



CTA-214-WFCRC Collaborative Coral Reef Registry Request for Support

The World Federation for Coral Reef Conservation
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Development of the World Federation for Coral Reef Conservation (WFCRC) Geo-Platform with ArcGIS Online for Organizations and ESRI's "The Hub"

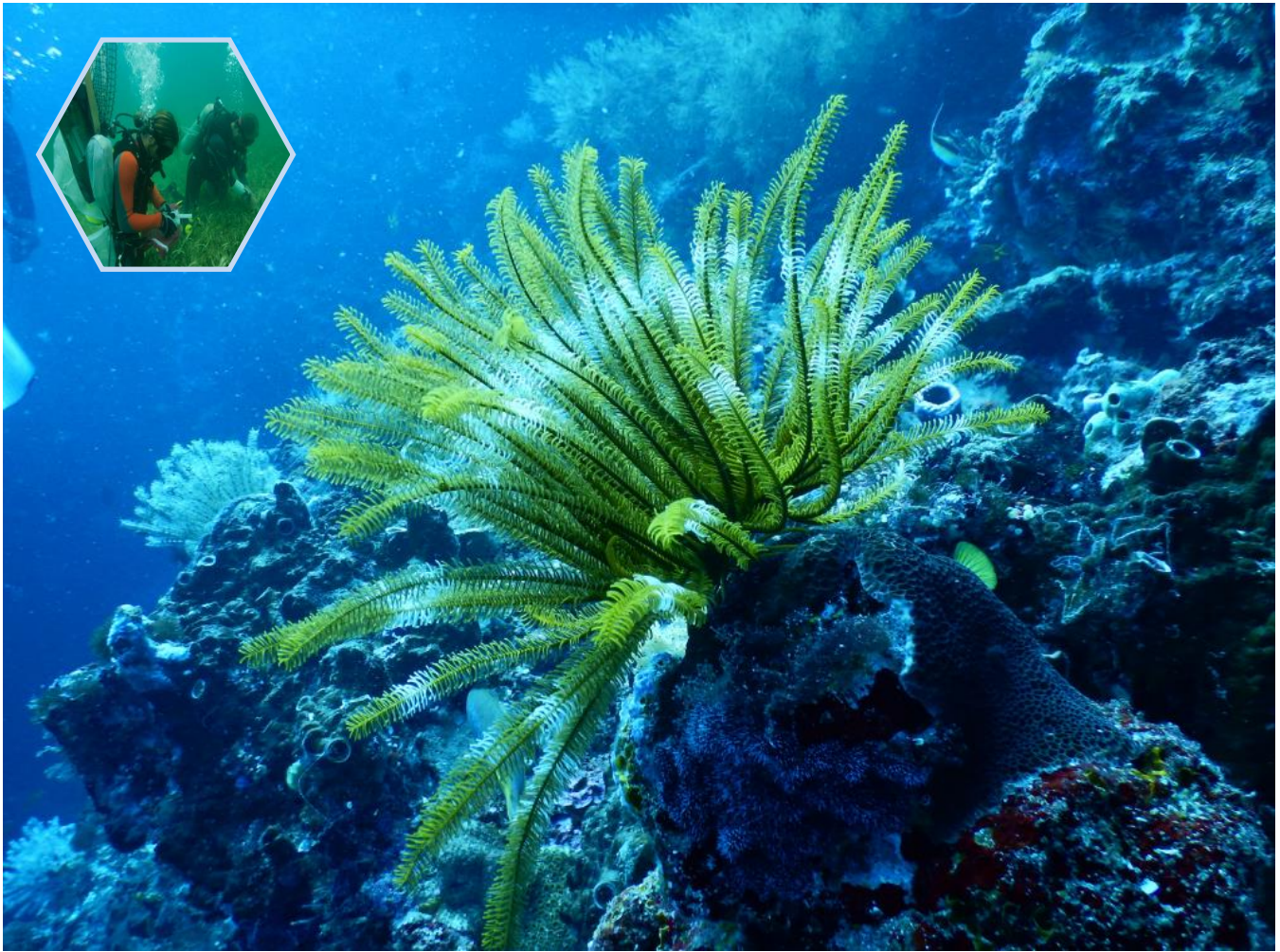
Introduction:

The World Federation for Coral Reef Conservation's Approach to Coral Conservation is: "to see them now, before they are gone!"



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During the middle to late Jurassic, coral reefs began to appear in the Geologic Time Scale. The rock record (left) is the Rosetta stone for the makeup of the earth's geological epochs.

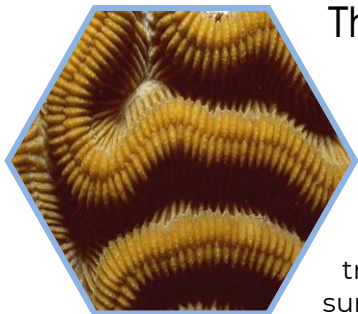
Without the rock record we would not know anything about past environments, fauna and flora, cycles, events and so much more. **The rock record has led to the discovery and the understanding of past events and what may be in store for the future. Cycles are identified using the record, making predictably more reliable.**

The parallelism between the Geologic Rock Record and **The Collaborative Beach & Coral Reef Registry** becomes evident in the discovery over time how events and patterns keep reappearing. Giving us a better reference point for comparison and to identify better avenues to pursue.

The World Federation for Coral Reef Conservation (WFCRC) is populating our web based knowledge sharing platform for publishing and sharing a more holistic view of the ocean's corals and coastal conservation efforts, by promoting knowledge and change management along with an exchange among

local stakeholders of the project location. We have built a solution around, and for a location, like our model in the Florida Keys.

The digital twin we create is an effort to *“see it before it’s gone”* methodology for capturing relevant local material for current reference and for historical value. Overtime the historic value will become even more evident as patterns; events develop and become more visible, making better data driven decisions delivered in almost real time. It’s like *“Last Chance Tourism”*.



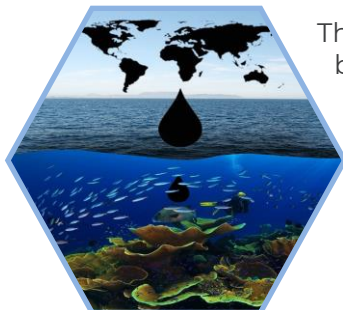
The Impacts of The WFCRC Approach

This platform provides education and access for citizens and researchers to have up-to-date data and information on the coastal and marine environment, while standing on the beach or from your living room.

This will support conservation, repopulation, disaster relief efforts, monitoring, tracking and peer to peer location sharing. The platform will provide a dashboard summarizing marine events and threats as well as serving a knowledge resource for project development like **“The Collaborative Beach and Coral Reef Registry.”**

The use of the Registry to guide conservation efforts is a novel approach with long term benefits and opportunities for local end users.

Conservation efforts inspired by a “bubble up” implementation rather than a “trickle down” implementation will provide the best long term action items to address land and marine based threats, fishing impacts, non-point source pollution, wastewater pollution, coastal development, and social impacts, along with the science behind these ecosystems.



The success of knowledge based networks, supports broad public usage and can be broadly shared in a manner that is focused on local areas. In other words, knowledge exchanges that are freely available for our members, can reasonably address a broad range of priorities of local relevance, spanning science, engineering, health, and commerce. Repositories with massive amounts of local knowledge could fuel the next wave of artificial intelligence exploration, driving innovations from scientific research to the [commercial sector](#)."

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This is not “off the shelf applications”, each feature is designed specifically for the project location, like our Florida Keys project. However, scalability will allow a Registry for any location around the world, given the availability of current and relevant data.



Benefits of the Registry Framework

The Collaborative Beach and Coral Reef Registry captures a more *holistic view of coral reef and coastal environments*, all based on GIS platforms, for the very long term. The best results come from evaluating and monitoring **ALL** of the impacts on coral reefs, terrestrial, marine and human.

Registry users will be able to, at a glance:

- See the science behind coral reefs and health of the reefs and any local research/events.
- Eco tourism will drive a renewed interest in local conservation
- Diver and outfitters renewed interest
- Historic and current imagery, data, not previously seen by end users
- Sea level rise precaution
- Beach erosion and ocean rise
- See where red tide, oil spills, point pollution or other events are in relation to users location
- Restricted access areas ie, turtle nesting sites, jellyfish, etc.
- A single source for coral and coastal data will provide a substantially better overall evaluation process,
- As a repository, opportunities exist in diver, tourist and local beach constituents, to have the opportunity to track or following past events and/or dive profiles.
- Hydrological and water quality monitoring,
- Tidal conditions
- Wildlife sightings
- Identify hazards/Alerts
- Local beach and coastal water quality and testing
- Where recovered derelict fishing gear and ghost traps are found
- Strengthening and expanding the network of organizations working to advance coral conservation in the identified project locations (Florida Keys)



Document Gallery

[Call to Action](#) (Pages 1-11)

[Coral Alert Network](#) (Pages 1-11)

[Marine Life Alert](#) (Pages 1-4)

[Oil Spill Alert](#) (Pages 1-4)

[Public Service Announcements](#) (1-5)

[Research](#) (Pages 1-6)



Opportunities Moving Forward

The robust charter of the Registry, as well as the on-the-ground impacts achieved by a diversity of organizations/individuals and funding partners, represent a framework and set of tools that have a high likelihood of achieving conservation benefits, in years not life times. Given that threats to coral reefs are only increasing. A

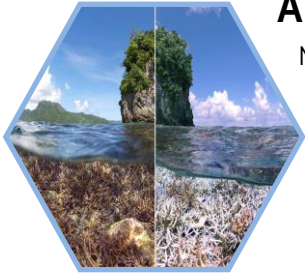
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strong, science/-based prioritization remains a critical need. Moving forward, WFCRC, coral conservation efforts present multiple opportunities for:

1. Advancing the message of a strategic approach to coral reef conservation
2. Deepening engagement with the scientific and local constituency
3. Expanding knowledge base
4. Building and disseminating the tools necessary to develop and identify proposed project locations for a Registry.
5. Promotional opportunities.
6. Expand the remote sensing capabilities to enhance the drone imagery experience.

A Multi-Partner Approach



Multiple donors, non-governmental organizations (NGOs), national and local governments, and academic partners are approached to prioritize coral conservation investments and activities, including [Ocean Rescue Alliance](#) (ORA), [BAY PARK DATA SOLUTIONS](#), [Mission Blue](#), [Allen Coral Atlas](#), [Project Aware](#), et. al.

Successes, and Impacts of a digital twin



The Collaborative Coral Reef Registry allows for local events and participation by local constituents, threats and parameters over time to be studied in relation to many other parameters in a single location without having to use mutable sources and/or databases. For example, with the ability of individual citizen scientist or the family on the beach, observations at a known location (lat, lng), will be able to make assumptions about how other observations may affect coral such as contaminated water, sediment runoff, or the movement of the red tide, research or what happen there last year or earlier.

Components of the Registry

The five components in the WFCRC Registry are: 1) Web mapping application(s), 2) Search and discovery mechanism, 3) Citizen reporting / crowdsourcing, 4) Real-time alerts, 5) Content gallery, 6) Remote sensing

Web Mapping Application



The Registry contains dynamic and interactive web maps, based on the following pertinent coastal and marine themes, and subject to the availability of up-to-date data:

1. Coral reef locations
2. Turtle nesting areas
3. Water quality
4. Identify points of pollution
5. Real-time weather and ocean data
6. Wind and ocean currents
7. Document shoreline condition

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8. *Current* shoreline conditions
9. Erosion and beach preservation
10. Identify, photograph, document, and map existing shoreline features, conditions, and problem areas.
11. Oil producing areas of the world co located with coral reefs and other sensitive environmental areas
12. Ocean floor topography and ESRI [EMU](#)
13. Natural and man-made marine disasters including red tide, seismic/tsunami, floods, hurricanes, oil spills, ship wrecks, sediment transport, and other land-based threats, etc
14. Satellite imagery and Unmanned Aerial Vehicles (UAV's)
15. Georeferenced research, reports and documents related to coral reefs and coastal conservation
16. Hydrology for point source pollution and creating real time alerts for sediment/chemical release

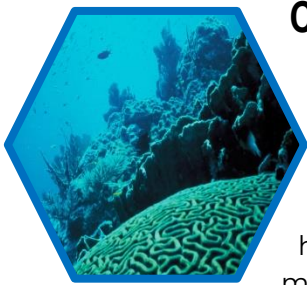
These maps are available, both as individual thematic maps, and combined together in a web mapping application. The latter is a visually pleasing and intuitive mapping interface that uses RIA (Rich Internet Application) technologies such as Javascript, Adobe Flex or MS Silverlight, and that supports basic mapping functions including but not limited to:

- 1) Map navigation (zoom and pan)
- 2) Turning map layers on/off
- 3) Display and edit features
- 4) Cascading style sheet details

Search and Discovery Mechanism

The search and discovery mechanism will provide easy and seamless access to all documents, images, and videos and other content from WFCRC and partners. It will support a search by:

- 1) Keyword
- 2) Geography
- 3) Content type
- 4) Date
- 5) [Citizen Scientist](#)



Citizen Reporting / Crowdsourcing

The WFCRC Geoportal provides an interface for uploading data/observations provided by citizens on selected marine-related events, situations or hot spots. This is by incorporating technology solutions to solicit information from the general public – namely “*crowd sourcing*” - to identify and report on environmental hot spots, with the aim of facilitating the participation of citizens in coastal and marine governance and management will:

1. Allow citizens to upload data/observations on certain pre-selected phenomena (air/water pollution events or impacts on biodiversity “hot spots”), thereby offering true ‘real-time’ alerts;
2. Display contributing citizens’ locations on a map with cascading details accessible by user by moving and clicking the cursor.

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Real-Time Alerts

The Geoportal provides a Geo RSS-type application that inventories and reports on various coastal and marine alert systems by:

- 1) Showing various alerts from RSS, IoT feeds or other means from sources such as USGS, FEMA, and ARGO etc.
- 2) Allowing the user to subscribe to the alerts through RSS, IoT and other relevant links
- 3) Allow citizens to upload data/observations on certain pre-selected phenomena (air/water pollution events or impacts on biodiversity “hot spots”), thereby offering true ‘real-time’ alerts;
- 4) Display contributing citizens’ locations on an interactive map with cascading details accessible by user by moving and clicking the cursor;
- 5) [Real time gaging stations release](#)

Approach

The [ESRI Hub](#) and Field Maps are identified as a suitable technology, owing to its versatility in handling maps, as a geospatial content management system that supports collaboration. Some of the major benefits of using The Hub are:

- 1) It enables publishing of maps to the web without an expensive web mapping solution such as ArcGIS Server
- 2) Flexibility for accessing the maps, with options for opening them in a web browser, map viewer, or desktop; data published is in the cloud
- 3) Ease of building mobile and web apps that complement each other using “solution templates” that are easily customizable and provide targeted maps and data

Deliverables

WFCRC GeoPortal Dashboard

A WFCRC GeoPortal Dashboard based on the ArcGIS Online for Organizations with the following components:

- **Web Mapping Application(s)** with functionality for searching and discovery of content, as well as crowd sourcing.
- **Real Time Alerts** application that allows users to view various coastal and marine alerts on a map, as GeoRSS feeds, as well as to subscribe to alerts on these feeds.
- Content shared with schools, institutions and libraries.

Other relevant interest and projects

[Coral and mangrove anchors](#)

What you can do and what we are proposing

As with any crowd sourced effort, it’s success is dependent on the broad participation in the project, by engaged participants. This is a cornerstone of The Registry. Engagement ranges from “likes and joining WFCRC” to large scale project funding, and everything in between.



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Membership in WFCRC and broadly sharing the program will help alert others that a catastrophe is on the horizon and that we need to respond in a measured manner. We are close to the tipping point and should monitor and capture the *Digital Twin* of our marine ecosystems before it is gone.

The other success factor is the funding to enable the total execution of the Registry. This can be achieved by:

- Individual donations
Go Fund Me, Pay Pal, Website, etc.
- Corporate financial support and sponsorship
- Join our consortium at LinkedIn and www.wfcrc.org and share your ideas and interest with us.
Please stand by for the opportunity to start uploading citizen scientists observations and end user participation.

Thank you

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