

Marine Protected Areas in Cuba

Results on Studies and their Role in Addressing Climate Change

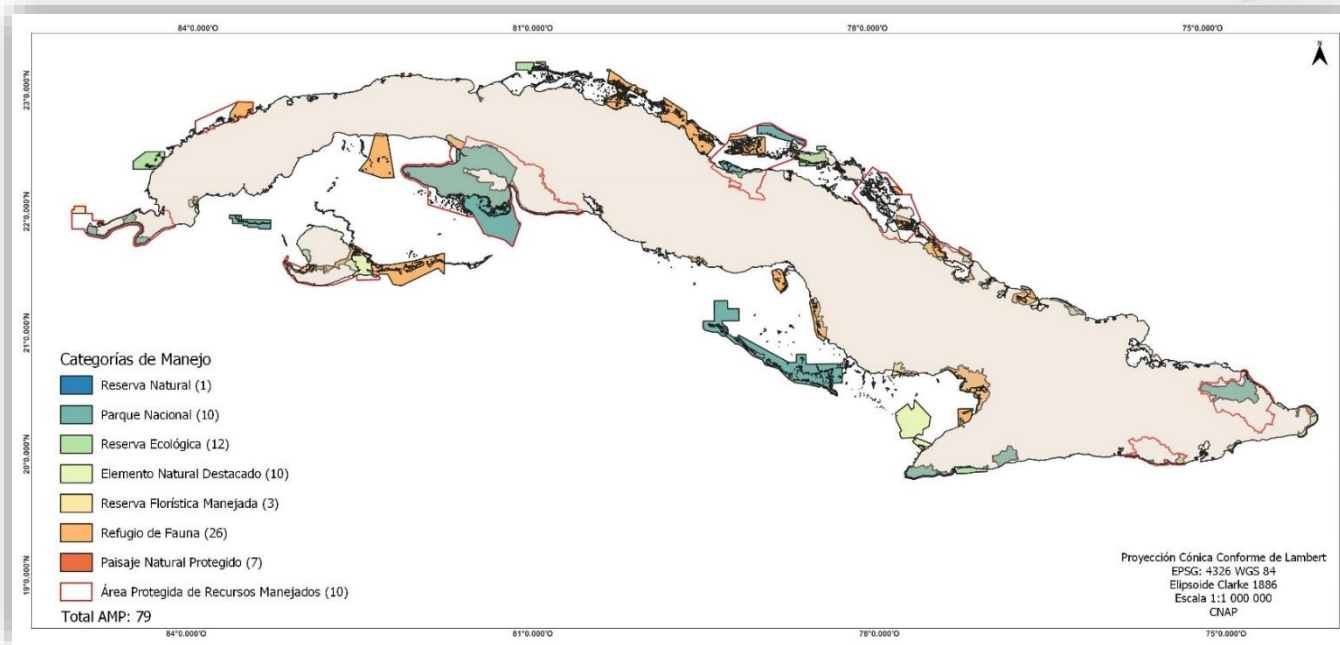
MCs. Aylem Hernandez Avila. National Center for Protected Areas



PRESENTATION OBJECTIVES

- The National System of Protected Areas (SNAP) and the Marine Protected Areas (MPA)
- Scientific results in projects, scientific expeditions and collaboration programs
- Future challenges for the MPA within the SNAP

NATIONAL SYSTEM OF PROTECTED AREAS



Categories management	Categories IUCN	SNAP	Declared	Identified
(RN)	I	4	4	0
(PN)	II	14	14	0
(RE)	II	34	23	11
(END)	III	39	21	18
(RFM)	IV	43	19	24
(RF)	IV	50	33	17
(PNP)	V	28	15	13
(APRM)	VI	19	15	4
Total		231	144	87

- Of the **144** declared, **79** are **AMP**
- The MPAs represent **23%** of the inland water surface of the Base Line for Cuba

MARINE PROTECTED AREAS:

Main lines of work

1. Strengthening of MPAs with the declaration of new areas to protect values of marine biodiversity and ensure connectivity.
2. Baseline studies, research and monitoring.
3. Strategic alliances with productive sectors such as fishing and tourism.
4. Working with local communities.
5. Actions for adaptation to climate change.
6. Strengthening vigilance and protection in AMPs.

Horizontal and vertical connectivity



Connectivity between mangroves, seagrass beds and corals



35-50m
Shallow
Mesophotic
reefs



50-75 m
Middle
Mesophotic
reefs



75-150 m
deep
Mesophotic
reefs



Connectivity between shallow reefs and mesophotic reefs

SINAP
Sistema Nacional
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Reed *et al.*, 2018.

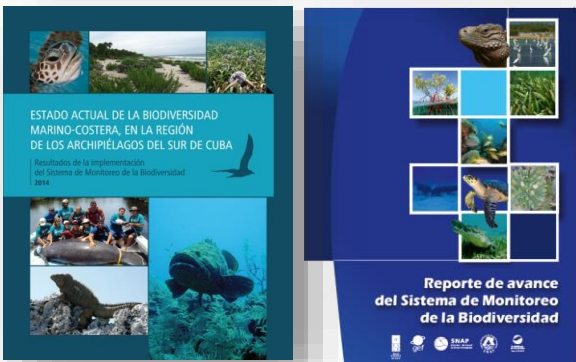
GEF/UNDP International Project “Application of a regional approach to the management of marine-coastal protected areas, in the region of the Archipelagos in the South of Cuba”



Biodiversity Monitoring System

- ✓ 12 monitoring protocols for the nine monitoring programs.
- ✓ 12 field tablets for species identification for the monitoring programs.
- ✓ Multimedia with the main results of the Biodiversity Monitoring System.
- ✓ Published the books:

- Progress Report. Biodiversity Monitoring System.
- State of the marine biodiversity in the coastal region of the Cuban southern Archipelagos. Results of the Biodiversity Monitoring System.

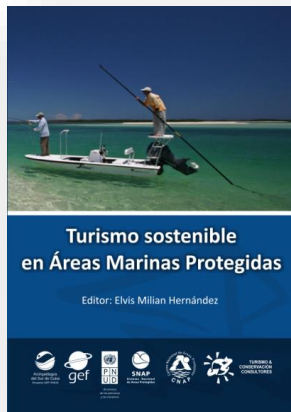


GEF/UNDP International Project “Application of a regional approach to the management of marine-coastal protected areas, in the region of the Archipelagos in the South of Cuba”

Economic Valuation of Ecosystem Services and Human Welfare in the communities of MPAs



- ✓ Diagnosis of ecosystems goods and services provided by MPAs, which may constitute a source of income.
- ✓ Implementation of economic alternatives for local communities.
- ✓ Books published:
 - Protected Areas and Human Communities. A view from the South.
 - Community Sustainable Economic Alternatives in Coastal Marine Protected Areas in southern Cuba.



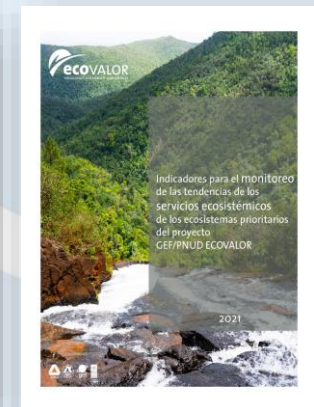
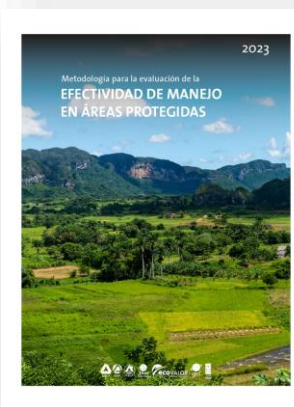
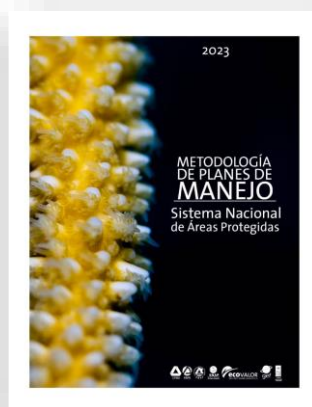
Sustainable tourism in MPAs

- ✓ Design of sustainable tourism products for AMP.
- ✓ Strategic Guidelines for Sustainable Tourism in AMP.
- ✓ Protocols for monitoring the impact of recreational diving and fishing activities have been developed and implemented.
- ✓ Published the book: Sustainable Tourism in AMP.

GEF/UNDP International Project “Incorporating multiple environmental considerations and their economic implications in the management of landscapes, forests and productive sectors in Cuba”

Planning and Management Tools for SNAP

- ✓ Prepared the fourth System Plan 2023-2030, governing document of the National System of Protected Areas of Cuba.
- ✓ Several methodological tools for SNAP management have been updated.
 - Methodology for the elaboration of Management Plans.
 - Methodology for the preparation of Management Effectiveness in Protected Areas.
 - Methodology for surveying the Base Line of ecosystem services.
 - Indicators for monitoring ecosystem goods and services.



Scientific Results: ECOVALOR Project



GEF/UNDP International Project "Incorporating multiple environmental considerations and their economic implications in the management of landscapes, forests and productive sectors in Cuba"

Economic Valuation Studies for SNAP

- ✓ Economic Valuation studies of ecosystem services developed in 11 AMPs
- ✓ 6 of them in Coral Reefs

Estimado Damage:
1.807.056 USD (100 years of recovery)

Recovery Cost:
250.000 USD

Compensation Proposal:
2.057.056 USD

- **Recreation (tourism):**
760-17.848 \$/Km²/years
- **Species Habitat:**
104-125 \$/Km²/years
- **Scientific Information:**
77-98 \$/Km²/years

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760-17.848 \$/Km²/years

Species Habitat:
104-125 \$/Km²/years

Scientific Information:
77-98 \$/Km²/years

- **Food (fishing):**
5.069.732 \$/years
- **Species Habitat:**
1.830.747 \$/years

Food (fishing):
347.300 \$/years

Recreation (tourism):
55.000 \$/years

Scientific information:
246.370 \$/years

Food (fishing):
10.500 \$/Km²/years

Recreation (tourism):
2.500-6.500 \$/Km²/years

Scientific Information:
37-437 \$/Km²/years

Food (fishing):
10.500 \$/Km²/years

Recreation (tourism):
2.500-6.500 \$/Km²/years

Scientific Information:
37-437 \$/Km²/years

Coastal Protection:
4.580 \$/Km²/years

Species Habitat:
1.330-1.430 \$/Km²/years

Recreation (diving):
57.425-86.070 \$/Km²/years

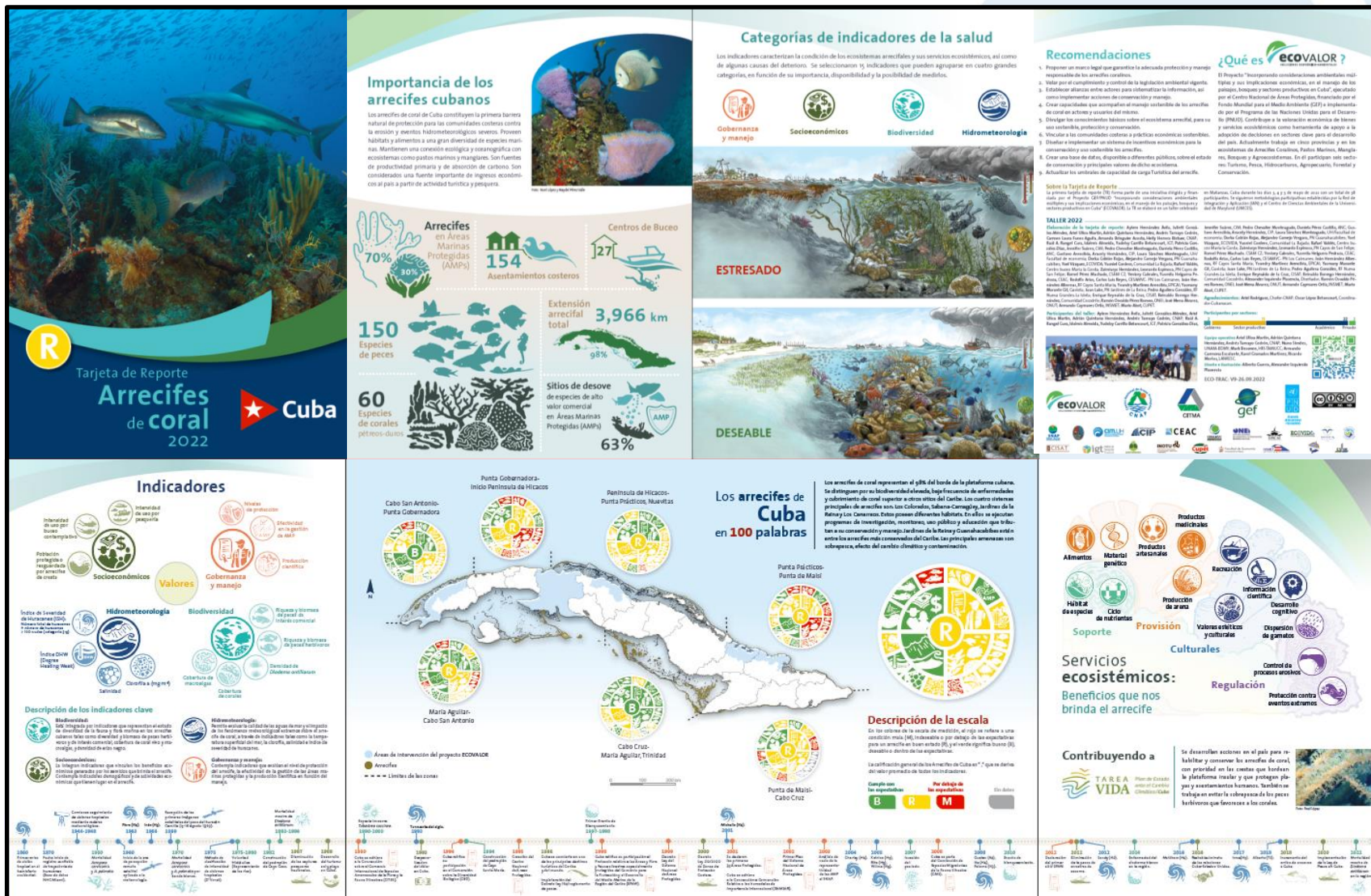
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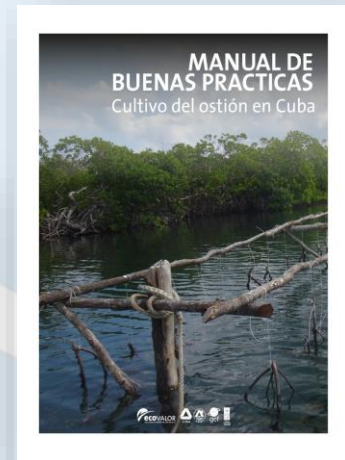
Report Card on the Coral Reefs of Cuba 2022



GEF/UNDP International Project “Incorporating multiple environmental considerations and their economic implications in the management of landscapes, forests and productive sectors in Cuba”

Alternatives for the fishing sector in MPA:

- ✓ Cultivation of the sponge with the creation of a farm in the AMP Refugio de Fauna Las Loras with 48 cages equivalent to 12ha, generating a reduction of impact on natural populations.
- ✓ Cultivation of oysters with the creation of: 3 farms of 8ha in the AMP RF La Isleta and 3 farms of 8ha in the AMP RFLas Picuas – Cayos del Cristo, generating a reduction of impact on the mangrove ecosystem.
- ✓ Book publication:
 - Manual of good practices for the artisan culture of oysters in Cuba.



FCB International Project "Applying nature-based solutions to increase coastal resilience and the capacity to adapt to climate change in protected areas of Cuba"

Ministerio Federal de Medio Ambiente, Protección de la Naturaleza, Seguridad Nuclear y Protección de los Consumidores



FIGURA 1. SITIOS DE INTERVENCIÓN DEL PROYECTO

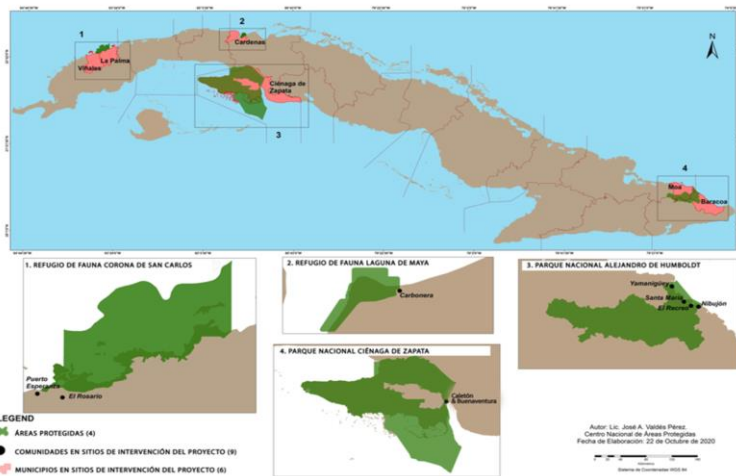
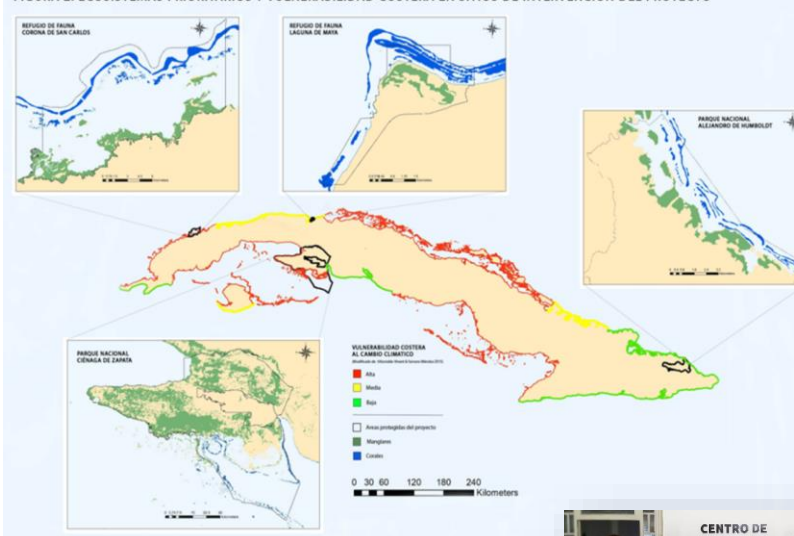


FIGURA 2. ECOSISTEMAS PRIORITARIOS Y VULNERABILIDAD COSTERA EN SITIOS DE INTERVENCIÓN DEL PROYECTO



General objective

- ✓ Design and implement nature-based solutions to achieve greater socio-ecological resilience in Cuban PAs and associated coastal communities, reduce risks to people as a result of extreme weather events, sea level rise, and less productive fisheries.

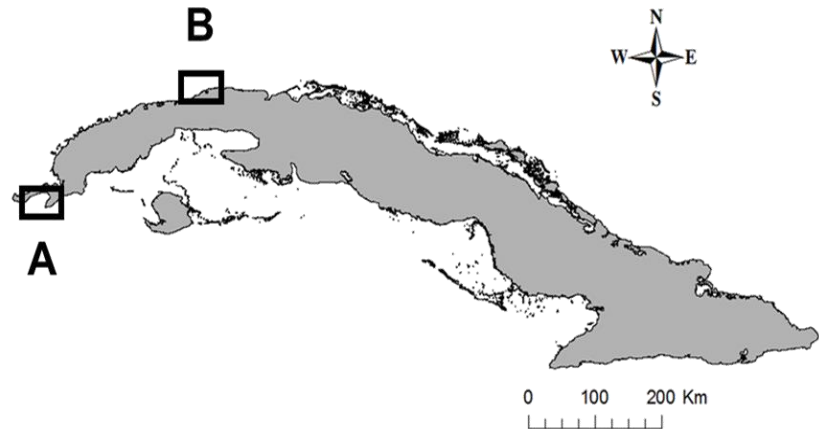
Expected results

- Improve the capacity of protected areas to integrate the management and protection of marine-coastal habitats and mitigate local threats that exacerbate climate risks.
- Restore coastal marine habitats that provide ecosystem services with community participation.
- Increase climate awareness and capacity building for ecosystem-based adaptation in local communities associated with project protected areas.



CTI Sectoral Project "Cultivation and propagation of stony corals for the restoration of reefs in Cuba II"

Restoration Efforts: Coral Culture, Stocking, and Assisted Sexual Reproduction



A – Guanahacabibes National Park B – Havana coastline

- On-site nurseries for coral cultivation: Trees, domes, lines (clotheslines)



➤ Coral Planting



➤ Microfragmentation



Process of microfragmentation and seeding of *O. faveolata* in artificial skeletons



CTI Sectoral Project "Cultivation and propagation of stony corals for the restoration of reefs in Cuba II"

➤ Assisted Sexual Reproduction



Laboratory Assembly



Floating Incubator



Collectors for collecting gamete packets during spawning: In the Guanahacabibes NP (*Acropora cervicornis*) (2019) and on the coast of Havana (*Orbicella faveolata*) (2020) and (*Diploria labyrinthiformis*) (2021)



Gamete Collection



Settlement on different types of substrates

➤ Monitoring and evaluating progress: **condition and health**



10 days later they begin to become coral recruits

Scientific Results: Walton Smith Scientific Expedition

Joint Cuba / EEUU expedition (May – June 2017)



Zonación de los arrecifes mesofóticos de Cuba



Objective

- ✓ Describe the distribution of **mesophotic reefs in Cuba** (MCE), compare their **health and connectivity** (physical, genetic and ecological) with each other and with the shallow reef systems of the southeastern US and the Gulf of Mexico

Results Obtained

- 36 mesophotic coral reef sites
- 43 dives, 103 hours of high definition videos
- 21,146 digital images
- Description and zoning of the MCE
- Evaluation of the structure and functioning of the MCE
- Evaluation of oceanographic, genetic and ecological connectivity
- Determine the health status of coral communities in the MCE
- 10 Scientific articles have been published in high impact journals
- Developed 5 Diploma Theses, 2 Master's and 2 PhD Theses in process



SNAP
Sistema Nacional
de Áreas Protegidas

Scientific Results: Alucia Scientific Expedition

Joint Cuba / EEUU expedition

(november 2017)



Objective

- ✓ Study the biodiversity of the reef system of the Jardines de la Reina National Park.

Scientific Seminar



Results Obtained

- 14 sites on fore reefs
- Total: 28 stations with > 90 dives
- Visual censuses of flora and fauna
- Genetic, microbiological and biochemical analyzes of marine organisms
- Reef Ecosystem Soundscape Ecology
- 5 Scientific articles have been published in high impact journals

Expedición Científica Alucia

La expedición científica en el buque oceanográfico Alucia se desarrolló del 1^{er} al 23 de noviembre del 2017 en aguas cubanas, bajo el proyecto Biodiversidad de los Arrecifes de Coral en Cuba. Científicos estadounidenses y cubanos trabajaron de conjunto en el estudio del sistema arrecifal Jardines de la Reina, uno de los más diversos y conservados del planeta. Entre los principales objetivos de la expedición se incluyen: censos visuales de la flora y la fauna; análisis genético, microbiológico y bioquímico de organismos marinos; y ecología de paisajes sonoros en este ecosistema. Esta expedición representa una nueva contribución a la colaboración científica entre Cuba y Estados Unidos de América.



PROGRAMA

Hora	Actividad	Ponente
1:30-1:45	Bienvenida e introducción a la actividad	Centro Nacional de Áreas Protegidas, Empresa Nacional para la Protección de la Flora y la Fauna
1:45-2:05	Resumen de la expedición científica a bordo del buque Alucia y resultados esperados	Dr. Amy Apprill Mooney (WHOI) Dr. Maickel Armenteros Almanza (CIM)
2:05-2:30	Soundscape in the reef. Fundaments and application in Garden of Queen reef	Dr. Ashlee Shannon Lillis (WHOI)
2:30-2:55	Nitrogen cycle research	Dr. Andrew Babbin (WHOI)
2:55-3:20	Metabolomics in the reef	Laura Weber (WHOI)
3:20-3:35	Coffee Break	
3:35-4:00	Biogeochemistry in the reef	Dr. Colleen Michelle Hansel Wankel
4:00-4:25	Microbiology in Cuban reefs	Dr. Amy Apprill Mooney (WHOI)
4:25-4:40	Estado de los arrecifes de coral en Jardines de la Reina	Dr. Silvia Patricia González Díaz (CIM)
4:40-4:55	Investigaciones sobre peces y corales en Jardines de la Reina	CIEC
4:55-5:10	Microbiología en arrecifes cubanos	MSc. Mayelin Carimate Fernández
5:10-5:20	Conclusions	



Results of the Collaboration: NGO WILDAID

- Signing of the collaboration agreement with the NGO WILDAID for surveillance and protection issues in the SNAP AMP.
- Donation to strengthen surveillance and protection capacities in the Cienaga de Zapata NP Administrations and the Zapata Peninsula APRM, in addition to the Ranger Corps.
- Visit of the Director of the Marine Program of the NGO WILDAID to the MPA Cienaga de Zapata NP and NP Guanahacabibes.
- Achieved financial support to increase the effectiveness of vigilance and protection of natural resources, within the marine zones of the Guanahacabibes, Cienaga de Zapata and Alejandro de Humboldt National Parks.



FUTURE OF SNAP MARINE PROTECTED AREAS

Main Challenges to continue working in the AMPs

1. Evaluation of new MPAs and other effective area-based conservation measures (OMECA), in oceanic waters within the Exclusive Economic Zone, to comply with Goal 3 of the Convention on Biological Diversity.
2. Declaration of MPA Tentative List sites as Natural World Heritage Sites.
3. Studies to determine the Blue Carbon potential of seagrasses in AMPs.
4. International Cooperation to complement the necessary financing in the management of MPAs.
5. Continue the implementation of the Biodiversity Monitoring System, in priority ecosystems and selected species and incorporate indicators to monitor the effects of climate change.
6. Continue research on ecosystem restoration, connectivity and movement of species.
7. Apply a training system to community leaders and AMP managers.



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