 sites from Tokyo to Okinawa

Thailand: has 3 groups: Andaman,

Danwei Huang: recommended to include latitude as a factor

Hiroya Yamano: recommended to use temperature

Samuel Chen: noted that one of the data fields "Zone" was not used, and asked if zones need to be included, eg. reef slope, reef crest, etc

Hiroya Yamano: recommended to include back reefs

Allen Chen: recommended that Taiwan and Japan include reef walls vs non reefs

Vivian Lam: noted that it was important to continue the discussion on zonation in order to achieve consistency with data required. E.g. data collected on fringing reef versus back reef. She asked if we want to lump these different countries together or layer the data?

Allen Chen: suggested the team look into highly developed countries e.g. Singapore where coral reefs are affected by development.

Samuel Chan: suggested to consider data for corals within marine protected areas

Hiroya Yamano: informed that MPA data can be downloaded from the WCMC website

Danwei Huang: agreed – GIS map – history of protection is an issue, but be careful when making inferences.

Samuel Chan: reiterated the need for everyone to help plot the data

Allen Chen: added that it will be useful to include the enforcement within an MPA, and to include the ranking of the MPA.

Cleto Nanola: added that the enforcement time, e.g. within the last __years should also be categorized. He informed the group that the Philippines has rankings from 1-4.

Danwei Huang: asked if country coordinators will do this ranking?

Thamasak Yeemin said that ranking should be done by the experts

Chou Loke Ming: suggested to follow Philippines ranking model, and that it should account for how long enforcement has been in effect.

Put O Ang: asked if the focus was still on coral and algal cover

Danwei Huang: replied to submit any data available, including fish data.

Samuel Chan: will check back with country coordinators if there are further gaps in their data, which need to be filled in. He will send out another round of slides after sorting so that problems with gaps or resolution can be resolved.

Chou Loke Ming: informed that historically they have been surveying the reef crest up to a depth of 3m. Previous surveys, which were conducted up to 10m, yielded many changes. He then noted the greater consistency at shallower depths

Danwei Huang: added that the changes were more on composition.

Hong Kong, most sites were stable, with not much changes even in composition

Singapore has been stable since 2012

Japan has average data with little changes

Put O Ang: asked to highlight information needed for analysis

Vivian Lam: shared that the Caribbean data only looked at cover and fish at individual sites. The long-term data sites are the more consistent ones, especially the sites where 1 scientist studies one site for a long time. With regards to authorship, these scientists will be invited. She also suggested for SC to compile a list of long-term data sets.

Samuel Chan: will send out a separate file - genus or morphology?

Most countries have long-term data sets.

Taiwan: Kenting (1987)

Hong Kong: Tung Ping Chau (1988-present 2 sites)

Philippines: El Nido, Palawan (1997)

Thailand: Khant Khao (1984)

Japan: Sekisei Lagoon (1983 / 2007- present coral cover only)

Danwei Huang: asked regarding Authorship, if the group is agreeing to include everyone who contributes data, published/unpublished?

Vivian Lam: said it was common to credit old data (site paper), out of goodwill, and also to include scientists whose data was requested from. There should also be an option for scientists who didn't want to share their data, but allowed data to be included only in larger analyses. She gave an example of the tedious back and forth needed with data owners during the 2010-2013 data collection for the IUCN Caribbean paper under GCRMN. A reminder that data shared on the Public domain need not include all authors.

Cleto Nanola: suggested for VL to write this protocol, mirroring that of Caribbean report.

Vivian Lam: emphasized the need for dedicated persons to liaise with the individual owners and to effectively follow-up.

Tadashi Kimura: raised the option to either use existing data or to source.

Cleto Nanola: Philippines has many different groups collecting data, and more ways need to be explored to approach data owners and to acquire their data – What are the "selling points"?

Put O Ang: suggested for CN to draft the 'letter'

Danwei Huang: pointed out that there is a need to better understand who owns data, and asked for country coordinators to give a sensing:

Hong Kong owns
Philippines need to check
Japan own/includes network
Taiwan needs to check with 2 other owners

Tadashi Kimura suggested inviting those who have contributed to the June18 conference.
The group decided to Concentrate on general coral cover for the 1st report.

Discussion:

Tadashi Kimura: requested for Danwei Huang and Samuel Chan to summarize their needs in order to complete the analysis of the regional data.

He then referred to the project time frame:

Time line for the re-analysis:

Phase I – Tadashi Kimura emphasized that March 2018 was the target for submission of the draft report. He also reminded each country coordinator to submit their national background chapter by January 2018

Phase II – A plan must be developed for formal data collection in time for the June 2018 regional workshop. Time must also be catered to invite collaborators.

Phase III – Tadashi Kimura highlighted that efforts have to be channeled to complete the report to ICRI GM

Phase IV – Key events for presentation of the group's work is at ICRS Germany in June 2019, and to ICRI GM in November 2019.

Tadashi Kimura asked for comments and suggestions.

Put O Ang: suggested one of the deliverables be to establish a central depository for regional data. Establish rules for accessing data etc. e.g. UN office ORBIS – to look into for the

future.

Tadashi Kimura: mentioned he had already suggested Singapore or Japan as the location for the regional depository.

Vivian Lam: said that universities were difficult choices as depositories as they didn't provide neutrality. The Caribbean project requested for IUCN to host, but they refused due to costs of maintenance, ownership issues, administration of online databases, etc – the issue remains unresolved.

Hiroya Yamano: said that as long as consensus is reached, a database can be established.

Tadashi Kimura: agreed and affirmed that this was an additional reason to formalize the society

Cleto Nanola: mentioned that lots of MSI data has been lost and much of it is now maintained by individuals.

Tadashi Kimura: suggested for Vivian Lam to develop a guideline based on her Caribbean experience. Tadashi Kimura to compile data for Japan in Dec2017, Put O Ang may be able to compile data from project just completed. Cleto Nanola will check on ownership, intent on centralizing data on the web, current data will be shared. Hiroya Yamano will also share. Allen Chen will retrieve hard copy data from early 1980s. Danwei Huang requested for more long-term data.

DW Summarized on Data Required:

- Data is currently available for 5 countries, more data will be received from Thailand and Japan, with community data.
- To provide a list of authors for APCRS next year. The same people will be reflected on talks, reports and papers.
- Other points of data needed:
  GPS coordinates, fish data, bleaching data, locality (which locality the sites belong to), months when data was collected (seasonality), clarification on local disturbances, to include historical data ref. Karenne Tun, Cleto Nanola to send criteria for ranking **MPA** (management effectiveness tool) – Philippines model: Cleto Nanola briefed the evaluation process for MPAs [ref: MPA MEAT Philippines form_feb2011] – only effective within frequently visited MPAs, limited within low accessibility sites. MPAs were required to maintain their ranking over a fixed duration.

Tadashi Kimura clarified Takafumi Osawa with regards to the expectations of the Ministry of the Environment, Japan. Takafumi Osawa stated that a summary of the results is sufficient. (WRAP UP)

**Day2 (November 21, 2017)**

**Next step on regional data analysis of coral monitoring data in East Asia (Karenne Tun / Tadashi Kimura): Presentation**

- Process of data collection for other countries
- Overall analysis of regional data

Regional Reporting

Process of data collection for other countries:

Samuel Chan provided a **Recap**:

- Missing **Fish** data
- Combined Analysis - **Coral**: Trend for all countries is slight increase with slight variation over time. Model over time – in general, coral cover decreasing over time, *interpretation must be with the help from countries with knowledge on the ground*
- Combined Analysis – **Algae**: Trend is increase in algal cover. Vietnam is quite stable. Model over time – in general, slight increase – Vietnam has small increase over time.
- **Problems** faced: to look at *depth* as an important factor. Vietnam's data set is in shallow and deep, they've been asked if they have those values already.
- *SC will send out the missing data needed.*
- Other values to consider is **ZONE** – fringing and non-fringing reef, protection of the reef (Philippine MPA assessment) – to insert in the model to assess impact to the reefs over time.
- Different **Algae** types – to standardize to Macro Algae as some were also using turf algae.

Tadashi Kimura – **Summary**: Presentation

Hiroya Yamano: first step is to use monitoring data only. If needed, other data can be collected. In Japan, there are a lot of research data available. Could collect subset data if needed.

Danwei Huang: agrees that it is a good point but should remain country specific, eg. In Singapore, monitoring and subset data are the same. If needed, country coordinators should advice the team where to extract additional data from.

**Data Storage**: Danwei Huang suggests using something like Drop Box for the time being. Coordinators can place dry versions in an online storage. For the long-term, a more robust data storage facility will be required to upload data.

**GIS data** (MPAs, etc)

**Timeline**:

Danwei' team to analyze *before Christmas 2017*.

The **National Background Chapter** format will be developed by Tadashi Kimura and Karenne Tun and sent out for coordinators to fill in.

*Review in Mar 2018*.

**Next steps after the pilot:**

- Overall analysis
- Regional workshop – to invite the other 7 countries for June 2018 in Cebu.
- Regional reporting
- Database developing – Japan and Singapore are possible locations to store the regional database.
- Scientific papers – deliverables after the project

**Timeline for 4 Phases**

**Phase 1** – Pilot Analysis

**Phase 2** – Follow up data collection, in time for the *Regional Workshop in either Indonesia or Malaysia in October 2018*.

**Phase 3** – Overall Analysis, in time for the *Regional Workshop in either Indonesia or Malaysia in June 2019*, and the *Task Force Meeting at **ICRI GM***.
Tuning up model / re-analysis to be done in time for **CBD-SBSTTA** [*Convention on Biological Diversity – Subsidiary Body on Scientific, Technical and Technological Advice*] in June 2020.

**Phase 4** – **Regional Report 2020** to be presented at ***ICRS** in June 2020* and at ***ICRI GM** in November 2020*.

Takafumi Osawa: recommended that the document be prepared by *end 2019* so as to provide sufficient time for submission to the secretariat of **CBD SBSTTA**
https://www.cbd.int/sbstta/

Cleto Nanola: asked for clarification on the mechanism and manner of reporting for the presentation at ICRS in June 2020. He noted that in the past, country reports were submitted, and asked if the regional report was to be supported by country reports. If so, a schedule is needed for these activities so country coordinators have time to prepare. It will also allow time for coordinators to seek funding.

TK: confirmed that everyone can follow the planned APCRS schedule which includes publishing the *special report for 2020*.

**Overall analysis of regional data**:

Takafumi Osawa: recommended that ***targets*** should be refined based on science. ***Management effectiveness*** is also a relevant topic discussed at **CBD**. **IUCN** also suggests increasing MPAs by 30%. He highlighted that *Reports* need not be specific but should provide an *overview* and *insights* into target topics. **Timeline**: to use temporal pattern to determine change and recommendations for management.

Allen Chen: to encourage Indonesia to contribute

Tadashi Kimura: JCRS also invited them to participate.

Put O Ang: asked how to get access to the many databases available in order to find usable data. In future, to look at more detailed data. He also asked how we can use this network to facilitate easier access to data.

Danwei Huang: said that we don't want to write all the scientific papers. We should each take leads on different analyses, and should think through how best to use the data. He will share the data in raw and processed form for this to happen. Some countries have community level data, and it can still be used.

**Messaging**: the current message is that there is not much change in cover but this should not be the message we should send out. Instead, we should find and highlight points in the Long-term data which show that there are changes, and what kind of changes occur at these points.

Allen Chen: agreed that data should be used qualitatively and that spatial and temporal data should be used.

Work plan for 2018-2020 (K.Tun / T.Kimura)

- Presentation @APCRS 2018
- Follow up analysis (2018-2019)
- Presentation @ICRS 2020

- Global analysis

Miscellaneous:

**APCRS preparation (Put O. Ang): Presentation**

Put O Ang provided an **update** on APCRS 2018 preparation:

- Timeline: behind schedule as the team is also working on another event.
- Local chair: Prof Alino – not sure how big his team is
- Appointment of **Chair, IOC** – Put O Ang agreed to be chair but has no update on the nomination. Chou Loke Ming confirms that PO will be appointed as Chair, IOC – APCRS
- **Programme Details**:

  *Keynote Speakers*: 8 speakers was the norm in past 3 meetings.

  - *Mini-Symposia, Chair* (different from session Chair): acts as an organizer, very focused on the topic versus a session, which remains more abstract. MiniS Chairs need to proactively seek speakers in order to ensure that sessions are special with specific and relevant topics. Applications to submit mini-symposias has already been closed.

    Put O Ang: suggested for APCRS members to volunteer as chairs.

    Cleto Nanola: stated that he submitted 2 MiniSymposias for fisheries and citizen science, but has yet to receive a response.

    Allen Chen: said that participant database is available from previous meetings and invitations can be emailed to this list. He also suggested for a committee to be set up by end December 2017.

    Put O Ang: has pushed the team to manage the small window of time available to organize the conference. He also reminded the organizers to provide time allowance for those who need to seek funding to attend the event.
- Student Competition session
- Contributed sessions and posters
- Concurrent sessions (4)

- Put O Ang asked if any APCRS members would be willing to help with assessing the scientific abstracts. It would only involve 2 weeks to review the abstracts. Put O Ang will email more details and invite members to the committee.
- In summary, the most pressing issues to resolve now are to confirm the **keynote speakers** and the **mini-symposia chairs**.
- **Logistics**

  - Finance: PHP 16m approved.
- - Venue: Marco Polo Hotel

  Drawbacks: very isolated, expensive, no nearby hotels, Compensation: restaurant to serve lunch, need transport, to provide social functions 3 out of 6 nights, June 3-8 2018 – to obtain services from conference organizers.

  Considerations should be made for students wanting to attend (cost, nearby hotels, transport)

  With sizeable funds approved and an expected 400 abstracts for the conference, it is highly recommended that a professional organizer be contracted.

**Others:**

**Formalizing APCRS (Tadashi Kimura): Presentatin**

Tadashi Kimura: raised the consideration for APCRS to be formalized as a registered entity.

Thamasak Yeemin: to share the procedures for registering non-profit entity in Thailand – it may take 1 month to process

Stephen Beng: to share the procedures for registering a non-profit entity in Singapore and detail benefits and drawbacks of each type non-profit entities recognized in Singapore.

To consolidate options by email

The Constitution should be reviewed again and amendments made before setting up the entity.

Website: facebook.com/groups/APCoRS

Members – to relook at the types of members to welcome.

Journals

To raise awareness of the APCoRS

Not to be concerned with JCRS intentions to form another regional network.

To work with ICRS more

Amidst all the politics and growing initiatives in the region, AC pledges his loyalty to APCRS!

Put O Ang: He had initially approached ISRS but then had the impression that they wanted APCRS to be under ISRS. They had also wanted a permanent member to sit in APCRS. This was therefore one of the reasons for APCRS to be independent.

Chou Loke Ming: registered a reminder that APCRS must continue to be more visible. "If we had been registered as a society 10 years ago we may be rich by now!"

Chou Loke Ming: suggested that memberships and benefits be relooked, with the objective to flood support for APCRS. He also urged for the registration to be done quickly so that the targeted official announcement in June 2018 can be met.

Allen Chen: stated that a full time staff is required to set up the society, and there may be a need for a secretariat. He asked for options to be weighed between having the entity registered in Thailand, Hong Kong, and Singapore, and to look into the financials.

Vivian Lam suggested to hire a staff to help consolidate data.To look into eventual requirement for a full time secretariat to manage and administrate society's affairs and funds.

Put O Ang suggests membership drives and to pool databases.

Tadashi Kimura asked if there can be a stronger network for younger members, graduates and post-graduates (define youth group) and to have dedicated sessions for them. Eg. Student night, young steering committee.

Danwei Huang suggested for the APCRS committee to be informed so that they can allocate a slot in the conference for the announcement of the society.

Tadashi Kimura asked if there were any other matters.

He thanked Chou Loke Ming for chairing the meeting. He thanked the members for their efforts. He also thanked Takafumi Osawa for his time and support.

**Closing**

**Closing remarks (Takafumi Osawa, MOE, Japan)**

Takafumi Osawa thanked everyone for their efforts. He felt it was productive and his ministry

was happy to fund the event. Pleased with the outcome of their funding. In Japan, the government is aware of events like bleaching but people are largely not aware and the research helps to raise this awareness.

**Closing remarks (Loke Ming Chou, NUS, Singapore)**

Loke Ming Chou stated that it had been a fruitful meeting. The level reached, especially with the intentions of shared databases, would allow the group to do more analyses in support of management policies. He hopes that the Japan MOE will continue to support the initiatives of APCRS so that we can all continue to reap the benefits produced by our coral reefs.

## ３．第 32 回 ICRI 総会・議題

# 32nd ICRI General Meeting

December 7th-9th, 2017

*United Nations Office at Nairobi*
***Conference Room 9***

*UN Avenue, Gigiri, Nairobi, Kenya*

*While on the UN compound, if you need any assistance, please contact Caroline Okana (Tel: +254 20 762 45 83 / Email: caroline.okana@unep.org). Please also always carry your passport with you.*

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| **Wednesday 6 December 2017** | |
| 19:30 | Public screening of **Chasing Coral**<br><br>Hosted by: Emmy award winning director, Jeff Orlowski, the Founder of The Ocean Agency, Richard Vevers, and the Head of the UN environment Coral Reef Unit, Jerker Tamelander<br><br>Location: The Alchemist Bar, Parklands, Nairobi. |
| **Thursday 7 December 2017 –Afternoon** | |
| 13:00-14:00 | **Registration at the Deck – Coffee will be served** |
| 14:00–15:00 | **Opening by Xavier Sticker,** French Ambassador for the Environment<br><br>**High-Level panel** on the following theme: " What can be done to protect coral reefs and mangroves by 2020 and beyond? "<br><br>✓ **H.E. Peter Thomson,** United Nations Secretary-General's Special Envoy for the Ocean<br>✓ **Inger Andersen**, Director General, International Union for Conservation of Nature<br>✓ **Martha Rojas-Urrego**, Secretary General, The Ramsar Convention<br><br>Moderator: **Xavier Sticker,** French Ambassador for the Environment |
| 15:00–15:15 | **Presentation and adoption of the agenda and presentation of the motions**<br>*ICRI Secretariat* |
| 15:15-15:45 | **New Member(s)**<br>*ICRI Secretariat*<br><br>✓ Myanmar, *Toe Toe Aung, Ministry of Resources and Environmental Conservation* |
| 15:45-16:00 | **Financial contribution to the Secretariat** (Monaco, France, US and Sweden)<br>*ICRI Secretariat* |
| *16:00-16:15* | **New commitments from Australia**<br>*Andrew Edge, Office of the Ambassador for the Environment* |

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| ***16:15-16:35*** | ***Break*** |
| 16:35 – 17:00 | ✓ Launch of the GCRMN Western Indian Ocean report<br>*Said Ahamada, Indian Ocean Commission, and Mishal Gudka, CORDIO* |
| 17:00-18:00 | **International Coral Reef Initiative (ICRI) and UN Environment Grants Programme 2017**<br>*UN Environment*<br><br>✓ Presentation of the grants programme<br>*Gabriel Grimsditch, Marine and Coastal Ecosystems Branch Ecosystems Division, UN Environment Environment*<br><br>✓ Presentation of 2 grantees<br><br>o Managing mangroves for climate change regulations and other ecosystem services in Kenya<br>*James Kairo, KMFRI*<br>o *Innovative financing and legal mechanisms for reef restoration and emergency response in selected sites of the MAR Region*<br>*Claudia Ruiz, MAR Fund*<br><br>✓ Presentation of the compendium of projects<br>*Gabriel Grimsditch, Marine and Coastal Ecosystems Branch Ecosystems Division, UN Environment Environment* |
| **18:30 - Cocktail at the French Embassy**<br>***(transportation will be provided from the meeting location)*** | |
| **Friday 8 December 2017** | |
| | **Theme 3: "Help to reduce human threats to coral reefs and associated mangroves and seagrasses, by making greater use of regulatory tools"** |
| 08:30-09:30 | ***Goal 1: promote legal frameworks for the protection of coral reefs and associated mangroves and seagrasses, with quantified targets and effective enforcement to protect these ecosystems***<br><br>Presentation from<br>✓ France, *Ludovic Schultz, French ministry for an ecological and solidary transition*<br>✓ Japan, *Takafumi Osawa, Ministry of the Environment Japan*<br>✓ Blue print for resilience, *Great Barrier Reef Marine Park Authority, Australia* |
| 09:30-09:45 | ***Goal 2: encourage a ban on plastic microbeads in cosmetic products***<br>*Presentation by the SPREP / ICRI Secretariat* |
| 09:45-10:30 | ***Goal 3: improve regulation and enforcement to reduce direct anthropogenic damage due to dredging and physical alteration of reef structures***<br>*Presentation of the motion to reduce damage due to dredging and dumping on coral reefs and discussion + adoption* |
| ***10:30-11:00*** | ***Break*** |

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| 11:00-11:30 | ***Goal 4: promote the deployment of mooring devices limiting the mechanical destruction of coral reefs and seagrasses***<br><br>✓ *Presentation of the work from the ICRI Secretariat*<br>*ICRI Secretariat*<br>✓ *Green Fins - Addressing the threat from anchor damage*<br>*James J. Harvey, Green Fins* |
| 11:30-12:00 | ***Goal 5: review issues related to the impact of sunscreens and other endocrine disruptors on coral reefs, and encourage the production of sunscreens that are proven not to damage coral reefs***<br><br>✓ *Presentation of the Policy Brief*<br>*Gabriel Grimsditch, Marine and Coastal Ecosystems Branch Ecosystems Division, UN Environment Environment* |
| 12:00-13:00 | **Theme 4: "Monitor the state of reefs in order to better manage them"**<br><br>GCRMN – update on progress made in implementation of Resolution on the Global Coral Reef Monitoring Network (GCRMN) adopted at the 3st ICRI General Meeting<br>*Jerker Tamelander, Coral Reef Unit, UN Environment UN Environment* |
| ***13:00-14:00*** | ***Lunch*** |
| 14:00-15:30 | ***Goal 1: promote regional reports on the health of coral reefs***<br><br>✓ Progress of the GCRMN-Caribbean<br>*Lucie Labbouz, Regional Activity Centre for Specially Protected Areas and Wildlife*<br><br>✓ Presentation of the executive summary of the GCRMN Pacific report<br>*Charlotte Moritz and Serge Planes, CRIOBE*<br><br>✓ GCRMN East Asia<br>*Tadashi Kimura, Japan* |
| 15:30-16:00 | ***Goal 2: better monitor the phenomena of coral bleaching (<u>follow-up on the recommendation adopted at the ICRIGM 31</u>)***<br><br>✓ The case of France, *Aurelie Thomassin, French ministry for an ecological and solidary transition*<br><br>✓ Large scale bleaching, *Takafumi Osawa, Ministry of the Environment Japan* |
| ***16:00-16:30*** | ***Break*** |
| 16:30-18:00 | **Theme 5: "Progress via education"**<br><br>***Goal 1: International Year of the Reef (IYOR) 2018***<br>*ICRI Secretariat + The Ocean Agency* |

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| | Presentation from ICRI members<br><br>✓ *IYOR in Japan*<br>*Takafumi Osawa, Ministry of the Environment Japan* |
| | ***Australian Government's Innovation Facility side event*** |
| | **Saturday 9 December 2017** |
| 08:30-09:30 | **Theme 2: "Meet international requirements regarding coral reefs"**<br><br>***Goal 1: implement the resolution on the sustainable management of coral reefs adopted at the 2nd session of the United Nations Environment Assembly (May 2016)***<br>*Update from Jerker Tamelander, Coral Reef Unit, UN Environment UN Environment*<br><br>***Goal 2: help to meet the Sustainable Development Goals (SDG), in particular those relating to Goal 14 ("Conserve and sustainably use the oceans, seas and marine resources")***<br><br>✓ Coral reefs and Sustainable Development Goals<br>*Hazel Thornton, UN Environment World Conservation Monitoring Centre (UNEP-WCMC)*<br><br>✓ Communities of Ocean Action: Coral Reefs. Following up on UN Ocean Conference voluntary commitments<br>*Gabriel Grimsditch, Marine and Coastal Ecosystems Branch Ecosystems Division, UN Environment Environment*<br><br>***Goal 3: take advantage of upcoming international events to pursue the advocacy for coral reefs and related ecosystems***<br>*Presentation from the ICRI Secretariat*<br><br>✓ The 'Coral reef life declaration'<br>*Wilfrid Deri, Monaco*<br><br>✓ Major upcoming events<br>*ICRI Secretariat* |
| 09:30-11:30 | **Theme 1 – "Help raise awareness of how coral reefs and related ecosystems help to fight climate change"**<br><br>**Presentation of the work on funding**<br><br>✓ **'Searchable catalogue' of current international donor funding commitments and priorities for coral reefs, mangroves and seagrass and analysis**<br>*Hazel Thornton, UN Environment World Conservation Monitoring Centre (UNEP-WCMC)*<br><br>✓ **Innovative funding for coral reefs**<br>*ICRI Secretariat*<br><br>✓ **Rethinking the Global Coastal Investment Portfolio** |

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| | *Erin McCreless, Department of Ecology and Evolutionary Biology, University of California, Santa Cruz*<br><br>⇨ **Motion for supporting investments in the natural infrastructure of reefs and mangroves to increase climate resilience** |
| 11:30-12:30 | **Presentation from ICRI members**<br><br>✓ Report of the 4th International Workshop: 'Bridging the Gap between Ocean Acidification Impacts and Economic Valuation'<br>*Didier Zoccola, Monaco*<br><br>✓ Coral Restoration Consortium, *Lucie Labbouz, Regional Activity Centre for Specially Protected Areas and Wildlife*<br><br>✓ 50Reefs, *Caleb McClennen, Wildlife Conservation Society*<br><br>✓ Presentations from other members |
| ***12:30-13:30*** | ***Lunch*** |
| 13:30-14:00 | Report from the Australian Government's Innovation Facility<br>*Andrew Edge, Office of the Ambassador for the Environment* |
| 14:00-14:30 | Next Secretariat |
| 14:30-15:00 | Meeting's outcomes |
| 15:00 | Closing |

**A DISCUSSION ON THE ROLE OF INNOVATION**

**IN THE PROTECTION, MANAGEMENT AND RESTORATION OF CORAL REEFS**

***Friday 8 December, from 18.15 to 20.30.***

***Dinner in Delegates Lounge at UN Offices***

The Australian Delegation invites ICRI members and interested parties to attend a dinner and discussion on the role of innovation in the protection, management and restoration of coral reefs.

We would like to invite attendees to participate in an open dialogue to:

- brief attendees on innovation activities supported by Australia
- discuss ways of catalysing greater collaboration on innovation
- discuss challenges that attendees think could benefit from innovation.

**DRAFT AGENDA**

**18.15 – 18.30** **Arrival of participants** (drinks, entrees)

**18.35** **Welcome and logistics**

Russell Reichelt, Chief Executive, Great Barrier Reef Marine Park Authority

**18.40** **Briefing on innovation activities supported by Australia**

Russell Reichelt, Chief Executive, Great Barrier Reef Marine Park Authority

Andrew Edge, Director Environment Unit, Office for the Ambassador of the Environment, Department of Foreign Affairs

David Souter, Research Manager - Australian Institute of Marine Science

Theresa Fyffe, Director of Projects and Partnerships - Great Barrier Reef Foundation

**19:10** **Dinner and table discussions**

**20.00** **Report back on table discussions**

**20.20** **Wrap up and close**

## ４．第 32 回 ICRI 総会・参加者リスト

**32nd ICRI General Meeting**
**7-9 December 2017, Nairobi, Kenya**

**List of participants**

| ICRI Members | Name | Position | Email |
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| **Australia / Australian Institute of Marine Science** | David Souter | Research Manager | D.Souter@aims.gov.au |
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| **France / ICRI** | Xavier Sticker | Ambassador for the Environment | |
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| **France / ICRI** | Ludovic Schultz | Ministry for an ecological and solidary transition | |
| **France / ICRI** | Aurelie Thomassin | Ministry for an ecological and solidary transition | aurelie.thomassin@developpement-durable.gouv.fr |
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| **Grenada Coral Reef Foundation** | Rolland Baldeo | Director | rolandbaldeo@gmail.com |
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| **Indonesia** | Mr. Hendra Yusran Siry | Deputy Director for Mitigation and Adaptation of Climate Change, Ministry of Marine and Fisheries of Indonesia | hendrasiry@gmail.com |
| **Intrnational Atomic Energy Agency (IAEA)** | David OSBORN | DIRECTOR IAEA ENVIRONMENT LABORATORIES | D.Osborn@iaea.org |
| **IUCN** | Inger Andersen | Director General | |
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| **Monaco** | Wilfrid Deri | Senior Officer/Ministry of Foreign Affairs | wderi@gouv.mc |
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| **Ramsar** | Martha Rojas-Urrego | Secretary General | |
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| **Secretariat of the Pacific Regional Environment Programme (SPREP)** | Warren Lee Long | Coastal and Marine Adviser | warrenl@sprep.org |
| **Secretariat of the Pacific Regional Environment Programme (SPREP)** | Mathilde Kraft | Coastal and Marine Assistant | mathilde.kraft@gmail.com |
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| **UN Environment** | Gabriel Grimsditch | Programme Management Officer / Marine and Coastal Ecosystems Branch<br>Ecosystems Division | Gabriel.Grimsditch@unep.org |
| **UN Environment** | Monika Macdevette | Deputy Director of the UN Environment Ecosystems Division | |
| **UN Environment** | Sam Barratt | Chief of advocacy and campaigns | Sam.Barratt@unep.org |
| **UN Environment** | Mette Wilkie | Director of the UN Environment Ecosystems Division | |
| **UN Environment** | Jerker Tamelander | COBSEA Coordinator a.i.<br>Head, Coral Reef Unit | tamelander@un.org |
| **UN Environment** | Ole Vestergaard | Programme Manager / Marine and Coastal Ecosystems Branch<br>Ecosystems Division | Ole.Vestergaard@unep.org |
| **UN Environment World Conservation Monitoring Centre (UNEP-WCMC)** | Hazel Thornton | | hazel.thornton@unep-wcmc.org |
| **United Kingdom** | John Clorley | Head - International Marine Environment; Departmnet fo<br>Environment, Food and Rural Affairs | John.Clorley@defra.gsi.gov.uk |
| **United Nations Secretary-General (UNSG)** | Peter Thomson | UNSG's Special Envoy for the Ocean | |
| **United State of America** | Stephanie W. Aktipis | Foreign Affairs Officer / Office of Conservation and Water<br>U.S. Department of State | AktipisS@state.gov |
| **United State of America** | Jason Philibotte | Program Manager / NOAA CRCP | jason.philibotte@noaa.gov |
| **United State of America** | Jennifer Koss | Director, NOAA Coral Reef Conervation Program | JENNIFER.KOSS@NOAA.GOV |
| **University of California Sana Cruz** | Erin McCreless | | emccrele@ucsc.edu |
| **Wildlife Conservation Society** | Caleb McClennen | Vice President, Global Conservation | cmcclennen@wcs.org |
| **WWF** | Jared Bosire | Conservation Director, WWF Kenya | jbosire@wwfkenya.org |

| **Members excused** |
|---|
| **Brazil** |
| **Egypte** |
| **Global Environment Facility** |
| **Indonesia** |
| **Secretariat of the Convention on Biological Diversity** |
| **Seychelles** |
| **The World Bank** |
| **The Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden (PERSGA)** |
| **UNDP** |

５．第 32 回 ICRI 総会・議事録

**32nd ICRI General Meeting**
December 7th-9th, 2017
Nairobi, Kenya

**Summary record**
*Updated version, Dec. 20, 2017*

The 32nd ICRI General Meeting (GM), and the second and final meeting under the 2016-2018 French Secretariat, was held from December 7th-9th, 2017 at United Nations Office at Nairobi, Kenya. Through the support from France, Sweden and UN Environment, delegates from several countries and organisations were able to attend and participate in the meeting. In total, more than 70 delegates from 20 ICRI member countries and organisations attended the meeting.

ICRI GM32 welcomed the participation of H.E. Peter Thomson, Special Envoy for the Ocean, UN Office of the Secretary General, Inger Andersen, Director General, International Union for Conservation of Nature, and Martha Rojas-Urrego, Secretary General, The Ramsar Convention, at its opening session. The Meeting was chaired by Xavier Sticker, French Ambassador for the Environment. Welcoming remarks were made by Monika Macdevette, Deputy Director of the UN Environment Ecosystems Division and closing remarks by Mette Wilkie, Director of the UN Environment Ecosystems Division.

## New Members

- ✓ **Myanmar** was welcomed as the latest member of ICRI (the 38th among the States members of ICRI)
- ✓ The ICRI secretariat will convene a working group that ICRI GM32 agreed to set up in view of revising the ICRI rules of procedures

## Financial contribution to the Secretariat (Monaco, France, US and Sweden)

The Meeting thanked countries that have provided financial support for the ICRI Secretariat and its 2016-2018 action plan, as well as for the long-term commitment of the USA. It called on other countries to also commit resources to ICRI.

- ✓ Monaco – Small grants program (100,000 Euros).
- ✓ France – Implementation of the ICRI plan of action and small grants program (500,000 Euros).
- ✓ Sweden - Implementation of the ICRI plan of action (300,000 Euros for 2017).
- ✓ United States of America – for the Coral Reef Unit's work to conserve and protect coral reef ecosystems worldwide and for the Coral Reef Unit's work with the International Coral Reef Initiative (290,000 Euros for 2017).

## International Coral Reef Initiative (ICRI) and UN Environment Grants Programme 2017

Over 230 submissions were received, out of which 5 projects were selected and will receive a USD 60,000 grant each

- ✓ Kenya - Managing mangroves for climate change regulation and other ecosystem services
- ✓ Malaysia - Including coral reef resilience and vulnerability to climate change in marine spatial planning
- ✓ Vanuatu - Increasing resilience of traditional Marine Protected Areas
- ✓ Regional, Caribbean - Innovative financing and legal mechanisms for reef restoration and emergency response in selected sites of the MAR Region
- ✓ New Caledonia - A Seascape genomics approach to improve coral reefs conservation strategies against BLEaching (SABLE)

Out of the 230 submissions, 33 outstanding projects were compiled into a compendium and will be widely distributed to potential donors. They should be viewed as the first stage of a chain of projects deserving financial support. ICRI members are encouraged to share this compendium and, if possible, to support them.

**Theme 1 – Help raise awareness on how coral reefs and related ecosystems help fight climate change**

*The purpose of this activity is to identify and map current international donor funding for sustainable management of coral reefs, mangroves and seagrass beds (including funding level as well as geographic, thematic and sectoral focus) and to identify gaps that may be addressed through future interventions and support efforts to mobilize donors for sustainable management of coral reefs, mangroves and seagrass beds.*

- ✓ The ICRI secretariat will disseminate the outcome of this activity once it is achieved in the beginning of 2018. It will share its results with the donor community.
- ✓ All ICRI members are encouraged to submit additional information to the ICRI Secretariat on the projects that they fund or host.
- ✓ It was observed that the management of the database should be an ongoing activity of the ICRI Secretariat, and that should be included in the next ICRI plan of action if possible.
- ✓ Furthermore, ICRI GM32 adopted a recommendation on supporting investments in the natural infrastructure of reefs and mangroves to increase climate resilience.

**Theme 2 - Meet international requirements regarding coral reefs**

*Goal 1 - implement the resolution on the sustainable management of coral reefs adopted at the 2nd session of the United Nations Environment Assembly (May 2016)*

- ✓ ICRI welcomed the creation of the advisory committee. The ICRI Secretariat looks forward to participating in its first meeting.
- ✓ The work, if possible, should be included in the next plan of action.

*Goal 2 - help meet the Sustainable Development Goals (SDG), in particular those relating to Goal 14 ("Conserve and sustainably use the oceans, seas and marine resources")*

- ✓ ICRI GM32 commended the work done by UNEP-WCMC on behalf of ICRI in pursuance of its 2016-2018 action plan. It expressed their strong interest in the completion of that work as soon as possible in 2018.

*Other international actions*

- ✓ Communities of Ocean Action: Coral Reefs. Following up on UN Ocean Conference voluntary commitments

  The GM positively noted the fact that ICRI has been nominated as a Focal Point, reflecting on the renewed visibility of ICRI.

- ✓ The 'Coral reef life declaration'

  The attention of ICRI members was drawn on the declaration and on the possibility to still sign it.

**Theme 3 - Help to reduce human threats to coral reefs and associated mangroves and seagrasses, by making greater use of regulatory tools**

*Goal 1- promote legal frameworks for the protection of coral reefs and associated mangroves and seagrasses, with quantified targets and effective enforcement to protect these ecosystems*

The secretariat is developing summaries on national legal frameworks for the protection of coral reefs and associated ecosystems (based on the members' reports), for the attention of ICRI members. ICRI members are encouraged to submit information and review the data relating to their situation.

*Goal 2 - encourage a ban on plastic microbeads in cosmetic products*

The meeting was updated on the follow-up ensured to ICRI GM31 recommendation on the use of microbeads in cosmetic products. Following the adoption of a Call for Action for SPREP Countries on Plastic Microbeads, other regions are encouraged to do the same.

*Goal 3 - improve regulation and enforcement to reduce direct anthropogenic damage due to dredging and physical alteration of reef structures*

Adoption of a recommendation

*Goal 4 - promote the deployment of mooring devices limiting the mechanical destruction of coral reefs and seagrasses*

Creation of an *Ad Hoc* Committee on "Green Marine Construction"

*Goal 5: review issues related to the impact of sunscreens and other endocrine disruptors on coral reefs, and encourage the production of sunscreens that are proven not to damage coral reefs*

- ✓ The conclusions of the report were noted, as well as the fact that more science is needed on this topic.
- ✓ ICRI members have been encouraged to draw the attention of their scientific institutions on the needs for more research in this area.
- ✓ Encouragements were given to the dissemination of good practices
- ✓ The policy brief on which ICRI GM32 was informed has been completed and will be shared with ICRI members after the Meeting

## Theme 4 - Monitor the state of reefs in order to better manage them – Global Coral Reef Monitoring Network (GCRMN)

With regard to the **GCRMN coordination**:

- ✓ ICRI GM32 was updated on the work of a working group that was established earlier in 2017, in accordance with the 2016-2018 action plan. The working group plans to hold a meeting in early 2018. A consultant was hired to assist in its work.
- ✓ It was noted that the Australian Institute of Marine Science (AIMS) offered to host the global coordination of the GCRMN contingent on receiving appropriate financial support to reinvigorate the GCRMN
- ✓ The importance of involving the Regional Seas conventions was also acknowledged.

With regard to the issuance of **regional reports** on the status of the reefs, it was noted that very good progress was made in all the regions:

- ✓ The Western Indian Ocean report has been launched at the ICRI GM32;
- ✓ With regard to the Caribbean, GCRMN-Caribbean has been following up on the implementation of standardized data collection and analysis, with a view to updating the Caribbean Report by 2020
- ✓ The Pacific report will be launched in early 2018;
- ✓ Preparations for an East-Asia report, under the strong leadership of Japan, are also making good progress. ICRI GM32 also thanked several countries and institutions for committing to share their data and further cooperate.

With regard to the monitoring of **bleaching events**:

- ✓ It was noted that several countries currently implement the recommendation adopted at the ICRI GM 31, which include the development of monitoring program for bleaching events (France, Madagascar, Comoros). Other countries are encouraged to do the same
- ✓ The GCRMN should now follow up on this work (monitoring after bleaching events).

**The latest Global GCRMN report was issued in 2008. In that context, it was suggested that ICRI GM consider the prospect of a new Global report by 2020.**

## Theme 5 - Progress via education and the International Year of the Reef (IYOR) 2018

- ✓ GM32 welcomed the contribution and expertise of The Ocean Agency for the IYOR 2018, in close cooperation with ICRI.
- ✓ GM32 also welcomed the contribution of the partners that The Ocean Agency intends to mobilize, including from the private sector.
- ✓ GM32 was briefed on the draft programme developed by The Ocean Agency for the IYOR 2018. In addition to sensitization to the status and importance of coral reefs, it was emphasized that the public communications campaign could also contribute to mobilizing financial resources for the protection and restoration of the reefs. The positive contribution that crowdfunding and philanthropy could make was highlighted. Inter alia, donors could be invited to 'adopt' projects that were eligible to the ICRI 2017 Small Grants Programme.
- ✓ GM32 noted that IYOR should not focus on coral reefs only, but that related ecosystems should also be included in the activities and public communications campaigns (including on the IYOR www.iyor2018.org website).
- ✓ ICRI Members are encouraged to develop national IYOR action plans, and that the IYOR should also be viewed as an opportunity to develop concrete actions and projects.

**The 3rd International Year of the Reef should be viewed as an opportunity to initiate a long-term campaign on raising awareness on coral reefs and related ecosystem (beyond 2018). In addition to raising awareness, this Year should be used to initiate or strengthen new partnerships, better involve the private sector and mobilize funding.**

## Australian Government's Innovation Facility

The Australian Government hosted an interactive discussion to assist in the design of the Coral Reef Innovation Facility recently announced by Australia's Minister for Foreign Affairs. ICRI member's views were sought on: establishing an innovation group or network amongst interested ICRI members; running an exercise that would develop an innovation pathway or blueprint for coral reefs; and specific challenges or issues that would benefit from greater innovation in approaches. The Australian Government undertook to keep members informed of work under the Coral Reef Innovation Facility including specific opportunities to collaborate.

## Next ICRI Secretariat

ICRI GM32 is welcoming the joint proposal by Monaco and Australia to host the next Secretariat. Further details, including possibly on an additional partner country, will be provided at a later stage.

６．第 32 回 ICRI 総会・決議文書（１）:

気候変動に対するレジリアンスを強化するための自然インフラとしてのサンゴ及びマグローブに対する投資の推進についての勧告

**Recommendation for supporting investments in the natural infrastructure of reefs and mangroves to increase climate resilience**

*Adopted on December 9th 2017, at the 32nd ICRI General Meeting (Nairobi, Kenya)*
*Updated version – December 22nd, 2017*

***Recognizing*** that coastal zones are the **areas with the highest population density on the planet**;

***Concerned*** that coastal communities and infrastructure are increasingly at risk from **storm impacts, which can be exacerbated by** climate change**, including heavy rainfall and storm surge**;

***Recognizing*** that scientists and the insurance industry have found that reef and mangrove restoration are among the most cost-effective actions for coastal adaptation in island states[1];

***Recognizing*** that reefs reduce up to 97 percent of wave energy that would otherwise hit coastlines[2], averting tens to hundreds of millions of dollars in flood damages every year for many nations[3];

***Recognizing*** that mangroves have been found to reduce flood damages to people and property by 25% annually[4];

***Recalling*** the ICRI Decision on Reef Restoration (2001)**;**

***Noting*** that about 3% of the value of coastal investments are dedicated to conserving and restoring coastal ecosystems including reefs and mangroves, known as natural infrastructure[5];

***Noting*** that **a significant amount** of global spending on both gray and natural infrastructure in coastal regions comes from national governments and multilateral institutions such as the Global Environment Facility, the World Bank, and regional development banks.

**The International Coral Reef Initiative**

***Commends*** previous investments in reef and mangrove restoration that have improved ecosystem health and climate resilience;

***Recognizes*** **that restoration should only be undertaken once current threats to coral reefs and mangrove forests have been addressed and reduced;**

***Recognizes*** the need to further increase global financial investment in coastal natural infrastructure such as through reef **conservation and** restoration, particularly where human communities are most at risk from climate change impacts;

***Encourages*** efforts to identify specific opportunities for conserving and restoring reefs and mangroves, and to select sites where this natural infrastructure will most effectively mitigate risks associated with climate change;

***Recognizes*** the need to develop innovative funding mechanisms for coral reef and mangrove conservation and restoration;

***Encourages*** development banks **and agencies** to **develop** funding approaches to better support natural **and hybrid** infrastructure for risk reduction **as cost effective and sustainable solutions**;

***Encourages*** governments to **promote the consideration of** natural infrastructure alternatives such as mangrove **forest** and reef **conservation and** restoration in assessments of the cost effectiveness of risk reduction measures;

***Encourages*** the insurance and finance sectors to develop new tools such as Resilience Bonds that could support the **conservation and** rebuilding of mangroves and reefs for risk reduction;

***Calls upon*** ICRI members to promote the development of natural approaches for increasing coral reef health and climate resilience;

***Encourages*** efforts to strengthen partnerships between local communities, governments, international agencies, and the private sector to identify mechanisms for funding natural infrastructure projects.

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[1] CCRIF. 2010. "Enhancing the Climate Risk and Adaptation Fact Base for the Caribbean." Grand Cayman, Cayman Islands: Caribbean Catastrophe Risk Insurance Facility. www.ccrif.org/sites/default/files/publications/ECABrochureFinalAugust182010.pdf

[2] Ferrario F, MW Beck, CD Storlazzi, F Micheli, CC Shepard, & L Airoldi. 2014. "The Effectiveness of Coral Reefs for Coastal Hazard Risk Reduction and Adaptation." Nature Communications 5 (May): 1–9.

[3] Beck, M. W., I. Losada, B. Reguero, P. Mendendez, L. Burke. 2016. Breaking Waves. M. Spalding, R. Brumbaugh, E. Landis, eds. Atlas of Ocean Wealth, TNC, Arlington, VA.

[4] Losada I, P Menéndez, MW Beck, D Trespalacios & S Narayan. 2017. Technical Report- Valuing the Protection Services of Mangroves in the Philippines. World Bank, DC.

[5] McCreless E & MW Beck. 2016. "Rethinking our Global Coastal Investment Portfolio." Journal of Ocean and Coastal Economics Volume 3, Article 6.

７．第 32 回 ICRI 総会・決議文書（２）:

サンゴ礁に対する浚渫・土砂廃棄による被害の軽減に関する勧告

**Recommendation to reduce damage due to dredging and dumping on coral reefs**

*Adopted on December 9th 2017, at the 32nd ICRI General Meeting (Nairobi, Kenya)*

***Noting*** the World Association for Waterborne Transport Infrastructure Report number 108, Dredging and Port Construction around Coral Reefs;

***Recognizing*** that the anthropogenic damage due to dredging and physical alteration of reef structures are serious issues of global concern;

***Recalling*** goal 3.3 of theme 3 of ICRI Action plan to improve regulation and enforcement to reduce direct anthropogenic damage due to dredging and physical alteration of reef structures;

**The International Coral Reef Initiative**

***Encourages*** governments to avoid, minimize and mitigate, the impacts of dredging and dumping activities in areas that might damage coral reefs;

***Further calls*** on ICRI members to promote marine and coastal sustainable tourism, especially for cruising activities;

***Resolves*** to promote exchanges of expertise and best practices to avoid, minimize, and mitigate the impacts to coral reefs due to construction of new harbors and ports, and new waterways;

***Resolves*** to promote exchange of expertise, best practices, and lessons learned to avoid impacts on coral reefs of dumping of dredge materials.

８．第 32 回 ICRI 総会・決議文書（３）:

環境に優しい係留ブイ及び海洋建設作業（エコ・デザイン）に関するガイドラインを作るアドホック特別委員会の作業要綱

**Terms of reference for the *ad hoc* committee on Green Marine Construction (eco-design)**

*Adopted on December 9th, 2017, at the 32nd ICRI General Meeting (Nairobi, Kenya)*

Following the presentation on the eco-mooring and green marine construction made during the 32nd ICRI General Meeting and the objective 4 (theme 3) of the ICRI plan: of action (to promote the deployment of mooring devices limiting the mechanical destruction of coral reefs and seagrasses), it is decided to create an Ad Hoc Committee on Green Marine Construction (eco-design).

The main objective is to provide ICRI Members guidelines to develop eco-design marine construction. The committee will work closely with other initiatives which are looking into this area.

The *ad hoc* committee will implement the following activities:

- Develop some guidelines on Green Marine Construction, focusing initially on eco-mooring
- Gathering additional case studies to develop a portfolio
- Develop a dedicated page on the ICRI website

Duration: the *ad hoc* committee will report at the 33rd ICRI General Meeting

Chair: ICRI Secretariat

Members: France, UK, Reef World Foundation

９．第 32 回 ICRI 総会・メンバーレポート要約：

テーマ１：サンゴ礁及び関連する生態系の気候変動対策への寄与に関する普及啓発の推進

## Theme 1 - "Help raise awareness of how coral reefs and related ecosystems help to fight climate change"

*The ICRI member's report outlines the activities of ICRI members; their progress and contributions towards the ICRI Plan of Action 2016-18. The contributions detailed below are taken from written responses by Brazil; Japan; Indonesia; Malaysia; Maldives; Monaco; UK; and the USA. The member report also includes responses from the Central Caribbean Marine Institute; Coastal Oceans Research and Development in the Indian Ocean; Fondation pour la Protection de la Biodiversité Marine; Great Barrier Reef Foundation; International Society for Coral Reef Studies; Reef-world Foundation; Science and Conservation of Fish Aggregations; The Nature Conservancy; UNEP Caribbean Environment Program; and the UN Environment World Conservation Monitoring Centre (as of December 1st, 2017). For more information, you can check directly the member report.*

*To address theme one, ICRI members were asked to provide examples of how coral reefs and related ecosystems help to mitigate the effects of climate change; and how they are encouraging financing for coral reef restoration and protection. Contributions to theme one included the use of MPAs, monitoring and research, education schemes, written articles, and conservation projects. The importance of determining a socio-economic value of a reef when regarded as protection from climate change-related events was highlighted.*

### ➢ Goal 1-1: highlight the contribution of coral reefs, mangroves and seagrasses to mitigate and adapt to climate change and its impacts

**Brazil**

Mangroves

A Brazilian Mangrove Atlas is being prepared to be launched soon and it will probably have example on this topic. ICRI will be informed about it. But until now research group still try to identify impacts of climate change on mangroves in Brazil, as reported by Schaeffer-Novelli et al., 2016 and Bernardino et al. 2016.

NDC

The NDC, recently implemented in Brazil, does not mention coral reefs/mangroves specifically. However, NDC uses the National Adaptation Plan for Climate Change (PNA) as an implementation tool, which recognizes the ecological, economic and social importance of these environments for Brazil. The NDC in Brazil is to be revised every 5 years from 2020 on, and it's fair to predict that the next Contribution will address coral reefs and mangroves specifically.

## Indonesia

A number of policies have been put in place to ensure good mangrove management by the Government of Indonesia and Ministry of Environment and Forestry, as follows:

One map policy
Indonesia has officially implemented the one-map policy. The Geospatial Information Agency (BIG) has officially unveiled its basic geospatial information map (IGD) for use by government agencies, several thematic maps (IGT) that comprise of a national land-cover map, a national sea grass/shallow waterbed map, and a provincial mangrove map of Sumatra, Java and Bali-Nusra, as well as Indonesia's Coral Reef Status 2017 and Indonesia's Seagrass Status 2017.
This one map policy is important in order to make the government agencies work together instead of creating their own maps using their own distinct standards. Accurate and up-to-date geospatial information is essential in helping the government draft policies, resolve land disputes and manage its assets in the regions.

Restoration of degraded mangrove forests and ecosystems
Mangrove maps showing the status of degradation are being generated to assist in national level planning for rehabilitation of degraded mangroves. Mangrove working groups have been established at the national, provincial and district levels to assist in the implementation of the rehabilitation strategy and a number of program have been developed by the MoEF.

Designated the Marine Protected Areas
Designated 7 marine protected areas (MPA) under the authority of MOEF, namely Bunaken in North Sulawesi (89.065 ha), Taka Bone Rate in South Sulawesi (530.765 ha), ,Teluk Cenderawasih in Papua (1.453.500 ha), Kepulauan Seribu (Thousand Island) in Jakarta (107.489 ha), Wakatobi in Southeast Sulawesi (1.390.000 ha), Karimun Jawa in Central Java (111.625 ha) and Togean Island in Central Sulawesi (362.605 ha). Designated all these MPAs is based on Law No. 5 year 1990 Concerning Law of The Republic of Indonesia On Conservation Of The Living Natural Resources And Its Ecosystem.

The ASEAN Mangroves Network, which was established in 2012 with the support from the Japan International Agency. It encourages cooperation among ASEAN countries on the sustainable management of mangroves.

## Japan

Effectiveness of seaweed beds and mangroves are being assessed on climate-change

mitigation and adaptation, such as blue carbons and breakwater against waves, by Environment Research and Technology Development Fund of the Ministry of the Environment (S-14), Japan.

**Malaysia**

The Ministry, through Department of Marine Park Malaysia has carried out resilience study of coral reefs within marine parks towards changes in their environment. Malaysia's preliminary finding is that there are reefs within marine park areas which demonstrates higher resilience to changes and was not affected during the recent bleaching events. These reefs are identified and zoned as preservation zones where human activities are limited.
Importance of coral reefs was not specifically mentioned in Malaysia's INDCs submission to UNFCCC. However, protecting the country's coastline especially mangrove forest has been identified as one of the Adaptation Measures towards climate change. The country has embarked upon replanting degraded mangrove forest since 2007. This is an annual program ever since. Ministry of Natural Resources and Environment through Forestry Department Peninsular Malaysia is the focal point for the program. In 2016, a total coastal area of 106ha was restored with suitable mangrove species. As for conserving protecting Malaysia's coral reefs, emphasis has been given to better manage current MPAs as well as getting new MPAs. Efforts to restore Malaysia's reef areas has also started since 2011. The Ministry, through Department of Marine Park Malaysia has taken actions on monitoring of coral reef health and water quality surrounding coral reefs within marine parks. The department has also developed Coral Bleaching Response Plan for implementation in the event of mass coral bleaching due to impact of climate change e.g. increase in sea surface temperature. The response plan includes recommended actions such as limiting human activities on reefs affected during bleaching event. Conserving Malaysia's natural resources and pursuing green growth are also mentioned as a priority focus under 11th Malaysia Plan – 2016- 2020 (a five-year development plan) to further reduce Malaysia's carbon footprint.

**The Republic of Maldives**

Over 120 islands in the Maldives have been developed as tourist resorts. Every island is self- contained with complete back-of-the-house services established on the island itself. Since the main tourism-product being sold on the resorts is the tropical setting in a pristine natural environment, some resorts do not have many hard structures that are used for shore-protection. However, some areas have hard structures (groynes, and seawall or revetments) to mitigate the effects of seasonal sand movement and erosion. Resorts cope and adapt to climate change with a combination of the soft and hard engineering solutions. The Maldives are planning to add in their NDC the importance of coral reefs/ mangroves.

**United States of America (USA)**

Coral reefs reduce wave energy by an average of 97%, functioning as effectively as or better than artificial breakwaters, and self- sustaining as long as they remain healthy (Ferrario et al 2014). U.S. flood damages averted due to coral reefs are estimated at $94 million annually with the U.S. ranking in the top 10 of countries to receive risk reduction benefits from reefs, but if just the top 1 meter of coral reefs were lost, the annual expected damages from flooding would more than double globally.[1]

**Great Barrier Reef Foundation (GBRF), Australia**

The GBRF are exploring opportunities, in conjunction with TNC and the Rockefeller Foundation, for valuing the coastal protection role of the GBR with the view to potentially piloting innovative financing options such as insurance products like the one launched in Mexico earlier this year.

**Reef-World Foundation**

Under a successful grant application to the National Fish and Wildlife Foundation (NFWF), The Reef-World Foundation are further supporting the implementation of the Green Fins initiative in the Philippines at sites that have been specifically highlighted as sites affected by climate change. The project titled, '*Managing a sustainable marine tourism industry in the Philippines using the Green Fins approach'* will be implemented between September 1, 2016 to August 30, 2018. Using state- of-art information on climate vulnerability that uses downscaled climate model projections in relation to the onset of annual severe bleaching is used to target actions that reduce stress on reefs caused by human activities. This project focuses on meeting this best-practice standard in the Philippines and will focus on building capacity of managers to support a sustainable marine tourism industry within Apo Reef, Marinduque, Ticao Island and Bantayan Island. State-of-art downscaled climate modelling indicates these locations are have the best chance of persisting as disturbance frequencies increase. Consequently, management actions in these locations have the greatest chance of being effective long-term. Marine tourism industries are currently rapidly expanding in these areas, which are all protected under the National Integrated Protected Area System (NIPAS) or are locally managed MPAs. Under this approach, building the capacity of resource managers specifically on how implementing best practice within marine tourism activities can help to build the resilience of coral reefs to wider scale threats such as raising

[1] Ferrario, F., M. W. Beck, C. D. Storlazzi, F. Micheli, C. C. Shepard, and L. Airoldi (2014) "The Effectiveness of Coral Reefs for Coastal Hazard Risk Reduction and Adaptation." Nature Communications, 5:3794.

sea temperatures and subsequent bleaching events.
As part of the Green Fins initiative, all staff at businesses that are taking part as active members undergo an annual training session by training Green Fins Assessors who provide an in-depth training session at the business premises that provides information on the importance of healthy and functioning marine habitats (coral reefs, seagrasses and mangroves) that can help protect coastlines against the increase in severity and frequency of storm caused by climate change. This information helps to inspire and empower resources managers and those in a position to act and help protect and conserve these habitats whilst ensuring tourism related businesses are using them in a sustainable manner.

**The Nature Conservancy**

To help improve decisions about coastal development in coral reef regions and to reduce risk to vulnerable communities and economies, the Conservancy has partnered with Swiss Re, one of the world's largest reinsurance companies. Leveraging the Conservancy's science on nature- based defences and Swiss Re's expertise in risk modelling, the project has found that a healthy coral reef can lessen the impact of storms and prevent erosion by 97%. These and other coastal ecosystems are the first line of defences for many cities around the world, from Miami to Manila. Along Mexico's Yucatan Peninsula, the Conservancy and partners in the hotel industry are collaborating to develop new insurance programs designed to sustain the protection benefits reefs provide in the face of hurricanes and tropical storms.
The Conservancy has partnered with SECORE International and California Academy of Sciences to help maintain corals' genetic diversity and maximize their ability to adapt to future conditions. Coral nurseries have been established off the coasts of several countries and in Florida and the US Virgin Islands, where TNC are growing corals that will be transplanted to depleted reefs across the region. The Conservancy has provided expertise and guidance to similar coral nursery projects in the Cayman Islands, Bahamas, British Virgin Islands, Dominican Republic, Grenada, Jamaica and Cuba.
Developed and launched the Corals & Climate Adaptation Planning: Adaptation Design Tool online course- developed for coral reef managers and practitioners as a collaborative project of the Climate Change Working Group of the interagency U.S. Coral Reef Task Force and The Nature Conservancy. It is based on the user guide, *Adaptation Design Tool: Corals & Climate Adaptation Planning.*
Continued maintenance of the Conservancy's online hub (reefresilience.org) of case studies, article summaries and webinars for coral reef managers to easily find resources based on the location, management challenges, and topics of interest. In 2016, 100,000 individuals visited the RR Toolkit and had access to more than 128 resilience science article summaries and 56 case studies and the Conservancy's webinars have received over

4,500 views.
TNC released the Atlas of Ocean Wealth, the planet's largest collection of spatial information tracking the natural resources provided by oceans. The database quantifies what the oceans provide to people, how much they provide and where those benefits accrue. Accessible to anyone, the online Atlas allows decision-makers to answer such questions as:

- How much money are coral reefs saving our city by reducing the force of incoming waves?
- Where are the most valuable reefs for supporting tourism?
- Which reefs produce the most fish for supporting local fisheries?

**UNEP Caribbean Environment Program, Jamaica**

UNEP-CEP Collaboration for an Ecosystem-Based Management of coral reef ecosystems:

CLME+ Collaboration
The project Caribbean and North Brazil Shelf Large Marine Ecosystems Project (CLME+) seeks to guide harmonized sectoral policies and also strengthen cooperation between regional fisheries bodies and environmental organisations. In the context of ensuring an ecosystem- based management of coral reefs, UNEP-CEP supports CLME+ long-term objective of "Healthy Reef, Continental Shelf and Pelagic Ecosystems" and its strategy to "Enhance the governance arrangements for ecosystem-based management of reefs and associated ecosystems (e.g. seagrass beds, mangroves, reef slopes and coastal lagoons)". UNEP-CEP was responsible for the implementation of the initial Pilot Project in 2010-2013, and has since continued to be engaged in the implementation of the CLME + Project and its sub-strategies for reef associated fisheries such as for Queen Conch and Spiny Lobster.

Blue Finance
The Regional Activity Centre for the Protocol concerning Specially Protected Areas and Wildlife (SPAW-RAC) under the Caribbean Environment Programme has also been involved in the innovative ecosystem-based management Blue Finance project (2015-2017), in partnership with GRID-Arendal, the Blue Solutions project, the French Initiative for Coral Reefs (IFRECOR), the Organization of American States and interested SPAW Parties.
It provides guidance on the use of economic instruments to finance reef management based on the ecosystem services contributed by coral reefs by involving the private sector from the tourism industry in particular. By drawing on existing methodologies for Payment for Ecosystem Services and other non-public funding mechanisms that have been successfully applied in terrestrial settings, the BlueFinance project adapts them to address the needs of the coral reef environment and ecosystem service uses. It aims to achieve environmental,

social and financial returns through strengthened collaborations with the private sector on coral reef conservation.
Sustainable financing mechanisms for marine managed areas are under consideration for Barbados, Antigua and Barbuda, Martinique and St. Kitts and Nevis.

Global Coral Reef Partnership

In 2014, UN Environment and its Regional Seas Conventions and Action Plans ('Regional Seas') initiated a Global Coral Reef Partnership to support countries deliver internationally agreed coral reef commitments through ecosystem-based management of coral reefs, as called for in the Global Strategic Directions for the Regional Seas 2013-2016. Participating organizations, partners and networks include ICRI, the Global Coral Reef Monitoring Network (GCRMN), the National Oceanic and Atmospheric Administration's (NOAA) Coral Reef Conservation Program, the Reef-World Foundation, Green Fins Initiatives, UNEP-World Conservation Monitoring Centre and GRID-Arendal. The partnership directly contributes to implementation of these internationally agreed coral reef commitments, including Sustainable Development Goal 14; Aichi Biodiversity Target 10, 11 and 15; SAMOA pathway paragraph 58(e); and the ICRI Continuing Call to Action and Framework for Action.

Caribbean Marine Protected Area Management (CaMPAM)

In order to address the need of ecosystem-based management of coral reefs and enhance the connectivity between reefs for coral resilience, UN Environment - CEP / RAC-SPAW has coordinated since 1997 a network to provide leadership and for building capacity of marine protected areas in the Wider Caribbean Region (CaMPAM), and implemented its programmes in collaboration with a number of partners and donors, including the Gulf and Caribbean Fisheries Institute (GCFI) and NOAA. CaMPAM uses the annual GCFI scientific meeting and workshops as its fora to discuss emergent issues related to the management of Marine Protected Areas and provides a network of capacity building programmes to leaders and members. Some of the major activities implemented by CaMPAM include:

- The Training of Trainers for Marine Protected Areas Managers
- The CaMPAM Mentorship Program
- Providing small and medium funds including grants to Promote Sustainable Fishing Practices and Alternative Livelihoods for Fishers
- The Marine Protected Area Database

In 2010, with funding from the Italian Ministry of Foreign Affairs, UN Environment - CEP / RAC-SPAW implemented through CaMPAM the project "Regional support for the Caribbean Challenge initiative: Networking, consolidation and regional coordination of Marine Protected Areas management" to support contracting parties of the SPAW Protocol and Caribbean Challenge objectives. The Caribbean Challenge Initiative was launched in 2008

with the support of The Nature Conservancy with the aim to meet protect 20% of the marine coastal environment by 2020, in line with Aichi Target 11. The project aims to strengthen linkages with the Global Island Network and other Small Island Developing States efforts.

- **Goal 1-2: encourage financing for projects and initiatives which help protect and restore coral reefs, mangroves and seagrasses**

**UNEP Caribbean Environment Program, Jamaica**

Coral Restoration Consortium (CRC)
A collaboration among scientists, managers, and practitioners including NOAA, the Nature Conservancy, the Coral Restoration Foundation, UN Environment – CEP / SPAW RAC and various universities emerged in 2017, in response to priority recommendations from the November 2016 "Workshop to Advance the Science and Practice of Caribbean Coral Restoration" in the form of the Coral Restoration Consortium (CRC), to which CEP serves as a Steering Committee member.
The goals of CRC are particularly in line with ICRI's Call for Action Goal 1.2.
The CRC's mission is to foster collaboration and technology transfer among participants, and to facilitate scientific and practical ingenuity to demonstrate that restoration can achieve meaningful results at scales relevant to reefs in their roles of protecting coastlines, supporting fisheries, and serving as economic engines for coastal communities.
To help increase the scale and efficiency of coral restoration, the CRC focuses on the following topical priorities for the next three to five years:

- Scaling-up in-water, land-based, and larval propagation
- Designing projects to demonstrate multi-species ecosystem functioning and coastal protection
- Coordinating and fostering genetics science into adaptive restoration
- Developing restoration monitoring guidelines and common-access data platforms

For each priority, a dedicated Working Group has been established to develop solutions-oriented action plans and to help establish best management practices.

１０．第 32 回 ICRI 総会・メンバーレポート要約：

テーマ３：規制ツールの活用強化によるサンゴ礁と関連するマングローブ及び海草に対する人為的脅威の削減の推進

## Theme 3: "Help to reduce human threats to coral reefs and associated mangroves and seagrasses, by making greater use of regulatory tools"

*The ICRI member's report outlines the activities of ICRI members; their progress and contributions towards the ICRI Plan of Action 2016-18. The contributions detailed below are taken from written responses by Brazil; Japan; Indonesia; Malaysia; Maldives; Monaco; UK; and the USA. The member report also includes responses from the Central Caribbean Marine Institute; Coastal Oceans Research and Development in the Indian Ocean; Fondation pour la Protection de la Biodiversité Marine; Great Barrier Reef Foundation; International Society for Coral Reef Studies; Reef-world Foundation; Science and Conservation of Fish Aggregations; The Nature Conservancy; UNEP Caribbean Environment Program; and the UN Environment World Conservation Monitoring Centre (as of December 1st, 2017). For more information, you can check directly the member report.*

*To address theme three, ICRI members were asked to outline legal frameworks that are currently in place in order to protect coral reefs and related ecosystems and how this is being measured. Members were asked how they are enforcing the regulations that prevent dredging. ICRI members also outlined the ways in which they are promoting the use of mooring devices, marine-friendly sun cream, and the reduction of the use of microbeads, to prevent coral reef and seagrass degradation and pollution. Contributions to theme three included laws, legislation, and policy improvements that protect coral reefs and relate ecosystems. Contributions also discuss the key role of MPAs in enforcing regulations. Brazil, Japan, Maldives, the UK and the USA have all banned, or are in the process of banning microbead manufacturing.*

- ***Goal 3-1: promote legal frameworks for the protection of coral reefs and associated mangroves and seagrasses, with quantified targets and effective enforcement to protect these ecosystems***

### Brazil

Currently, only 1.57% of Brazil's seaboard territory is under the Marine and Coastal Protection Areas Network (MCPA), instituted by the Federal Government in 2000. The Marine and Coastal Protected Areas Project (GEF Mar), described above, will take place to expand the existing MCPA until 2019/2020 and also to promote its long term financial sustainability by developing innovative financing mechanisms. Joint efforts have been made within the scope of the GEF-Mar, mainly in 2016 and 2017. This is a great opportunity for Brazil to achieve part of the international goals of conservation of marine ecosystems and biodiversity. An example of ongoing action is the contracting of consultancies by FUNBIO to compile and gather information necessary to support the

process of expansion of the Abrolhos National Marine Park, and creation and implementation of Amazonas River Mouth Protected Area, Foz do Rio Doce Protected Area and Vitoria Trindade Chain Protected Area.

Besides GEF Mar, Brazil implemented a National Plan of Action for conservation of ecosystems, coral reefs and mangroves.

National Action Plan for Coral Environments Conservation (PAN Corais) includes and establishes priority conservation strategies for 52 species of fish and aquatic invertebrates considered to be endangered, listed in the National List of Endangered Species. Simultaneously, it establishes strategies for the conservation of 11 other species that are known to benefit from the maintenance of the latter. This has a validity period that ends in February 2021. PAN Coral will be implemented in 18 focus areas located along the Brazilian coast, from the State of Maranhão to Santa Catarina, including areas within the Exclusive Economic Zone, in addition to its territorial sea.

10 specific objectives were defined:

1. To promote the integrity and maintenance of habitats, ecosystem services and populations of target and benefited species.
2. To contribute to the management and monitoring of fishing activity in coral reef environments.
3. To use ecosystem-based approaches to promote the sustainable exploitation of fish stocks.
4. To enhance the general knowledge about coral reef environments that are still poorly investigated.
5. To minimize activities and enterprises that directly or indirectly affect coralline environments.
6. To contribute to the organization of tourism activity in coral environments in order to minimize its impact, considering the local socioeconomic situation.
7. To prevent the introduction and spreading of invasive exotic species in coral reef environments, and to evaluate and mitigate impacts in already affected regions.
8. To evaluate and minimize chemical, physical, organic and biological pollution in coral environments.
9. To promote the revision, integration, innovation and effectiveness of current public policies. This will consider the sustainability perspective of coral environments in the social, environmental and economic contexts; broadening and strengthening participatory mechanisms and social control in the management of territories.
10. To evaluate and highlight the role of environmental services of coral reefs in climate change related issues and its impacts, as well as to develop strategies for the

successful mitigation and adaptation of these environments based on the building of specific scenarios. The previous objectives comprehend 146 actions and over one hundred organizers and contributors of various institutions.

Periodic Assessment

The action plan will be evaluated annually to review and adjust the implemented measures. In addition, a mid-term evaluation is expected to be administered half-way through the project's cycle. A final assessment will be administered at the end of the management cycle. The National Action Plan for the Conservation of Threatened and Economically-Important Species of the Mangrove Ecosystem (PAN Manguezal) is aimed at conserving Brazilian mangroves, reducing degradation, and protecting the focal species of the National Action Plan. This insures a level of maintenance of areas and preservation of their traditional uses; incorporating traditional and academic knowledge.

PAN Manguezal is made up of eleven specific objectives, each with its own actions, being:

1. Contribute to the effectives of territorial planning in areas of mangrove and associated ecosystems (landholding regularization/ territorial planning).
2. Contribute to the strengthening of social participation and integration between government agencies by means of public policies on strategic areas of the PAN Manguezal.
3. Align the legislation in accordance with regional specificities for the implementation of fisheries and aquaculture management at the areas of the PAN, taking into consideration the participation of traditional people and communities.
4. Reduce impacts resulting from different types of pollution and from the introduction of exotic species in mangroves and associated ecosystems.
5. Reduce habitat loss and expand mangrove and associated ecosystem's recovery and conservation areas.
6. Reduce risks of environmental accidents and mitigate their socio-environmental impacts in activities that directly or indirectly affect mangrove and associated ecosystems.
7. Strengthen the supervision and monitoring of licensed enterprises with potential for negative impacts, as well as mangrove and adjacent areas.
8. Inhibit the implantation and expansion of economic enterprises that result in negative impacts for the mangrove ecosystem.
9. Contribute to the eradication of shrimp farms and salt evaporation ponds' enterprises at the intertidal zone, and to the recovery of ecosystems already affected by these practices.
10. Train social agents and managers involved in the PAN Manguezal.

11. Elaborate communication strategy for the PAN Manguezal.

Project "Mangroves of Brazil"

Half of mangrove's area is concentrated on the North region of the country and 87% of mangroves are located inside federal, state or municipal Protected Areas. The project Mangroves of Brazil was conceived by the Ministry for the Environment, with the objective of improving Brazil's capacity in promoting the effective conservation and sustainable use of resources in mangroves, based on the strengthening of the National System of Conservation Units, and on the designation of permanent preservation areas for all Brazilian mangroves.
The project is executed by the Chico Mendes Institute for Biodiversity Conservation which, in order to reach this goal, aims to create a management strategy for protected areas. This strategy will focus on the effective conservation of a representative sample of Brazilian mangroves, acting mainly on existing shortcomings that compromise management effectiveness; hereby promoting the conservation and sustainable use of mangrove ecosystems, and the environmental services and functions necessary for national development and the well-being of coastal communities.
It is expected that the actions will assist on the conservation of 568.000 ha of mangroves that hold global relevance, as well as generating positive impacts on the livelihoods of communities which depend on this ecosystem. The project will enable the replication of lessons learned to all Brazilian mangroves. This initiative has also naturally aligned with the Sustainable Development Goals of the 2030 Agenda, especially with Goal 14, "Conserve and sustainably use the oceans, seas and marine resources". The initiative, supported by resources of the Global Environment Fund (GEF), aims at developing actions for the effective management and conservation of mangrove areas, acting along the Brazilian coastline.
In 2000, Brazil created the National System of Conservation Units (SNUC) (Law 9,985, July 18, 2000) gathering all existing instruments and regulations, constituting a framework for the creation, implementation, consolidation and management of protected areas. In 2006, Brazil established the National Strategic Plan for Protected Areas (PNAP) with the commitment to consolidate a comprehensive, ecologically representative and effectively managed protected area system integrated with broader land and marine landscapes by 2015. The PNAP attends the deliberations of the World Summit for Sustainable Development, Strategic Plan of Convention on Biological Diversity and National Environmental Conferences.
In this context, the Marine and Coastal Protected Areas Project (GEF Mar) started in 2014 with the main objective to support the creation, enlargement and implementation of a representative and effective system of marine and coastal protected areas to reduce biodiversity loss. GEF Mar is financed by the Global Environmental Fund with $18.2 million

approved by the World Bank. The goal of project is to increase the marine protected area from 1.57 to 5%, totaling 175,000 km2, most of this percentage must include coral reefs and associated ecosystem. Brazil is strongly committed to creating at least 10% of new MPAs, including areas with coral reefs such as São Pedro and São Paulo Archipelago and the submerged reefs at the mouth of the Amazon River recently mapped. Several studies are in progress to elaborate the processes of creation of new MPAs.

Brazil is signatory of five international MPAs conventions

- Convention on Biological Diversity 2010
- United Nations Convention on the Law of the Sea
- Ramsar Convention on Wetlands of International Importance
- International Coral Reef Initiative
- The World Heritage Convention.

In addition, Brazil is member of The Regional Seas Conventions. Therefore, the effective creation of Marine Protected Areas is a commitment assumed by Brazil. Brazil has also internalized the Aichi Biodiversity Targets by Resolution CONABIO (National Biodiversity Commission) n. 06, September 3, 2013.

Under the Brazilian Forest Code, mangroves, including hypersaline tidal flats were considered permanent preservation zones. However, in 2012 the national congress voted a reform of the forest code (Law n. 12.651, May 25, 2012) and hypersaline tidal flats were excluded from protection against land development and maritime culture, in particular shrimp farming, with some safe conduct provided in the Law n. 12.727, October 17, 2012, as to protect adjacent mangroves, among other requirements. A Ministry of Environment Normative Instruction n. 03, April 16, 2008 does not allow shrimp farm in mangroves within Protected Areas.
Environmental crimes law (n. 9.605, February 12, 1998) provides fines and detention penalties for activities harmful to the environment, including corals (casting vessels or throwing debris of any kind on banks of mollusks or corals, duly marked in nautical chart) and mangroves (Destroying or damaging native or planted forests or dune-fixing vegetation, which protects mangroves, which is the object of special preservation).

## Indonesia

Regulation of Minister of Economic Coordinator Number 4 Year 2017

Regulation of Minister of Economic Coordinator Number 4 Year 2017 on Policy, Strategy, Program and Performance Indicator of National Mangrove Ecosystem Management is a mandate from Presidential Regulation Number 73 year 2012 on the National Strategy of Mangrove Ecosystem Management. This regulation is a guideline for the related parties in order to manage mangrove ecosystem which consist of ecology side, socioeconomic and institutional to guarantee function and the benefit of mangrove for the community welfare. In order to accelerate the implementation of this regulation each related party must establish activity based on its responsibility such as rehabilitation, protection of mangrove ecosystem which is covering the location, target (quantitative), time, and budget.

Laws associated:

- Law Number 5 Year 1990 Concerning the Conservation of the Living Natural Resources and its Ecosystem;
- Law Number 41 Year 1999 Concerning the Forestry;
- Law Number 32 Concerning Protection and Environment Management;
- Law Number 45 Year 2009 Concerning Amendment to Law Number 31 Year 2004 about Fisheries;
- Law Number 27 Year 2007 Concerning the Management of Coastal Areas and Small Islands;
- Government Regulation Number 28 Year 2011 Concerning Management of Nature Reserve Area and Natural Conservation Area;
- Presidential Regulation Number 73 Year 2012 Concerning National Strategy of Mangrove Ecosystem Management;
- Presidential Decision Number 48 Year 1991 Concerning Endorsement on *Convention on Wetlands of International Importance Especiallly as Waterfowl Habitat;*
- Decree of the Minister of Marine Affairs and Fisheries Number: Kep.38 / Men / 2004 About the General Guidelines of Coral Reef Management;
- Regulation of the Minister of Marine Affairs and Fisheries of the Republic of Indonesia Number Per.17 / Men / 2008 About Conservation Area in Coastal Areas and Small Islands.

Quantified Targets

Based on Act No. 5 year 1990 Concerning Law of The Republic Of Indonesia On Conservation Of The Living Natural Resources And Its Ecosystem, conservation of the living natural resources and its ecosystem is based on preservation of ability and usefulness of the living natural resources in its ecosystem in harmonious and well-balanced manners.

## Japan

As reported, Japan formulated the Japan's National Coral Reef Ecosystem Conservation Action Plan for 2016-2020. This plan is not a legal framework, though it mentions nature restoration projects and projects for child-nature friendship in national parks. There are legal frameworks relating to nature restoration and national parks in Japan (e.g. Natural Parks Act), and hence such laws are relevant to nature conservation, including the protection of coral reefs and mangroves.
MPA is defined in Japan's "Marine Biodiversity Conservation Strategy" as follows; "Marine areas designated and managed by law or other effective means, in consideration of use modalities, aimed at the conservation of marine biodiversity supporting the sound structure and function of marine ecosystems and ensuring the sustainable use of marine ecosystem services."

## Malaysia

Marine protected areas in Malaysia are designate through various legislations. Marine Protected Areas in Malaysia generally are composed of Marine Parks and Fisheries Prohibited Areas. The history of the establishment of MPAs in Malaysia dates back to the 1970s. For Marine Parks and Fisheries Prohibited Areas in the Peninsular Malaysia and Federal Territory of Labuan, Ministry of Agriculture and Agro-based Industry has the jurisdiction to establish new marine parks of which these parks are manage by Ministry of Natural Resources and Environment through Department of Marine Park Malaysia. For Sabah and Sarawak, MPAs are established and managed by the State Governments – Sabah Parks and Sabah Wildlife Department, for the State of Sabah and Sarawak Forestry Department for the state of Sarawak. In Sabah, marine areas are protected via the Parks Enactment 1984 and Wildlife Conservation Enactment 1997. In Sarawak, two State level legislation are used for the establishment and management of MPAs namely the National Parks and Nature Reserves Ordinance 1998 and the Wildlife Protection Ordinance 1998. In Peninsular Malaysia, marine parks are created by way of gazzetment under the Fisheries Act of 1985. The Fisheries Act 1985 contains only one out of 11 Parts which is relevant to marine parks. Section 43 of the Act contains prohibited activities within marine parks.

Malaysia has set a quantifiable target to protect their marine ecosystem in Malaysia's National Policy on Biological Diversity. It is defined under Goal 3, Target 6 of the Policy. Malaysia aims to conserve 10% of their coastal and marine areas by 2025 through a representative system of protected areas and other effective area based conservation measures. Currently, 3.48% of Malaysia's Exclusive Economic Zone (EEZ) are gazetted as MPAs. Currently, only areas designated and gazetted through legislations are recognize as an MPAs. However, the Ministry is considering to widen the definition of protected areas.

This is to include areas which are managed by local communities whereby there are conservation programmes and communities practice sustainable consumption. This study is carried out through a GEF funded Project on Enhancing effectiveness and financial sustainability of Protected Areas in Malaysia.

**The Republic of Maldives**

National Biodiversity Strategy and Action Plan 2016 – 2025.
The National targets for 2025 are to protect 10% of coral reefs, 20% of mangroves and wetland, one sandbank and one uninhabited island under the Environment Act.

**United States of America (USA)**

Please find attached a list of U.S. federal, state, and territorial laws and regulations that govern activities in and around coral reef ecosystems.

*Quantified targets*

The Micronesia Challenge

A commitment by the Federated States of Micronesia, the Republic of the Marshall Islands, the Republic of Palau, Guam, and the Commonwealth of the Northern Marianas Islands to preserve the natural resources that are crucial to the survival of Pacific traditions, cultures and livelihoods (View signed declaration). The overall goal of the Challenge is to effectively conserve at least 30% of the near-shore marine resources and 20% of the terrestrial resources across Micronesia by 2020. This ambitious challenge far exceeds current goals set by international conventions and treaties, which call for countries to conserve 10% of terrestrial and marine resources by 2010 and 2012 respectively.

It includes commitments to protect 30% of priority watersheds and effectively manage 30% of nearshore ocean waters by 2030. Hawai‘i also accepted the invitation to join the Global Island Partnership and will share their model for sustainability, the Aloha+ Challenge, with other island communities: The 30 by 30 Oceans target is a part of the State’s Sustainable Hawaii Initiative.

Area currently under protection
U.S. Marine Sanctuaries/Monuments with coral habitat: TOTAL AREA = 697,761 $mi^2$

- Paphanoumokuakea MNM: 580,000 mi2
- Marianas Trench MNM: 96,714 mi2

- Pacific Remote Islands MNM: 86,888 mi2
- American Samoa NMS: 13,581 mi2
- Rose Atoll MNM: 13,436 mi2
- Florida Keys NMS: 3,800 mi2
- Flower Gardens NMS: 56 mi2 Of that 697,761 mi2, 440 mi2 are shallow hard bottom coral reef habitat – the larger footprint is important for connectivity between reefs and fishing impacts.

**Fondation pour la Protection de la Biodiversité Marine (FoProBiM)**

Haiti's protection laws are extremely weak; however, FoProBiM are hoping to have the laws updated soon, and Haiti's first MMA management plan has been completed. Haiti is currently above the 20% target with more MMA declarations in the works. All remain paper parks (but with the beginnings of management activities).

**The Nature Conservancy**

Seychelles Marine Spatial Plan (MSP) Initiative

An output of the government-led Debt-for-Climate-Change-Adaptation Swap in which the Government committed to expanding marine biodiversity protection to 30% of the EEZ and Territorial Sea by 2020. The Seychelles Conservation and Climate Adaptation Trust (SeyCCAT) was created from the debt swap, and is an independent public-private trust mandated to support the implementation of the MSP and other marine conservation and climate adaptation activities in Seychelles. Seychelles is the first country to have implementation funding in place before it has completed its marine spatial plan.
In Manus Province in Papua New Guinea and Choiseul Province in Solomon Islands, TNC are assisting communities and government partners with establishing ridges to reefs protected area networks. These protected area networks are helping to conserve biodiversity, enhance food security and build community resilience to climate change.

The 4th year of the Caribbean Marine Biodiversity
A five-year project (2014-2019), funded by the U.S. Agency for International Development and The Nature Conservancy, operating in five target countries- Dominican Republic, Grenada, Haiti, Jamaica and St. Vincent & the Grenadines. The program focuses on creating and effectively managing marine conserved areas and establishing and promoting sustainable fisheries.

**UNEP Caribbean Environment Program, Jamaica**

Protection of marine species under the SPAW Annexes

Contracting Parties to the SPAW Protocol (adopted in 1990 and entered into force in 2000; currently 16 Contracting Parties) adopted the Annexes of species requiring special protection. These Annexes outline coastal and marine species of flora (Annex I), and fauna (Annex II), requiring the highest level of protection for which exploitation is forbidden. Species of flora and fauna for which exploitation is authorized but regulated to ensure and maintain population at an optimal level are listed under Annex III. Recognizing the growing threats to reef ecosystems and the urgent call for action, coral species are listed under Annex III of the SPAW Protocol since 1991, ensuring legal protection to coral reefs among Contracting Parties to the Protocol. Acropora and Faviid corals have since been listed to Annex II in 2014 due to their IUCN "Endangered" status.

In the light of an ecosystem based management of coral reefs, fisheries species including Queen Conch, Caribbean Spiny Lobster and Nassau Grouper have also been listed under Annex III of the SPAW Protocol (1991 for Queen Conch and Spiny Lobster, 2017 for Nassau Grouper). An additional nine species of sharks and rays associated with reef habitats have also been added to Annexes II and III of the SPAW Protocol. Despite parrot fish fisheries being prohibited in Belize, Turk and Caicos, Bonaire, Puerto Rico and the U.S Virgin Islands (Choat et al 2012), the need to list parrot fish under the SPAW protocol was one of the main recommendation ensuing from the GCRMN report "Status and Trends of Caribbean Coral Reefs: 1970-2012" addressing the trophic cascade associated with the overfishing of herbivorous fish and the shift to microalgae dominated state (Mumby et al 2006), reiterated during 15$^{th}$ and 16$^{th}$ WECAFC sessions (Trinidad and Tobago, March 2014 and Guadeloupe, June 2016 respectively).

Protected Areas listed under the SPAW Protocol

Through the aforementioned activities, UN Environment – CEP is not only working towards meeting global Aichi Targets, but is also in line with ICRI's Call of Action Plan (2016-2018) Goal 3.1 to "Promote legal frameworks for the protection of coral reefs and associated mangroves and seagrasses, with quantified targets and effective enforcement to protect these ecosystems".

Within the CaMPAM database, 32 marine protected areas officially listed under the SPAW Protocol ensuring a legal framework for the protection of reefs. Some of the benefits associated with the listing of protected areas under the SPAW Protocol are:

- Access to additional avenues for dialogue and information sharing
- Strengthening the leadership role of Contracting Parties in marine conservation in the wider Caribbean
- Higher visibility resulting in possible increases in employment opportunities and income (e.g. from tourism)
- Increased likelihood of benefiting from SPAW grant of the current 32 SPAW-listed

protected areas, 20 directly protect coral reefs.

- ***Goal 3-2: encourage a ban on plastic microbeads in cosmetic products***

| Country/ Organisation | No use of microbeads | Ongoing efforts to ban microbeads |
|---|---|---|
| Brazil | | Commercial industry has not yet stopped manufacturing.<br><br>In 2018, sectoral meetings will decide which recommendations should be included in the National Plan. |
| Japan | The cosmetic industry in Japan is refraining from using them in compositions of cosmetic products on a voluntary basis, while replacing them with natural materials such as cellulose | |
| Maldives | | Maldives joined UN Environment's Clean Sea Campaign to eliminate marine litter (September 2017).<br><br>Maldives pledged to collect and remove plastic rubbish from the sea by fishermen while they fish. |
| UK | | The UK is currently working to implement this legislative ban and expects to do so in 2018 |
| USA | A ban on manufacturing of cosmetics with microbeads commenced on 1st July, 2017 | |

**Brazil**

Brazil has undertaken a voluntary commitment to the World Ocean Conference, in June 2017, titled "Development of a national strategy to combat marine litter." Brazil must

follow UN Resolutions on the subject - Resolution 1/6 and Resolution 2/11, which mention a ban on microbeads as a goal, but, at the same time, urges people to reflect on the cost-effectiveness of the alternatives. It is important to mention that Brazil should follow UNEA.
The private industries and services are already aware of the issue but have not yet commented specifically on the microbeads matter in a clear and specific way. Between 6 and 8 of November 2017, the Ministry of Environment, in partnership with the United Nations Environment Program and the Oceanographic Institute of the University of São Paulo (IOUSP), held the 1st National Seminar to fight marine litter, with support from the World Animal Protection and the Consulate General of France in Rio de Janeiro.
This was the first step towards the development of the National Plan to Combat Marine Litter by the federal government. In 2018, sectoral meetings will decide which recommendations should be included in the National Plan.

**Japan**

Regarding microbeads, the cosmetic industry in Japan is refraining from using them in compositions of cosmetic products on a voluntary basis, while replacing them with natural materials such as cellulose. The current situation of micro-plastics in the ocean including microbeads is being monitored continuously.

**Malaysia**

Malaysia's effort to reduce the use of plastic bags began when the Penang State in 2009 banned the use of plastic bags from shopping stores on Mondays. In 2010, Selangor state followed to ban the use of plastic bags for customers on Saturdays. Both State Governments ultimately imposes the ban on the use of plastic bags on any day. Customers are charged MYR0.20 (USD0.06) for each plastic bag they requested and the money is channeled to charity bodies or consumerism programs and environmental conservation efforts.
The federal government through the Ministry of Domestic Trade, Cooperative and Consumerism (MDTCC) in 2011 launched the No Plastic Bag Day (NPBD) Campaign throughout Malaysia for each Saturday. The objective is to reduce the use of plastic bags in order to reduce its negative impact on the environment. Stores charge a levy of MYR0.20 (USD0.06) for each new plastic bag requested by customers during the program. The Malacca State Government has directed retailers to replace conventional plastic bags with biodegradable ones instead but without any additional charge.
On a smaller scale, the Ministry, through Department of Marine Park Malaysia carries out annual beach and reef clean up within their marine park areas. Besides that, tourism operators are also encouraged to reduce the use of plastic food containers. As for day trippers, the operators are required to pack all garbage to be dispose of on mainland. Diving operators are also encouraged to be members of Green Fins and to be involved

actively in conservation programs. To date, there are 33 active Green Fins members operating on marine park islands.

**The Republic of Maldives**

Marine litter and microplastics have been identified as a serious issue at a national level and the government is planning the necessary steps to be taken to address this issue. On 12th September 2017 Maldives joined UN Environment's Clean Sea Campaign to eliminate marine litter. Maldives also has pledged to collect and remove plastic rubbish from the sea by fishermen while they fish. After they are collected the rubbish will be shipped to the capital, Malé, where it will be transferred to long-distance ships for recycling into plastic-based fabrics.

**United Kingdom**

The UK has sought to implement a ban on both the manufacture and sale of plastic microbeads in cosmetic products in order to reduce their entry into the marine environment. To do so the UK sought scientific evidence to underpin the legislative directive (scope of potential bans), undertook public consultation processes in accordance with UK law and consulted the EU and World Trade Association in accordance with standard protocol. The UK then developed an Impact Assessment including advice/evidence supplied from Industry and recommendations from economists before engaging within government and across associated governments (devolved administrations) on the potential impacts of such a ban. The UK is currently working to implement this legislative ban and expects to do so in 2018.

**United States of America (USA)**

President Obama signed into law a ban on rinse-off cosmetics that contain intentionally-added plastic microbeads beginning on January 1, 2018, and a ban on manufacturing of these cosmetics beginning on July 1, 2017.

- ***Goal 3-3: improve regulation and enforcement to reduce direct anthropogenic damage due to dredging and physical alteration of reef structures***

**Brazil**

In Brazil, harbors and dredging activities must be licensed by state and national

Environmental Agencies. Federal environmental licensing is done by the Brazilian Institute for the Environment and Natural Renewable Resources (IBAMA). Also, to obtain authorization for marine disposal of dredged material, an environmental licensing protocol must be followed according to the CONAMA (Brazilian National Council of the Environment) resolution 237/1997.
In addition, CONAMA published another resolution 454/2012 establishing general guidelines and reference procedures for the management of material to be dredged in marine areas within national jurisdiction. An environmental monitoring program is also required to identify and quantify the impacts that may be caused by dredging. Water turbidity is monitored, based on a risk scale, through fixed oceanographic stations regularly calibrated to issue warnings and stop dredging while the turbidity lies above acceptable range levels. Nevertheless, these resolutions do not prevent Marine Protected Areas near harbors and dredging areas from being affected by the impacts of such activities. If a Protected Area is affected by dredging activities it receives an environmental compensation. Article 36 of SNUC (Brazilian National System for Conservation Areas) determines that in cases of environmental licensing for constructions of significant environmental damage, the entrepreneur is forced to upkeep the implementation and maintenance of an Area of High Level Conservation, or, in case it affects a specific Conservation Area, or its buffer area, that area it should be one of the beneficiaries for the compensation, even if it's not a High-Level Conservation Area. However, the compensation value doesn't amount to more than 0.5% of the cost of the project.

**Japan**

In national and quasi-national parks, reclaiming land in marine areas, physical alteration of sea floors, and some other activities are legally regulated according to Natural Parks Act.

**Malaysia**

All development activities within marine park areas are prohibited unless allowed for by the Director General of Marine Parks. Development activities that are allowed are required by law to carry out Environment Impact Assessment (EIA) regardless of size of the project. This is provided under Environment Quality Act 1974 – Environmental Quality (Prescribe Activities) (Environmental Impact Assessment) Order 2015. Under the Order, development projects in areas on or adjacent to marine ecosystems which are deemed as Environmental Sensitive Areas are also required to carry out EIA.

**The Republic of Maldives**

Separate regulation under Environmental Act has been formulated to address dredging and reclamation of reefs and lagoons of Maldives. The regulations also contain standards and guidelines to follow to minimize the negative impacts of such activities.

**United Kingdom**

As most of the UK's cold-water coral reefs occur in the deep-sea they are not typically exposed to dredging activity. However, the UK has a marine licensing system to ensure that dredging (and other regulated industry activities) do not adversely affect priority habitats and species, including coral reefs. The licensing process identifies potential adverse impacts of activities and developments and where appropriate will refuse consent, or impose license conditions to monitor or mitigate impacts. If a project is likely to have a significant effect on the environment an Environmental Impact Assessment (EIA) must be carried out before a license can be granted; most aggregate dredging applications require an EIA. There is also a strict set of rules concerning adverse effects on the designated habitats of SACs, such as cold-water coral reefs and seagrasses. This 'Habitats Regulations Assessment' process requires developers (e.g. dredging companies) to demonstrate no impact of the activity on the protected habitats, or to put in place mitigation measures if an impact is anticipated.
The Marine Management Organisation and Marine Scotland are responsible for licensing of dredging activities in the UK. Please get in contact if further detail on the UK licensing process would be useful to ICRI.
Benthic habitats and species need to be considered within the relevant EIA, where this is required. This includes all habitats and species listed as Annex 1, SSSI or UK or local BAP designations and the OSPAR list of threatened and/or declining species and habitats. Consideration is also given to whether or not the effects of activities requiring a license might affect the 78 Descriptor 1 and 6: Benthic habitats conservation objectives of sites designated under the EU Natura Directives. Where there is a risk of such an effect a formal assessment of the potential activity is made in relation to the sites conservation objectives. The Strategic Environmental Assessment and Environmental Impact Assessment (EIA) Directives both require the effects of developments to be assessed for their impact on the environment, including seabed habitats. The objective of these directives is to ensure no significant impacts, and to ensure all relevant considerations are made before developments occur.

**United States of America (USA)**

The U.S. Coral Reef Task Force (USCRTF) developed the "Handbook on Coral Reef Impacts: Avoidance, Minimization, Compensatory Mitigation and Restoration." The Handbook is a characterization of the federal mandates; review of existing policies and federal agency,

state and territory roles and responsibilities; and a compendium of best practices, science-based methodologies for quantifying ecosystem functions or services, and protocols available for use when assessing, mitigating, and restoring coral reef ecosystems. The target product is an amalgamation of coral reef regulatory practices.
The target audience for this Handbook includes project applicants, proponents, permittees or consultants for projects that may affect coral reefs or for responsible parties (RP) and their consultants in the event of unplanned impact events. This Handbook is also intended to be a reference for resource managers who are charged with project permitting, damage response, impact mitigation, and habitat restoration. This Handbook was adopted by the USCRTF in the fall of 2016.

**UN Environment Program World Conservation Monitoring Centre (UNEP-WCMC)**

Within the Proteus Partnership, UNEP-WCMC provide leading extractive companies with global marine and coastal habitats data to strengthen business approaches for biodiversity management. Specific focus is given to 'Critical Habitat', including coral reefs and associated ecosystems, as identified under International Finance Corporation Performance Standard Six (ICF PS6) through production of global layers of these marine and coastal habitats, hosted on the Ocean Data Viewer.

- ***Goal 3-4: promote the deployment of mooring devices limiting the mechanical destruction of coral reefs and seagrasses***

**Brazil**

The rules on anchoring in coral reefs and seagrass in Brazil are only for MPAs and are recommended in actions in the management plans of these MPAs. For example, Abrolhos National Marine Park has mooring devices on sandy areas for tourist and research boats, the number of boats is also controlled. At Rocas Atoll Biological Reserve, where only research is allowed, a fixed mooring is used by the boat that takes the research teams to the Atoll. At Fernando de Noronha National Marine Park, an important tourist destination and diving, in most dive sites the boat anchorage is not authorized. At Costa dos Corais Marine Protected Area (sustainable use), anchoring is not allowed in coral reefs and seagrass in 135 km extension, however enforcement is a challenge in such a large area.
Example: Public Use Plan for Abrolhos: "...the number of vessels allowed to operate will be conditioned to the quantity and distribution of mooring points, to avoid anchoring over the reef or algae bottom". The anchoring system consists in determining fixed points for diving activities and, upon local approval by the Brazilian Institute for the Environment and Renewable Natural Resources, a stainless-steel cable may be attached to parts of the reef top *(chapeirão*). At the other end of the cable, a tire is attached (preferably painted red to

facilitate location) at an approximate depth of 2.5 meters below the surface at high tide. The system allows the master of the vessel, sailor or the one responsible for the diving operation, to easily see the diving spot. Upon seeing it, a cable coming from the vessel is passed through the tire, returning it to the vessel. With this maneuver, the need for installing moorings or releasing anchors on the *chapeirão* is eliminated, thus avoiding damage to its structure. The geographic coordinates of those points should be widely disclosed by the Park. The suggested model is based on the diving operation carried out in other Conservation Units of several countries such as Bonaire, Grand Cayman, Bahamas, Papua New Guinea, Australia and others. This model is adopted for its cost vs. benefits relationship, since it is efficient and of low cost and maintenance, compared to other models.

**Japan**

Significant recovery of coral reef was observed at a diving point, which was closed for three years (1998-2001) by Zamami Fishery Cooperative after being damaged by ship anchors and divers. Thereafter, the same point has been opened to the public again. Herein, mooring devices are deployed to avoid anchor drop, and also the number of incoming ships is limited. By doing so, local people are trying to protect coral reefs. A similar measure is implemented in Tokashiki as well, and these efforts have resulted in effective conservation of coral reefs.

**Malaysia**

The Ministry, through Department of Marine Park Malaysia provides mooring buoys to all marine parks. This is carried out on an annual basis where buoys are replaced and added as required. Boats are prohibited by law under Fisheries Act 1985 to anchor on reefs within marine parks. Therefore, mooring buoys are provided on suitable sites especially dive sites and snorkel sites. Mooring buoys are also provided to villagers to prevent beaching of boats to the beach.

**The Republic of Maldives**

There are no mooring programs at a national level, but mooring programs are being set at protected areas. Currently, there are mooring buoys deployed in the Baa atoll biosphere reserve. The Environment Ministry is planning on extending the deployment of mooring buoys to other marine protected areas which are famous dives sites.

**United Kingdom**

A 'Marine Biodiversity Impacts Evidence Group' led by the Department of Environment, Food and Rural Affairs (Defra) has nearly completed a review of eco-mooring techniques using case studies of where these methods have been explored and tested in England and Wales. The review considers whether these devices would provide a suitable approach for managing recreational mooring activities in MPAs and explores potential funding mechanisms for their implementation. The UK will happily share the project report with ICRI as soon as it becomes available.
Eco-mooring projects are being piloted at a number of seagrass bed sites in the UK. The Porthdinllaen Seagrass Project in North Wales is trialing ways to reduce impacts on seagrass while allowing people to continue recreational and economic activities. This project will: trial helix anchors to replace concrete moorings; design adaptations for chain mooring; and consider establishing designated anchoring zones away from seagrass beds. In Pembrokeshire Marine SAC in south-west Wales, a voluntary no-anchor agreement has been established in sensitive habitat zones and visitor moorings have been provided outside of key seagrass areas. This has successfully deterred anchoring on seagrass beds and further steps are now being considered, such as trialling seagrass-friendly moorings that can also benefit sea users (e.g. through better protection in adverse weather and greater boat density in mooring zones). The UK can share experiences and lessons learned from these projects as they continue to develop.

**United States of America (USA)**

There are a few funding opportunities and multiple programs in the United States that promote the use of mooring devices to prevent both large commercial and smaller recreational boat impacts. The following bullets are a few representative examples.

- Port Everglades commercial vessel anchorage, Fort Lauderdale, Florida
  The commercial anchorage for Port Everglades was moved to reduce the potential for future groundings off the coast of Fort Lauderdale. The former anchorage area was located between the second and third coral reefs running parallel to the shoreline. The new anchorage area is located further offshore and is approximately 13 percent smaller. The new configuration is expected to continue to meet the needs of ships conducting business in Port Everglades, a key regional economic engine.

- Florida Keys National Marine Sanctuary Buoy Program
  Mooring buoys, which are 18" in diameter with a blue stripe, have been used in the Florida Keys since 1981 as an alternative to anchoring, which can break and damage the coral reef. There are over 490 mooring buoys available for use within the sanctuary on a first-come, first-served basis at no cost to the boater. Anchoring on living coral within the sanctuary in waters less than 40 feet and when the bottom is

visible is prohibited.

- Puerto Rican Mooring Buoys
  The Department of Natural and Environmental Resources of Puerto Rico has installed over 270 mooring buoys in seagrass, coral, and mangrove regions with the anticipation that they will curb boating damage and allow these natural environments to recover.

- Hawaii Day-Use Mooring Buoy 10-Year Strategic Plan
  With a grant from the NOAA Coral Reef Conservation Program, the Malama Kai Foundation published the Day-Use Mooring Buoy 10-Year Strategic Plan (DMB PLAN) to provide the state of Hawaii with a long-term strategy to install and manage day-use moorings buoys throughout the main Hawaiian Islands. The DMB PLAN identifies existing and future sites for day-use moorings in order to reduce/eliminate anchor damage and minimize user conflicts, and over-use. The DMB PLAN recommends a long-term strategy to manage the moorings, necessary rule changes and identifies potential reliable and consistent funding sources.

- Mooring Buoy Planning Guide
  With funding from a NOAA Coral Reef Conservation Program, this guide was produced by Project AWARE Foundation and PADI International Resort Association to address some of the issues relating to the planning, installation and maintenance of a mooring buoy program.

**Reef-World Foundation**

Through the Green Fins Code of Conduct #5 (*Participate in the development and implementation of a mooring buoy program and actively use moorings, drift or hand place anchors for boats*) governments responsible for the protection and sustainable use of coral reefs are working alongside scuba diving businesses to help install mooring buoys. As government departments usually lack the skills, training and equipment needed for installing mooring buoys, the Green Fins approach has helped to forge new relationships with businesses who are able to provide resources and assistance in these areas. Private sector businesses are commonly not legally allowed to install mooring buoys at dive sites and acquiring the correct permission and authority to do so is often a major limiting factor due to complicated bureaucratic systems in place. Enhanced communications channels between public and private sectors establish through the Green Fins initiative allow for better cooperation, removing barriers to enable to installation of mooring buoys at dive sites leading to an overall reduction in damage from anchoring.
Reef-World have recently developed a series of two-minute videos that have received a

large online uptake with one of the videos specifically addressing this threat. The How to Use Alternatives to Anchoring video has been viewed over 30,000 times since its release in August 2017.

- ***Goal 3-5: review issues related to the impact of sunscreens and other endocrine disruptors on coral reefs, and encourage the production of sunscreens that are proven not to damage coral reefs***

**Japan**

In Kerama/Zamami in Japan, coral-friendly sunscreens are sold. The sunscreens do not contain oxybenzone (Benzophenone-3), which is allegedly harmful to corals. However, scientific background of this idea is not clear, according to an ecologist. Furthermore, artificially produced chemicals, such as DCMU (which is used for paintcoating of ship bottoms and agricultural chemicals), is damaging to growth of corals, according to research by WWF and others.

**Malaysia**

There were preliminary studies on the impact of sunscreens on coral reefs by researchers from local universities in Malaysia. There has no recommendation or policy call to produce sunscreens that do not damage coral reefs yet.

**United Kingdom**

Sunscreens are regarded as cosmetics and as such are regulated under EU Regulation 1223/2009. The legislation requires that products are notified to the EU Commission and safety assessments carried out by safety assessors. The EU Commission is required to update this regulation to cover endocrine disrupting effects.

**United States of America (USA)**

There is a developing body of scientific evidence showing that certain chemicals included in sunscreens that provide protection to people from the sun, including oxybenzone, can physiologically injure and/or kill a number of marine organisms, including coral species listed under the Endangered Species Act (ESA). Oxybenzone is toxic to coral and threatens overall coral reef health by:

- Inducing coral bleaching
- Harming or killing coral larvae by inducing cross deformities, DNA damage, and bleaching

- Acting as an endocrine disruptor
- Bioaccumulating in coral tissue.

NOAA scientists from the Coral Disease and Health Consortium participated in the development of some of these studies and are reviewing the results from others. (C. A. Down, 2016)

**Reef-World Foundation**

Through the Green Fins initiative, The Reef-World Foundation actively raise awareness to the issues associated with the use of sunscreens in coral reef areas, advocating the restricted use of sunscreen during snorkeling and diving activities and instead where possible promoting the use of eco-friendly alternatives to marine tourism businesses. The charity is currently not engaged in any specific academic research but has carried out its own literature review into current research that has identified the specific compounds and active ingredients that are considered harmful to coral reefs and other marine life in order to better educate Green Fins members and provide alternatives. Reef-World would be interested in knowing more information based on scientific findings to enhance current awareness raising activities.

The Reef-World Foundation successfully acquired consumer discounts for Green Fins members interested in purchasing coral reef 'safe' sunscreen that does not have any active ingredients that have been identified as being harmful to corals or other marine life. Through collaborating with www.humanheartnature.com based in the Philippines, The Reef-World Foundation were able to provide a discount code specifically for Green Fins members based in the Philippines who were interested in purchasing sunscreens for re-sale purposes to their customers or guests.

１１．第 32 回 ICRI 総会・メンバーレポート要約：

テーマ４：より良い管理のためのサンゴ礁の現状の監視

## Theme 4: "Monitor the state of reefs in order to better manage them"

*The ICRI member's report outlines the activities of ICRI members; their progress and contributions towards the ICRI Plan of Action 2016-18. The contributions detailed below are taken from written responses by Brazil; Japan; Indonesia; Malaysia; Maldives; Monaco; UK; and the USA. The member report also includes responses from the Central Caribbean Marine Institute; Coastal Oceans Research and Development in the Indian Ocean; Fondation pour la Protection de la Biodiversité Marine; Great Barrier Reef Foundation; International Society for Coral Reef Studies; Reef-world Foundation; Science and Conservation of Fish Aggregations; The Nature Conservancy; UNEP Caribbean Environment Program; and the UN Environment World Conservation Monitoring Centre (as of December 1st, 2017). For more information, you can check directly the member report.*

*To address theme four, ICRI members were asked how they encourage regional reports to be carried out on coral reef health; and how they are monitoring and addressing the issue of coral reef bleaching. Contributions to theme four included the publication of new academic research on coral bleaching and the creation of large-scale monitoring networks. Multiple contributions discussed the role of modelling future weather patterns to help manage the effects of climate change on coral reefs and related ecosystems.*

### Goal 4-1: promote regional reports on the health of coral reefs

**Brazil**

Brazilian National Coral Reefs Monitoring Program has been underway since 2002, covering 7 MPAs, with a methodology compatible with Reef Check, but more comprehensive, thus gathering more detailed data. The program is conducted as a partnership between the Brazilian Institute of Environment (ICMBIO)/Ministry of Environment and the Federal University of Pernambuco, with local support from other Universities, NGOs, Dive operators and volunteers. The program is funded by the GEF-Mar project. Other coral reef research programs, conducted by University research groups, NGOs and collaborators also include monitoring activities on specific sites along the distribution of coral reefs in Brazil.

Results from the National Coral Reef Monitoring Program and other initiatives have been previously reported on the global status of the Reef Series during the previous GCRMN phase, when Brazil was part of the SA node. Under the new phase, in which the publication of regional reports is prioritized, Brazil is not yet part of any regional network and thus not featured on the 2014 publication of the Status and Trends of Caribbean Coral Reefs.

As part of the ICRI plan of action, "the Secretariat will encourage the publication of reports for regions in which work has not yet begun or is underway." A manual of methods and a report on the results of Brazilian coral reef monitoring program is under preparation at the moment to be released in 2018 during the IYOR. Therefore, Brazil would like to line up with the GCRMN in order to:

- Line up this initiative with the UNEP Coral Reef Unit guidelines
- Align with the Caribbean coral reef monitoring network for sharing and interchange of methods and expertise.

The methods proposed by the GCRMN-CARIBBEAN GUIDELINES FOR CORAL REEF BIOPHYSICAL MONITORING are compatible with the protocols adopted in Brazil and further collaboration and networking with the present GCRMN coordination and the Caribbean coordinators will certainly improve the effectiveness of actions along the region.

**UNEP Caribbean Environment Program, Jamaica**

GCRMN-Caribbean

The Global Coral Reef Monitoring Network (GCRMN) was established to support the ICRI's Call to Action and Framework for Action in 1994. This network works through regional networks, comprising a variety of institutions, with the aim of strengthening the provision of the best available scientific information and communication on the status and trends of coral reef ecosystems, for their conservation and management.
The regional GCRMN network for the Caribbean region (GCRMN-Caribbean) is an open and growing network of coral reef scientists and managers involved with coral reef monitoring in the wider Caribbean region. Coordinated by the UN Environment-CEP and its Regional Activity Center, the SPAW-RAC, it is led by a Steering Committee composed of fifteen regional experts, assisted by Members-at-large. Currently, more than 100 Members are sharing experiences, information and knowledge within this network.
To address the findings of the State of Caribbean Coral report, UN Environment-CEP / SPAW-RAC and the Dutch Ministry of Economic Affairs organized a workshop, from 6 to 8$^{th}$ August 2014 in Curaçao with the objectives of "Reviewing, improving and revitalizing the network and the nodes for a more effective coral reef monitoring and data management". UN Environment-CEP led the re- launching of the GCRMN-Caribbean which had suffered reduced functionality in data collection, information archiving and disseminating. SPAW-RAC is engaged in strengthening coral reef monitoring to ensure the collection of useful and accessible data that can effectively reveal the status and trends of the coral reefs in the region.
To this end, the GCRMN-Caribbean published minimum as well as preferred coral reef

monitoring guidelines for ecological and socio-economic data collection, to be disseminated within the Caribbean region (the "GCRMN-Caribbean baseline scientific monitoring guidelines for Biophysical Monitoring" and the "GCRMN-Caribbean guidelines for integrated coral reef monitoring"). These guidelines were drafted using the experience and lessons learned from long term and well vetted scientific protocols, and seek to provide a compromise between practical applicability and ease of comparison between existing methods and long-term datasets (kindly refer to "Publications" for more details).
In this context, UN Environment-CEP / SPAW-RAC coordinated the first GCRMN-Caribbean Integrated Coral Reef Monitoring Workshop (Discover Bay Marine Laboratory, Jamaica, April 2016). The scientific capacity building event, "GCRMN-Caribbean Guidelines Capacity Building Workshop: Towards comprehensive coral reef monitoring" integrated the newly endorsed biophysical and socio- economic guidelines to the training programs.
In 2016, following the First Integrated Coral Reef Monitoring Workshop, GCRMN-Caribbean coral reef monitoring guidelines were implemented in Cuba, Jamaica, Bermuda, the French and Dutch Antilles and in over 55 sites including reefs located within the limits of SPAW-listed Marine Protected Areas (St Eustatius Marine Park, Man O War Shoal National Marine Park).
Subsequently, with partial sponsorship generously provided by The National Fish and Wildlife Foundation (NFWF), the GCRMN-Caribbean guidelines are being implemented, in the framework of the project "Capacity Building for Coral Reef and Human Dimensions Monitoring within the Wider Caribbean". A training workshop took place (Port Royal Marine Laboratory, Jamaica, October 2017) with participants from Jamaica and Cuba, and a second workshop will be held in Saint Martin in 2018, with participants from Saint Martin, Sint Marteen, Saba, Sint Eustatius, and Saint Barthélémy. As a follow-up to the workshops, a grant will be allocated for biophysical and socio-economic monitoring activities based on capacity and resource needs. Such undertaking will result in the first complete integrated coral reef and human dimensions assessment carried out under GCRMN-Caribbean.
The GCRMN-Caribbean will continue to promote harmonized data collection through the implementation of guidelines in additional sites and member countries, as well as promoting the standardization of data analysis and reporting within the region.

## Goal 4-2: better monitor the phenomena of coral bleaching

### Brazil

Coral bleaching monitoring is conducted under the National Coral Reef Monitoring Program, and by many research groups and collaborators working on specific sites along

the distribution of coral reefs in Brazil. Among those, there are four Long Term Ecological Projects (PELD) linked to the ILTER network and financed by the Brazilian National Research Council that monitor Brazilian coral reef sites and report bleaching events. Bleaching events synchronized with global climate related bleaching have been registered for Brazilian reefs since the 90's. In 2016, a large-scale bleaching event, of moderate intensity, was observed in several sites along 2000 km of coast and in Oceanic islands. Coral bleaching has been surveyed using different methods compatible with both Reef Check and AGGRA protocols. Preliminary results did not detect mass coral mortality in Brazil post 2016 bleaching event, corroborating with Leão et al. (2016) findings for previous bleaching episodes that did not report mass coral mortality on Brazilian reefs since 1998.

**Japan**

Last year, Japan confirmed a large-scale bleaching event of coral reefs in Japan. In response to this event, Japan held a Conference on Emergency Countermeasures for Large-scale Coral Bleaching in this April. There, Japan shared the latest information on current situation and measures against the bleaching, and "Emergency Declaration of the Large-scale Coral Bleaching Event" was made. This declaration leads us to promote future measures against the bleaching. On the other hand, the Ministry of the Environment is monitoring bleaching event through the implementation of Monitoring Sites 1000. In addition, the Ministry of the Environment has also been undertaking spot surveys in Sekisei Lagoon. Furthermore, from this year, Japan is considering possible adaptation measures of coral reef ecosystems by conducting impact assessments of climate change (climate-change vulnerability assessment) as well as forecasting in Kerama and other locations.

**Malaysia**

Malaysia have been actively monitoring reefs in their waters since 2007 in collaboration with Reef Check Malaysia. To date, they have only experienced one mass coral bleaching event in 2010 aside from the earlier bleaching event in 1998. During the 3rd global bleaching event in 2014-2017, Malaysia was not significantly affected. However, the country has developed Coral Reef Bleaching Response Plan 2013 and a second edition of the Response Plan 2016-2020. The Plan includes recommendation on continuous monitoring programs, coral restoration programs on degraded reef areas, restriction of human activities on reefs affected by the bleaching event and chain of communication to spread information and status updates to stakeholders and the public.

**The Republic of Maldives**

Marine Research Centre is working on a National Bleach Response Plan to strengthen the data collection and the procedures to follow in an event of bleaching. Under this response plan, focal points from the relevant ministries will be selected and strategic plans and ways to proceed with a bleaching event will be decided**.**

**United States of America (USA)**

The NOAA Coral Reef Conservation Program is actively working with its partners to address the impacts of climate change and ocean acidification on coral reef ecosystems. The Coral Program promotes resilience-based management (RBM) as the best strategy to achieve management goals in a changing climate. Resilience refers to the capacity of a system to resist and/or recover from a disturbance event and maintain structure and function to allow the continued provision of ecosystem goods and services. It is important to understand this is a not the system's ability to "bounce back" to a single state but rather the ability of an ever-changing system to return to a healthy state after these impacts.

Resilience-based management (RBM) involves using knowledge of current and future drivers of ecosystem condition and function to identify, prioritize, and adapt management actions that sustain ecosystem resilience and human well-being. RBM actions are those that reduce stressors on the ecosystem, reduce the exposure to stressors, build or maintain system resistance and promote recovery after disturbance. This can include direct interventions to reduce stress and proactive and/or reactive restoration activities. A key aspect of RBM is using the best available knowledge to identify sites that contribute disproportionately to system resilience and prioritize actions that maintain and/or build that resilience at those sites. This requires a dynamic understanding of the system and agility to adaptively manage these systems as conditions change.

In order to provide support to the jurisdictions to implement RBM, there are three areas of focus for the program; to provide an understanding of past, present and projected future impacts to coral reefs caused by coral bleaching and other climate impacts; to assess and understand likely social and ecological responses to climate change; and to support the identification and prioritization of management actions to support ecosystem resilience and human well-being. The RBM approach unifies the work under all the pillars of the program and will assist the program and its partners in being strategic about how the U.S. invest in conservation.

Climate Strategy: Increase coral reef resilience to climate change and ocean acidification.
To achieve this, the U.S. will:

- Provide enabling conditions for resilience-based management by supporting an ongoing dialogue with jurisdictional partners on the approach and benefits and the

necessary training and capacity on the principles of RBM and tools that support the approach.
- Ensure that jurisdictions have climate change vulnerability assessments, including periodic reassessments and the understanding of how to use that information in planning.
- Support the integration of multiple types of monitoring and modelling to provide a dynamic understanding of the system to inform decisions and allow for adaptive management.
- Support research at the national and jurisdictional level to answer key research questions to validate and improve upon the RBM approach.
- Support and encourage jurisdictional partners to use RBM to apply the climate lens to planning efforts and to prioritize and tailor management actions to increase resistance and support recovery in an effort to increase resilience of coral reef ecosystems.

**Central Caribbean Marine Institute, Jamaica**

CCMI maintain an annual reef monitoring program which encompasses bleaching surveys. Researchers at CCMI are studying resilience in staghorn coral which was reared in the coral nursery and has since been planted on the neighboring reef. CCMI scientists are aiming to better understand the nature of resilience among some of the coral and causes of mortality among others.

**Coastal Oceans Research and Development in the Indian Ocean (CORDIO)**

Project 1: 2017 WIO GCRMN Coral status report

The 2016 coral bleaching event affected the whole Western Indian Ocean, and as in past years since 1999, CORDIO has been active in both direct monitoring and coordinating general action. This activity was undertaken as part of the regional reporting on the status and health of Western Indian Ocean coral reefs with support from the Indian Ocean Commission Biodiversity Project and implementing the strategy of the Nairobi Convention Coral Reef Task Force.

Regional report on the health of coral reefs in the Western Indian Ocean: CORDIO has been contracted by the Indian Ocean Commission under its Biodiversity Project to be the Technical Lead on the regional GCRMN reporting process for 2017. This report will be launched by the Indian Ocean COmmission and the Nairobi Convention (UNEP) at the ICRI General Meeting in Nairobi in 2017.

CORDIO wrote a chapter in the coral status report on the 2016 bleaching event in the WIO, using data collected from a regional initiative to collect real-time reports of bleaching and mortality between January and September 2016.

Project 2: 2017 WIO post-bleaching assessment

In order to get a full picture of the impact of the 2016 bleaching event on the Western Indian Ocean, the Biodiversity Project is supporting the reef network to conduct a post bleaching assessment in six countries in the region (Comoros, Kenya, Madagascar, Mauritius, Seychelles, Tanzania). Under the Coral Reef Task Force – WIO countries which do not fall within the scope of the Biodiversity Project (France, South Africa, Mozambique, Somalia), will also be included in this data sharing joint output. CORDIO is leading the regional coordination of the project with the assistance of national coordinators from each country. The assignment will build on the regional coral reef health dataset developed for the 2017 Regional Coral Reef Status Report.

Provided an updated training on coral reef monitoring methods specifically for the post-bleaching assessment.

Held a meeting of participants at the 10th WIOMSA Scientific Symposium in November 2017, to provide a progress update on the project.

Project 3: Coral bleaching alerts

Each year during the regional (Western Indian Ocean) summer (January – May), CORDIO produces a coral bleaching alert on a two-weekly basis, using the bleaching satellite products of the US National Oceanic and Atmospheric Administration (NOAA) Coral Reef Watch in conjunction with other regional and global climate information.

Project 4: Global GCRMN Implementation and Governance Plan

**I**mplementing the decision taken at ICRI GM31 to develop an Implementation and Governance Plan for the GCRMN for the period 2017-2020 CORDIO has signed a contract with UN Environment to finalize this plan between November 2017 and February 2018, in cooperation with the GOOS Biology and Ecosystems Panel, GEOBON Marine Biodiversity Observation Network and the Ocean Biogeographic Information System (OBIS).

Project 5: Coral reef ecosystem and coral species Red List Assessments

As the Chair of the IUCN Coral Specialist Group, CORDIO has developed a parallel project to Project 4, to undertaken Red List assessments of coral species and coral reef ecosystems, using the GCRMN reporting framework as the primary data infrastructure and feeding GCRMN data into societal benefit areas for the Aichi Targets and Sustainable Development Goals.

**Fondation pour la Protection de la Biodiversité Marine (FoProBiM)**

FoProBiM have begun monitoring certain reefs using AGRRA protocols.

## Great Barrier Reef Foundation (GBRF), Australia

The Great Barrier Reef Foundation is funding an initiative aimed directly at reducing the impact of coral bleaching through local scale environmental adjustments. GBRF have piloted a surface film technology and shown it can reduce light entering the water by 30%. The film has just undergone environmental impact assessments and mechanical testing at the Australian Institute of Marine Science and has been demonstrated to be safe and effective. This could be a potential tool in the bleaching toolkit for application at highly valuable reef sites such as those that are vital for reseeding other reef areas.
GBRF are also funding many initiatives aimed at boosting the resilience of the Great Barrier Reef. This includes a resilience mapping tool which uses a combination of monitoring and modelling to identify the reefs most important for resilience of the system. GBRF have also funded, in partnership with CSIRO, AIMS, the Queensland Government and Australian Government, the development of the eReefs modelling tools which are critical diagnostic tools for predicting coral bleaching in the short term (ReefTemp tool) and long term (eReefs scenario modelling suite). The model outputs were recently assessed against the in-water bleaching survey data from the 2016 bleaching event on the GBR and the model outputs performed with a high degree of accuracy against the monitoring data. The three-dimensional nature of the model allows it to also model the likely impacts of coral bleaching at a range of depths, making it a powerful tool to complement in-water surveys. GBRF have also funded work testing the feasibility of using remote sensing satellite technology to monitor the impacts of coral bleaching.
GBRF has also ramped up its focus on reef restoration science and practice in light of the last two years of catastrophic bleaching and extreme weather on the GBR. GBRF have just completed the first successful trial of larval reseeding on the Great Barrier Reef, and I October 2017 released the first coral genome library to the world enabling researchers from around the globe to better understand the adaptability of corals and their symbionts. GBRF are also working closely with DFAT to explore innovative new solutions (via DFAT's recently announced $5m Reef Innovation Fund) for building the health and resilience of coral reefs in the face of ever increasing climate impacts.

## Reef-World Foundation

Green Fins members are provided with an annual in-house training session for all staff involved in diving and snorkelling operations. As part of this training, they receive information on what coral bleaching is, how to report it via the use of existing mechanisms and provided with information on how to avoid encouraging bleaching through site specific

best practice such as alternatives to chemical cleaning products, actions to reduce deliberate and accidental contact and alternatives to other negatively impacting actions from divers and snorkelers that could reduce the resilience of coral reefs to coral bleaching events.

**The Nature Conservancy**

Completed more than 230 coral reef surveys to monitor and assess bleaching as part of the Florida Reef Tract Coral Bleaching Response Plan.
Conducted coral bleaching monitoring on Maui island, Hawaii. This data collection has helped to monitor the health of corals at Polanui, Maui. In order to better understand the changes in coral health at Polanui, TNC set up comparable sites across leeward Maui to determine which other contributing factors might lead to changes in coral health. The results of these surveys will assist in determining which interventions can be made to reduce other stresses. The products of this project include a Coral Bleaching Monitoring Protocol, guidance for future training sessions, guidelines for adding sites in the future, and a preliminary ArcGIS interface for photo accessibility. These products will serve as tools and offer a step-by-step process to add other sites and their associated interested community participants.
Continued coordination of the BleachWatch Virgin Islands program, developed as a part of the US Virgin Islands Reef Resilience Plan to assess the impacts to corals from mass bleaching events and support effective management responses. The program approaches the problem with a two-tier strategy:

- Tier 1 - the BleachWatch Virgin Islands community monitoring network is an early warning system to provide a rapid report of the distribution and intensity of coral bleaching at the onset of a bleaching event.
- Tier 2 - a network of USVI scientific divers from TNC, the University of the Virgin Islands, the National Park Service, and the US Geological Survey mobilized during mass bleaching events to conduct bleaching and post-bleaching monitoring. In 2017 40 new volunteers were trained.

**UNEP Caribbean Environment Program, Jamaica**

Within the Teamwork platform, discussion occurred between members on the theme of "Coral Bleaching Response Plan and Protocols", with exchanges of relevant material from their national legislations on this issue. Moreover, in the framework of the NOAA initiative "Coral Reef Watch", Teamwork members gathered coral bleaching data from their countries, to be shared with NOAA.

１２．第 32 回 ICRI 総会・メンバーレポート要約：

テーマ５：教育を通したサンゴ礁保全の推進

## Theme 5: "Progress via education"
## Goal 5-1: prepare for the 2018 International Year of the Reef (IYOR)

*The ICRI member's report outlines the activities of ICRI members; their progress and contributions towards the ICRI Plan of Action 2016-18. Prior to the ICRI General Meeting December 2017, the member report also details the activities planned by contributing members for the International Year of the Reef 2018 (IYOR).*

*The contributions detailed below are taken from written responses by Brazil; Japan; Indonesia; Malaysia; Maldives; Monaco; UK; and the USA. The member report also includes responses from the Central Caribbean Marine Institute; Coastal Oceans Research and Development in the Indian Ocean; Fondation pour la Protection de la Biodiversité Marine; Great Barrier Reef Foundation; International Society for Coral Reef Studies; Reef-world Foundation; Science and Conservation of Fish Aggregations; The Nature Conservancy; UNEP Caribbean Environment Program; and the UN Environment World Conservation Monitoring Centre (as of December 1st, 2017). For more information, you can check directly the member report.*

### Brazil

The Brazilian Ministry of Environment is creating a communications plan for several IYOR2018 celebration actions next year. The actions will be carried out in partnership with NGOs, universities, research groups, private initiative, prefectures of important areas with coral reefs along the Brazilian coast. The plan consists of releases in social networks and diving magazines, awareness campaigns on coral reef conservation, exposure of photos and videos, and other activities. The Brazilian Coral Reef Monitoring Program will launch a book with more than 15 years of results and statuses of Brazilian coral reefs. The IYOR2018 celebrate plan will be aligned, when possible, with Ramsar Convention National Strategy to be carried out also in 2018.

### Japan

Japan organized a kick-off meeting and will organize an opening symposium of IYOR in Japan. By doing so, Japan is inviting various parties interested (private companies, researchers, media, and policymakers etc.) to collaborate with each other and address conservation of coral reefs.

### Malaysia

The Ministry through Department of Marine Park Malaysia will designate 2018 as the 3rd

International Year of Reef. The Department has carried out preliminary internal planning for the year. The plan includes:

- A national level launch in March/April 2018.
- Beach and reef clean-up.
- Education and awareness programs.
- Capacity building programs for local communities.
- Programs with partners including:
- Publication of first day cover to commemorate IYOR 3 with National Philately Association.
- Officiating collaboration with Aquaria Malaysia.
- Engaging corporates on CSR Programs (F&N, Petrosains, Malakoff) pertaining to reducing usage of plastic material or recycling programs.
- Research Seminar.
- High Level Forum on way forward on Coral Reef and associated marine ecosystem conservation.

This plan will be further developed and updated after further discussion with their partners and stakeholders.

### The Republic of Maldives

A photo competition and the Marine Science Symposium held by the Marine Research Centre will be dedicated to the IYOR 2018.

### The Principality of Monaco

Many actions are planned during the year 2018, including a photographic exhibition in Monaco, animations directed to the general public during the Monaco Ocean Week, animations and visits of the coral culture facilities of the CSM all year for schools.

### United Kingdom

The UK welcomes the designation of 2018 as the International Year of the Reef. The UK is exploring ways to raise awareness of threats to coral reefs and associated eco-systems as well as currently undertaking an ocean acidification research program.

### United States of America (USA)

The U.S. is currently considering a series of events and activities for IYOR2018 and will share information about these events at the 2018 ICRI meeting.

## Central Caribbean Marine Institute, Caribbean Islands

CCMI has developed a communications plan for IYOR2018 to increase local and international awareness of the IYOR and in support of UN Sustainable Development Goals 13 and 14. CCMI is currently seeking local partners who will help convey messages regarding the value of coral reefs and the threats they face. As per the UN Chronicle Article, "Can We Save Coral Reefs?" CCMI will be advocating the need for greater societal-level changes and individual actions to mitigate anthropogenic impacts to coral reefs.

CCMI will also launch Reefs Go Live in conjunction with IYOR. Reefs Go Live is an interactive telepresence educational programme, wherein students in classrooms and at informal science learning centres will be connected to researchers at work under the ocean in a two-way video dialogue. Topics focus on coral reefs will be tied into their school curriculum in an engaging, interactive format.

## Fondation pour la Protection de la Biodiversité Marine (FoProBiM)

FoProBiM are planning to integrate IYOR2018 into FoProBim's Ocean's Day activities in 2018 as well as add components of the importance of reefs in FoProBim's coastal community environmental education activities. FoProBiM will also try to gain media access in order to promote IYOR2018 both before and during the year.

## Great Barrier Reef Foundation (GBRF), Australia

The Great Barrier Reef Foundation is a member of the GBR2050 Communication working group developing an integrated plan of IYOR2018 activities. GBRF is intending on running the following IYOR2018 events:

<u>Community Education & Engagement events</u>

Three key events will be included with an installation and engagement activities.

- World Science Festival – March
- Commonwealth Games – April
- Royal National Show (Ekka) - August

Visitors to these events will have the opportunity to have a 'reef experience' while at the event to gain an understanding of how amazing the Great Barrier Reef is.

The events can also play a significant role in raising the awareness of the threats to Reef such as of single use plastics and what citizens can all do to help.

Year of the Reef stamp

- An application has been made for a series of stamps issues by Australia Post to recognize the international Year of the Reef and GBRF's unique position as custodians to the Great Barrier Reef
- The stamps would profile the unique creatures on the Reef OR Well known Australian artists could be commissioned to create a series of stamps

MyReef App (June)

- A digital game based application developed for primary school aged children that inspires a love and respect for the Great Barrier Reef, empower them to make positive change
- The app will integrate across the Australian curriculum (primarily in the areas of science, maths, geography, technology and art) allowing it to be used in conjunction with in-classroom learning and activities
- There is a great need in developing an educated and engaged Queensland community that understands and supports the protection and preservation of the Great Barrier Reef. No more is that seen than in children who already have a natural wonder and curiosity for what is essentially in their backyard. Through children, there is a flow on effect to parents, teachers and the wider community which can create further understanding and awareness.

Google Expedition on the Great Barrier Reef - With Google Expeditions, students can take field trips right from their classroom. In development are a series of additional expeditions on the Great Barrier Reef – to places students could normally never go to like Raine Island, the largest green sea turtle rookery in the southern hemisphere.

Reef Hero Awards (September)

- An Awards program to recognise inspirational and passionate Reef Heroes
- Opportunity to profile those doing great things for the Reef & celebrate the good stories about the GBR
- Recognized with an event, badging & profile.
- Categories to include: Community; Tourism; Science; Farming; Boating / Fishing / Shipping; Business / Corporate; Indigenous; Leadership; Young Leader; Collaboration; Innovation and International.

TEDxGreatBarrierReef (October)

TEDx has never been held on the Great Barrier Reef. TEDxGreatBarrierReef would be the curation of suite of short, carefully prepared talks that are Reef idea-focused to provoke conversations that matter. It would be – multidisciplinary, one day only and an invitation only event.

## International Society for Reef Studies (ISRS)

- An article promoting IYOR was published in Reef Encounter, and IYOR will continue to be promoted in the newsletter in 2018
- E-mail discussions have been held about key IYOR messages with ISRS members
- ECRS, which is sponsored by ISRS, will be holding an event to launch IYOR in Europe
- ISRS Conservation, Education and Student Committees are considering ways in which ISRS members can contribute further. The Education Committee, through its members have a variety of activities planned.

## Reef-World Foundation

The Reef-World Foundation are planning on specifically working alongside ICRI and UN Environment to promote and enhance awareness to IYOR2018. Plans are underway to develop specific awareness raising campaigns to be released throughout the year alongside established partners and networks in conjunction with regular Green Fins activities. Current initial ideas include:

- 4 action points / campaigns will be evenly promoted throughout the year for a 3-month period per action point with the aim to focus on each problem and associated solution.
- GF testimonials/ coral reef values
- GF film to be developed
- TED talk: using IYOR 2018 as a focus + collaborating with other partners
- Partner with Dive.in who have offered to create infographics for the IYOR2018 campaign
- Partners such as Divebooker and Deepblu have expressed interest in supporting Reef-World Foundation campaigns
- Advertisement (social media, magazines, etc)
- Use hashtags to monitor action

## The Nature Conservancy

TNC is still developing its strategy for 2018 IYOR of the Reef and will be able to report

more by the end of the year. TNC will be supporting targeted communications efforts to raise awareness and support action to conserve reefs during 2018.

### UNEP Caribbean Environment Program, Jamaica

CEP is exploring the possibility for the convening of a technical session at the 71th GCFI conference, to be held in San Andres, Colombia, in 2018, within the framework of the IYOR. This technical session would serve as a forum for the exchange of information and perspectives among decision- makers, scientists, managers, educators, resource users, and students on various issues of relevance to coral reef management.

### UN Environment Program World Conservation Monitoring Centre (UNEP-WCMC)

UNEP-WCMC will host a section on their website to showcase their support and the importance of IYOR

Please note, UNEP-WCMC are open to other collaborations, projects and events to help celebrate and raise awareness.

## １３．サンゴ礁の生命宣言

Coral reef life declaration

# CORAL REEF LIFE

**Declaration**

**By adopting the *Sustainable Development Goal # 14* on the conservation and sustainable use of the ocean, seas and marine resources, we committed to protecting L*ife below Water.*** [1]

**At the UN Ocean Conference in June 2017 we undertook to:**

*"develop and implement effective adaptation and mitigation measures that contribute to increasing and supporting resilience to ocean and costal acidification, sea level rise and increase in ocean temperatures, and to addressing the other harmful impacts of climate change on the ocean as well as coastal blue carbon ecosystems, such as mangroves, tidal marches, seagrass and coral reefs, and wider interconnected ecosystems impacting on our ocean, and ensure the implementation of relevant obligations and commitments*."[2]

**BECAUSE *LIFE above Water* depends upon the health of *Life below Water,*** including the health of coral reefs which maintain some of the richest biodiversity on our planet, and thus sustain the irreplaceable culture and livelihoods of coral reefs peoples.[3]

**BECAUSE CORAL REEFS ARE HOTSPOTS OF BIODIVERSITY** hosting in less than 0.2% of the total surface of the ocean no less than 30% of the species of marine life known to date[4].

**BECAUSE HEALTHY CORAL REEFS CAN GENERATE 5 TO 15 TONS OF FISH** per square kilometre each year.[5]

**BECAUSE CORAL REEFS REPRESENT A TRILLION DOLLAR ASSET** at the very least, with benefits for hundreds of millions of vulnerable coastal people all over the world[6].

**BECAUSE HEALTHY CORAL REEFS ECOSYSTEMS REDUCE 97% of WAVE ENERGY** and act as barriers to storms and are the first line defence for millions of people globally, preventing catastrophic erosion, flooding and destruction.[7]

**BECAUSE CORAL REEF-RELATED TOURISM** generates annual revenues of $36 billion globally.[8]

**BECAUSE THE SEVERE IMPACTS OF CLIMATE CHANGE AND OCEAN ACIDIFICATION** on marine, coastal and island life are expected to continue to grow, and include unprecedented temperature-related coral bleaching and mortality events, rising sea level, flooding of coastal and island communities, and storms of unparalleled destructive strength and frequency, as well as increasing reef erosion catalysed by changing seawater chemistry.

**BECAUSE OVERFISHING, EUTROPHICATION, SEDIMENTATION AND POLLUTION,** which result from bad management practices, weaken the resistance and resilience of coral reefs and increase their vulnerability.

**BECAUSE THE OPPORTUNITIES OF THE BLUE ECONOMY WILL BE LOST** if we destroy the assets upon which it depends, especially coral reefs in coral-dependent Small Island Developing States, jeopardising economic opportunity for millions of livelihoods.

**BECAUSE THE VERY EXISTENCE AND FUTURE OF SMALL ISLAND DEVELOPING STATES** and other island and coastal coral-dependent communities are being compromised.

**WE WILL:**

1. **WIDEN AWARENESS OF CORAL REEF ECOSYSTEMS AS KEY INDICATORS OF OCEAN AND PLANETARY HEALTH,** as well as their environmental, economic, social and cultural values during the Third International Year of the Reef (IYOR 2018) declared by the International Coral Reef Initiative (ICRI), while contributing to the priorities set in ICRI's 2016-2018 action plan, and as called for by Resolution 2/12 of the UNEA.

2. **AS PART OF THE IMPLEMENTATION OF THE PARIS AGREEMENT COMMITMENTS AND NATIONALLY DETERMINED CONTRIBUTIONS,** be conscious of the need for action to avoid damaging coral reefs any further and to help, through protection and conservation, reef-dependent people to adapt and increase ecological resilience to climate change.

3. **ENCOURAGE THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)** to highlight the role and fate of coral reef ecosystems, and to explore and promote solutions, in their preparation for the launch in September 2019 of its Special Report on Climate Change, Oceans and the Cryosphere.

4. **PROMOTE HIGH-LEVEL MULTIDISCIPLINARY RESEARCH** on the recent coral reef bleaching events, with a view to understanding resilience and adaptation needs, be better prepared to predict future events and thus orient public policies.

5. **SUPPORT LOCAL ADAPTATION AND MANAGEMENT STRATEGIES** aimed at increasing the resilience of coral reefs regionally.

6. **AIM TO DEVELOP ENVIRONMENTALLY SUSTAINABLE BUSINESS MODELS** that actively promote the health of coral reefs by engaging the private sector.

7. **WORK WITH THE BUSINESS COMMUNITY** to reduce coral-related investment risks.

8. **IDENTIFY AND PROMOTE THE FINANCIAL BENEFITS OF INVESTING IN CORAL REEFS** as assets of a sustainable blue economy.

9. **ASK THE HOSTS OF THE 5th OUR OCEAN CONFERENCE** to schedule a high level plenary session on action for the enhancement of the resilience of coral reef environments, specifically on finance and capacity building at the scale needed to ensure that we do not lose these world's most diverse ecosystem.

10. **INVITE OTHER COUNTRIES** to join this declaration.

[1] https://sustainabledevelopment.un.org/sdg14
[2] Paragraph 13k of *Our Ocean, Our Future: Call for Action*, June 2017
http://www.un.org/ga/search/view_doc.asp?symbol=A/RES/71/312&Lang=E
[3] Biodiversity II: Understanding and Protecting Our Natural Resources, pp. 88-108. Joseph Henry/Nat. Acad. Press, Washington, D.C.
[4] The global biodiversity of coral reefs: a comparison with rain forests, Reaka-Kudla MJ (1997), in Biodiversity, Reaka- Kudla et al. eds
[5] Reefs at Risk Revisited, Burke *et al*. 2011.
6 Hoegh-Guldberg, O. et al. 2015. Reviving the Ocean Economy: the case for action - 2015. WWF International, Gland, Switzerland.
[7] Ferrario et al. 2014. The effectiveness of coral reefs for coastal hazard risk reduction and adaptation. Nature Comm 5:3794
[8] Mapping the Global Value and Distribution of Coral Reef Tourism, Spalding *et al*. in Marine Policy, August 2017
http://www.sciencedirect.com/science/article/pii/S0308597X17300635

【環境省請負業務】

# 平成 29 年度 国際サンゴ礁イニシアティブ及び地球規模サンゴ礁モニタリングネットワーク東アジア地域解析推進調査業務
# 報　告　書

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