International Coral Reef Initiative (ICRI)

Member's Report | 37th General Meeting

19th – 23rd September 2023 Hawai'i, – United States of America

Reporting Period: 2021 – 2023

A. Member Information:

- Name of ICRI member: **MONACO**
- Name of person(s) completing member's report:

Pr. Denis Allemand
Scientific Director
Scientific Centre of Monaco (CSM)

Wilfrid Deri
Senior Officer
Ministry of Foreign Affairs and Cooperation

Email: allemand@centrescientifique.mc - wderi@gouv.mc

- Are you a Focal Point: ☒ Yes ☐ No
  - If no, who are you completing the form on behalf of:
- Which was the last General Meeting you attended: GM36
- Will you be attending the 37th ICRI General Meeting: ☐ Yes ☒ No
- Member social media:
  - Twitter: @
  - LinkedIn:

B. Reporting on the implementation of ICRI Plan of Action 2021-2024: turning the tide for coral reefs. *Your responses will help inform the Secretariat about members' contributions toward the current Plan of Action*

Theme 1 - Preparing for the Future: Promoting Resilient Coral Reefs

1.A - Strengthening policies - Supporting conservation and recovery of coral reefs and associated ecosystems through resilience-based management frameworks.

- (ICRI) How have you embedded resilience-based management into your policies? *(Tip – refer to the RBM policy brief: https://icriforum.org/resilience-hub/)*

1.B - Promote capacity building for applying resilience-based management approaches to coral conservation Ad Hoc Committee on Resilience-based Management.

- (ICRI) Please list any examples of leading practices, techniques and strategies for building reef resilience that your organisation/country is involved in. Include their location and extent, methods of implementation, financing, and an assessment of their results (or likely results), with links for more information if possible.

- (ICRI) Have you developed, or are you aware of, training materials that you can share?

1.C - Promote and build capacity for the restoration of resilient coral reefs Ad Hoc Committee on Reef Restoration

- (ICRI) Please list any examples of reef restoration mechanisms that your organisation/country is involved in. Include their limits, conditions of implementation, financing and an assessment of their results, with links for more information if possible.

Answer:

The Monaco Scientific Center has been developing for more than 30 years in vitro fragmentation techniques for different types of coral (tropical, temperate and deep scleractinians; octocorals).

These corals are cultivated under controlled conditions in the culture rooms for use in research and at the Oceanographic Museum of Monaco for communication purposes. An experiment on in situ *cultivation of Octocorals,* Corallium rubrum*, is currently underway in artificial caves 30 m deep.*

Theme 2 – Coral Reef Science and Oceanography: Advancing and Utilizing the Latest Science and Technology

2.A – Coral monitoring capacity building

- (ICRI) Do you have information / case studies that could contribute to the update of the "Methods for ecological monitoring of coral reefs" (https://portals.iucn.org/library/efiles/documents/2004-023.pdf), especially related to the use of new technologies.

Answer:

As part of the Tara Pacific expedition, scientists from Monaco developed a series of new biomarkers, in collaboration with our partners (Porro et al. In press). Among these, the length of telomeres is very interesting (Rouan et al 2023).

The high longevity of massive corals is linked to a high stability of the telomeric ends of these coral species.

The telomeres of the corals with the longest lifespan seem insensitive to seasonal temperature variations, while the corals with the lowest life expectancy are very sensitive. More generally, variations in the length of their telomeres allow them to adjust their nutrient balance and respond to a changing environment - faced with the number of times they may have been exposed to heat waves for example, because indeed the Temperature influences telomere length.

- (ICRI) Are you aware, developing, or involved with, any capacity building activities related to the use of coral reef monitoring mechanisms, especially regarding the advancement of monitoring practices (noting technology)?

2.B – The Global Coral Reef Monitoring Network (GCRMN)

The GCRMN would like to receive feedback on the Status of Coral Reefs of the World: 2020 report to improve the production of future regional and global reports. As such, please kindly respond accordingly to the questions below:

- (ICRI) In reference to the Status of Coral Reefs of the World: 2020 report:
  - Have you read the report?
  - Did you utilise the report and/or use the results and contents?
  - How could the next report be improved (considering the entire process from data acquisition to reporting)?

Answer:

- Have you read the report? *YES*
- Did you utilise the report and/or use the results and contents? *YES*
- How could the next report be improved?

  Despite the difficulty, it is important to arrive at a scientifically established number on the percentages of degraded or disappeared reefs to date because the literature is full of random figures which gives a bad image of coral science.

- (ICRI) The GCRMN intends to establish time-bound task forces to address specific priority issues and to build capability and capacity across the network. As a first priority, a Data Task Force was established. The Task Force brings together subject matter experts to increase the transparency, reproducibility, and robustness of future GCRMN reports alongside capacity in monitoring, data collection, analysis, management and sharing of coral reefs and associated ecosystems. The Task Force will focus on:

    - Improving data integration and analyses to facilitate the production of GCRMN regional and global reports; and

    - Promoting good data management practices based on FAIR data principles for the coral reef scientific community.

    Tell us is if you will be interested in joining the Data Task Force, or upcoming task forces. More so, please inform us if you have data to contribute to upcoming regional, or global, reports and if you will be organising and/or partaking in any capacity building activities regarding data monitoring:

Theme 3 - Local Threat Reduction: Integrating Response Planning Frameworks

Please tick the most appropriate box/boxes:

- (ICRI) Do you have (or in the process of developing) a coral reef response plan(s) on, for example, but not limited to:
    - ☐ coral disease
    - ☐ vessel groundings
    - ☐ bleaching
    - ☐ invasive species outbreaks (lionfish and COTS)
    - ☐ large storm events
    - ☐ other:

    If yes, please provide us with more information.

Answer:

The principality of Monaco does not have any coral reefs on its territory, but researchers from the Centre Scientifique de Monaco (CSM) are developing basic research on the physiology of corals and their mechanisms of adaptation to ocean acidification.

With its national (Prince Albert II Foundation and Oceanographic Institute) and international partners, the CSM is also developing the World Coral Conservatory program that consists of creating a world reference center for coral that will house, in a network of public and private aquariums, a unique worldwide collection of most species and strains of corals described to date, in the form of living colonies.

The active phase begun last year with a collection of 21 species (58 samples in total) in Aldabra Atoll (Seychelles).

*At the local level, as explained above, Monaco is developing programs for the study, monitoring and conservation of coralligenous ecosystems. In particular, the Monegasque Association for the Protection of Nature (AMPN) and the CSM are developing programs for cultivating Octocoral corals (*Corallium rubrum*) in situ.*

Theme 4 - Diversity and Inclusion: Expanding the Coral Reef Community

4.A – Connect with youth audiences:

- (ICRI) Are you developing (or planning to develop) any communication campaigns or outreach materials? What will your primary target audiences be and what would your key messages include?

4.B - Collaborate with Indigenous people and seek to incorporate indigenous and local knowledge into policies and management plans:

- (ICRI) How do you incorporate indigenous and local knowledge into policies and management frameworks. Please provide us with some examples. Do you have any plans or strategies to further promote this incorporation?

- (ICRI) Do you have any, or know of, best practices to solicit Indigenous and local community knowledge?

C. Kunming-Montreal Global biodiversity framework

- (ICRI) Do your current National Biodiversity Strategies and Action Plans (NBSAP) incorporate coral reefs? If not, what kind of material will be useful for your Country/organisation to ensure coral reefs are integrated in the revision of NBSAPs?

Answer:

There is no coral reef in Monaco, but Mediterranean corals are part of the National biodiversity Strategy related to MPA.

- (ICRI) How are you planning to implement the Kunming-Montreal Global biodiversity framework. For you, which targets are the most relevant for coral reefs?

D. Upcoming events

Please tick the most appropriate box/boxes:

☐ September 19th – 23rd 2023: 37th ICRI GM, USA, Hawaii

☒ 30th November – 12th December 2023: 28th Conference of the Parties to the United Nations Framework Convention on Climate Change

☒ 26th February – 1st March 2024: 6th session of the United Nations Environment Assembly

☒ 10th – 12th April 2024: 2024 UN Ocean Decade Conference, Barcelona, Spain.

☒ 2024: United Nations Biodiversity Conference (COP16) of the Parties to the UN Convention on Biological Diversity (CBD), Turkey.

☐ Other

Please list any upcoming regional / international events relevant to ICRI that your organisation plans to attend:

E. Publications. Please list relevant publications / reports you have released recently (+ add a link if possible)

Publication	**URL**
Armstrong et al. (2023). Host transcriptomic plasticity and photosymbiotic fidelity underpin Pocillopora acclimatization across thermal regimes in the Pacific Ocean. Nat Commun 14, 3056	https://doi.org/10.1038/s41467-023-38610-6
Blanckaert et al. (2023). Species-Specific Response of Corals to Imbalanced Ratios of Inorganic Nutrients. Int J Mol Sci 24(4), 3119	https://doi.org/10.3390/ijms24043119
Blanckaert et al. (2023). Nutrient starvation and nitrate pollution impairs the assimilation of dissolved organic phosphorus in coral-Symbiodiniaceae symbiosis. Sci Total Environ 8 (2), 159944	https://doi.org/10.1016/j.scitotenv.2022.159944
Blanckaert et al. (2023). Desert dust deposition supplies essential bioelements to Red Sea corals. Glob Chang Biol 28 (7), 2341-2359	https://doi.org/10.1111/gcb.16074
Canesi et al (2023). Differences in carbonate chemistry up-regulation of long-lived reef-building corals. Sci Rep 13, 11589	https://doi.org/10.1038/s41598-023-37598-9

Capasso et al. (2022). SpiAMT1d: molecular characterization, localization, and potential role in coral calcification of an ammonium transporter in *Stylophora pistillata*. Coral Reefs 10.1007	https://doi.org/10.1007/s00338-022-02256-5
Ferrier-Pagès et al. (2022). Symbiotic stony and soft corals: Is their host-algae relationship really mutualistic at lower mesophotic reefs? Limnol Oceanogr 67, 261-271	https://doi.org/10.1002/lno.11990
Galand et al. (2023). Diversity of the Pacific Ocean coral reef microbiome. Nat Commun 14, 3039	https://doi.org/10.1038/s41467-023-38500-x
Hilmi et al. (2023). The pressures and opportunities for coral reef preservation and restoration in the Maldives. Frontiers Env. Economics. 1110214	https://doi.org/10.3389/frevc.2023.1110214
Hochart et al. (2023). Ecology of Endozoicomonadaceae in three coral genera across the Pacific Ocean. Nat Commun 14, 3037	https://doi.org/10.1038/s41467-023-38502-9
Kleypas et al. (2021). Designing a blueprint for coral reef survival. Biological Conservation 257: 109107	https://doi.org/10.1016/j.biocon.2021.109107
Marangoni et al. (2023). Polystyrene nanoplastics impair the photosynthetic capacities of Symbiodiniaceae and promote coral bleaching. Sci Total Environ 815, 152136	https://doi.org/10.1016/j.scitotenv.2021.152136
Martinez et al. (2022a). Symbiodiniaceae Are the First Site of Heterotrophic Nitrogen Assimilation in Reef-Building Corals. Mbio 01601-22	https://doi.org/10.1128/mbio.01601-22
Martinez et al. (2022b). Symbiont starvation affects the stability of the coral-Symbiodiniaceae symbiosis. Front Mar Sci 9, 979563	https://doi.org/10.3389/fmars.2022.979563
Noel et al. (2023). Pervasive tandem duplications and convergent evolution shape coral genomes. Genome Biol 24, 123	https://doi.org/10.1186/s13059-023-02960-7
Ouédraogo et al. (2023). What are the toxicity thresholds of chemical pollutants for tropical reef-building corals? A systematic review. Environ Evid 12, 4	https://doi.org/10.1186/s13750-023-00298-y
Planes, S., Allemand, D. (2023) Insights and achievements from the Tara Pacific expedition. Nat Commun 14, 3131	https://doi.org/10.1038/s41467-023-38896-6
Porro et al. (In press). Different environmental response strategies in sympatric corals from Pacific Islands.	
Rouan A. et al. (2023). Telomere DNA length regulation is influenced by seasonal	https://doi.org/10.1038/s41467-023-38499-1

temperature differences in short-lived but not in long-lived reef-building corals. Nature Communications 14, 3038	
Schmidt et al. (2023). Faster Crystallization during Coral Skeleton Formation Correlates with Resilience to Ocean Acidification. JACS 144, 3: 1332-1341	https://doi.org/10.1021/jacs.1c11434
Van de Water et al. (2022). Coral holobionts and biotechnology: from Blue Economy to coral reef conservation. Current Op. Biotechnol. 74, 110-121	https://doi.org/10.1016/j.copbio.2021.10.013
Veglia et al. (2023). Endogenous viral elements reveal associations between a non-retroviral RNA virus and symbiotic dinoflagellate genomes. Commun Biol 6, 566	https://doi.org/10.1038/s42003-023-04917-9
Voolstra et al. (2023). Mitigating the ecological collapse of coral reef ecosystems. Embo Press E56826	https://doi.org/10.15252/embr.202356826
Voolstra et al (2023). Disparate genetic divergence patterns in three corals across a pan-Pacific environmental gradient highlight species-specific adaptation. npj biodivers 2, 15	https://doi.org/10.1038/s44185-023-00020-8

F. ICRI Member Feedback. What do you find most valuable about being a member of ICRI as well as completing the ICRI member reports? If you have any ideas to improve the Member Reports, please list below:

G. Contact information & member information. (Note that this information will be posted on the ICRI website on your member page: https://icriforum.org/members/).

Please use the table below to provide us updates to your member's focal points as well as the blank cells to indicate changes to information (please add more rows, as needed):

Focal Point 1:	
Name:	**Pr. Denis Allemand**
Title/Organisation:	**Scientific Director** **Scientific Centre of Monaco (CSM)**
Email:	**allemand@centrescientifique.mc**
Focal Point 2:	
Name:	**Wilfrid Deri**
Title/Organisation:	**Ministry of Foreign Affairs and Cooperation**

Email:	**wderi@gouv.mc**
Member page updates:	
Section	*Update*
Do you have new resources (reports, guidelines etc.) that you would like to display?	
Resource description	*URL*

Thank you very much for sharing your valuable experiences and information with ICRI. Members reports, meeting outputs and resources will be uploaded to: https://icriforum.org/events/37th-icri-general-meeting/