Integrating equity-focused planning into coral bleaching management

González-Espinosa Pedro C.\* 1, Bossier Sieme 1, Singh Gerald G.2, Cisneros-Montemayor Andrés M. 1

1 Nippon Foundation Ocean Nexus, School of Resource and Environmental Management (REM), Simon Fraser University (SFU) Technology and Science Complex 1, 643A Science Rd, V5A 1S6, Burnaby, BC, Canada

2 Nippon Foundation Ocean Nexus, School of Environmental Studies, University of Victoria, 3800 Finnerty Road

V8P 5C2, Victoria BC, Canada

\* Corresponding author: [pgonzaleze@gmail.com](mailto:pgonzaleze@gmail.com)

# Supplementary materials

Table S1.- Ocean Decade endorsed actions (as of May 2023) related to coral reefs.

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| **Name** | **Action /Aim** | **Focus / Extent** | **Lead Institution and country** |
| The Global Fund for Coral Reefs | Deploys and unlocks funding across a blended ‘Investment Ecosystem’ under a ‘protect-transform-restore-recover’ approach. | SIDS and LDCs | United Nations Multi-Partner Trust Fund Office |
| Reef Recovery 2030 | Boost the resilience of these unique reef ecosystems and the people that rely on them. | Great Barrier Reef, Australia | Great Barrier Reef Foundation, Australia |
| Hope for Reefs | Advance high-impact interventions—from establishing sustainable fisheries and marine protected areas to on-the-reef restoration— Scale a successful model for community reef monitoring to the national level; increase capacity for rapid response to catastrophic events impacting reefs; and apply new technologies to map, monitor, forecast, and regenerate reef health. | Global | California Academy of Sciences – United States of America (USA) |
| Pacific Coral Reef Action Science and Knowledge | Provide the science needed to support Pacific Island Countries to build resilience of coral reefs. | Pacific Islands Small Developing states | Secretariat of the Pacific Regional Environmental Programme – Samoa |
| The Cozumel Coral Conservatory | Preserve and grow corals uniting science, technology, engineering, arts, and math (STEAM). Natural coral heads, as well as artistic and functional artificial reef structures and sculptures, populate the seafloor in the Villa Blanca reef | Cozumel, Mexico | Living Sea Sculpture, United States of America (USA) |
| The Coral Reef Sentinels: A Mars Shot for Blue Planetary Health | Deploy autonomous, low-cost robots to monitor the health of coral reefs around the world in near real-time. | Global | Smithsonian Institution, at Panama, USA |
| Low-cost real-time monitoring of pollutants and water quality along the coral reefs in Tanzania: Supporting effective ocean management | Deploy water quality monitoring devices in eight coral reef sites along the coast of Tanzania. | Tanzania | Aqua Farms Organization, Tanzania |
| Coral Reef Restoration Engaging Local Stakeholders Using Novel Biomimicking IntelliReefs | Deploy additional IntelliReefs and further analyze the benefits and applications of IntelliReefs for fish, corals and local economies. | Caribbean | IntelliReefs United States of America (USA), |
| Submersible Technology to Advance Reef Science | Produce billions of new ocean observations that benefit the coastal ocean and the species and economies that depend on it. | Global | 2DegreesC – United States of America (USA) |
| Science Without Borders®: Conserving the Tropics | Provide science-based solutions to help communities protect coral reefs, mangrove forests, and seagrass beds. | Global | Khaled Bin Sultan Living Oceans Foundation (KSLOF), United States of America (USA) |
| Allen Coral Atlas: Global Coral Reef Monitoring | Assist stakeholders ranging from local communities to regional and national governments to reach their coral reef conservation goals. | Global | Arizona State University’s Center for Global Discovery and Conservation Science, United States of America (USA) |

## Bleaching reports and BAA accuracy computation

We used the most comprehensive and at high-resolution global mass coral bleaching database [1] to assess the relationship between the reports and the BAA product [2]. The database comprises 35,779 individual reports that provide latitude and longitude of observations, date (including month and year), bleaching severity, and the corresponding bleaching alert area value (BAA). With this information, we developed a Random Forest classifier model, employing BAA as a predictor variable and the observed bleaching reports. We opted for the RF classifier method due to its better performance compared to other classification methods, as well as its robustness in selecting training samples and handling noise in the training dataset [3; 4]. To evaluate the model's performance, we employed 50,000 trees employing 1000 estimators using a K-fold repeated cross-validation with 5 folds and 10 repeats. (1000 estimators \* 5 fold \* 10 repetitions).

# References

1. Virgen-Urcelay, A., & Donner, S. D. (2023). Increase in the extent of mass coral bleaching over the past half-century, based on an updated global database. PloS One, 18(2), e0281719. <https://doi.org/10.1371/journal.pone.0281719>
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3. Breiman, L. (2001) Random Forests. Mach Learn 45:5–32 <https://doi.org/10.1023/A:1010933404324>
4. Cutler, D., Edwards. T., Beard. K., Cutler. A., Hess. K., Gibson. J., Lawler. J. (2007) Random Forests for Classification in Ecology. Ecology, 88(11), 2783-2792. <http://www.jstor.org/stable/27651436>