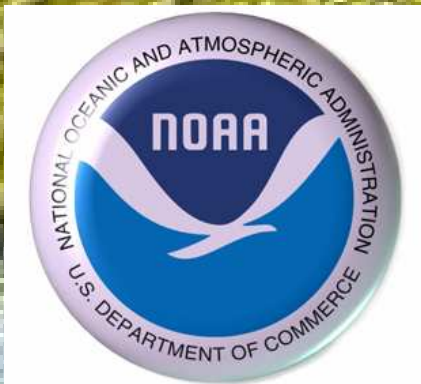


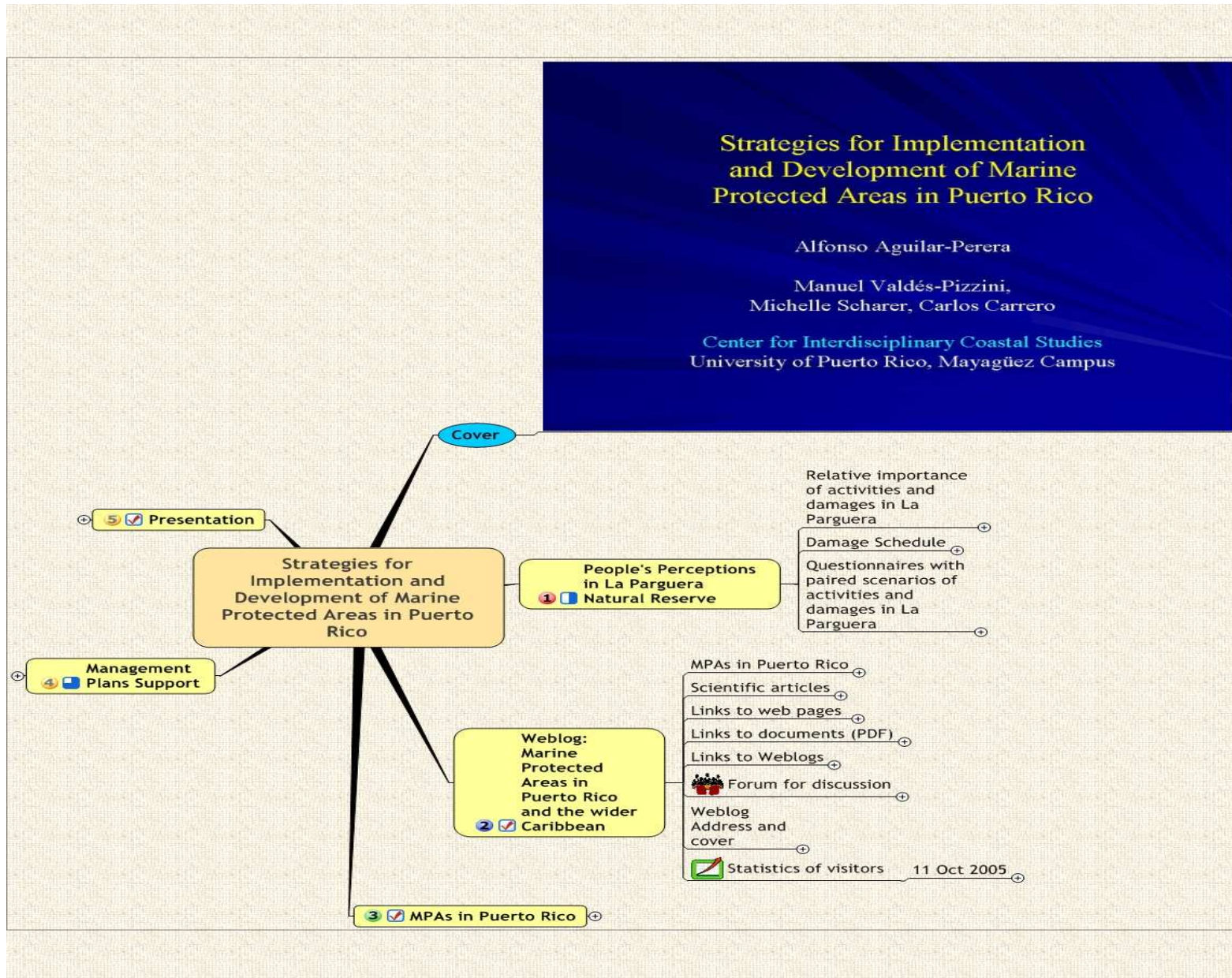
# Strategies for the design, development and implementation of Marine Protected Areas in Puerto Rico under the Caribbean Coral Reef Institute

La Parguera, August 4, 2006

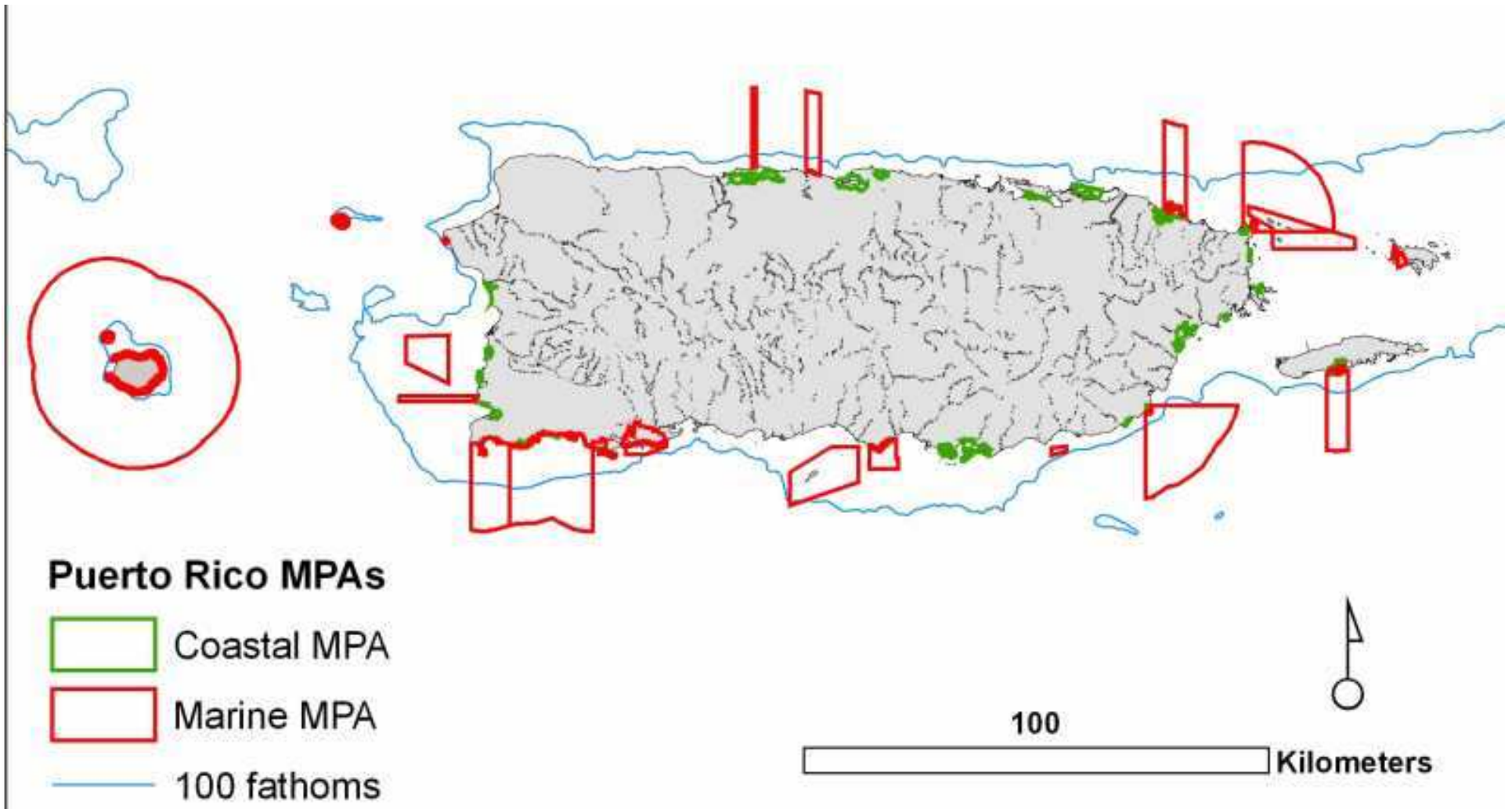
Manuel Valdes Pizzini  
Interdisciplinary Center for Coastal Studies (CIEL)  
University of Puerto Rico at Mayaguez



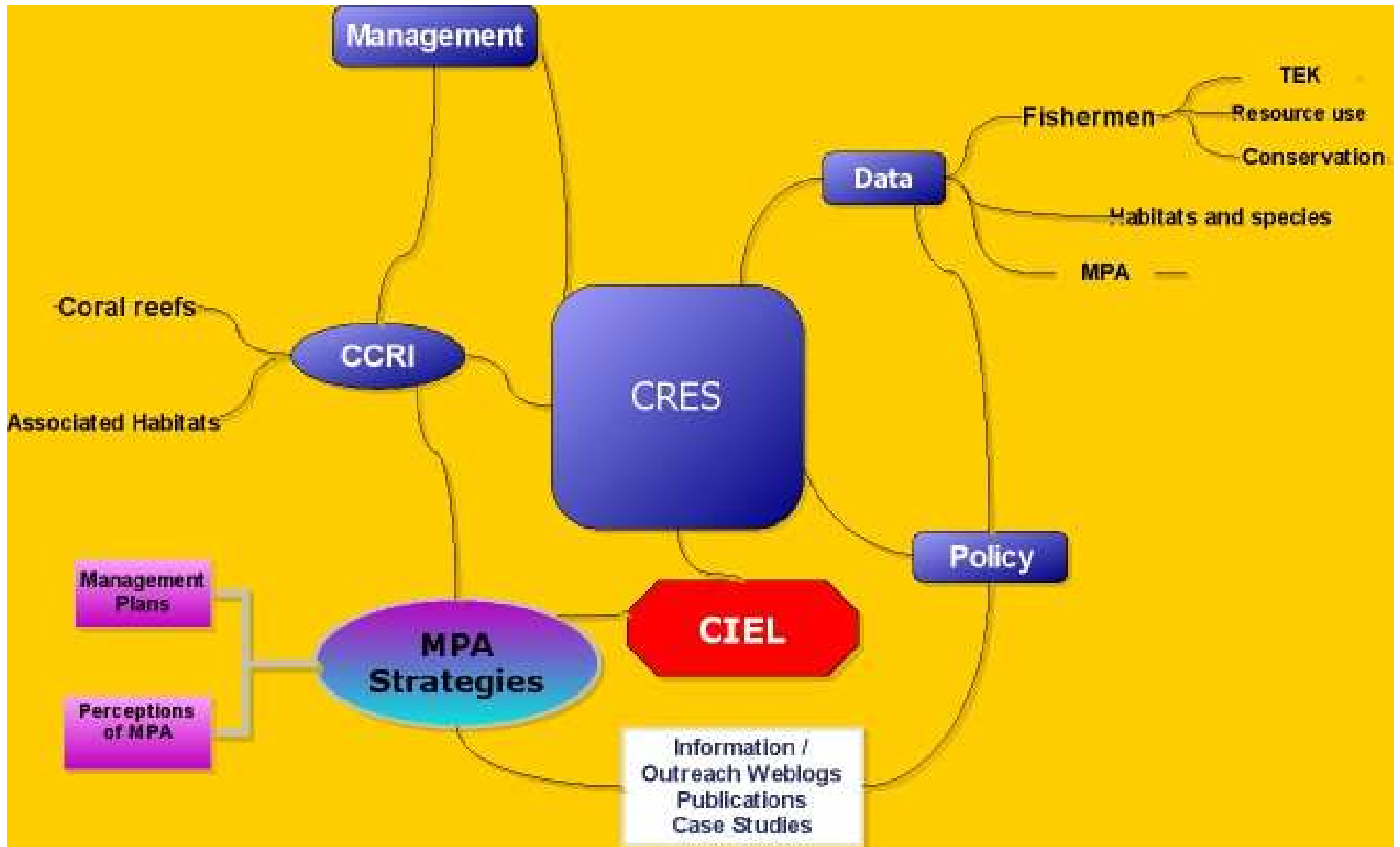
# Caribbean Coral Reef Institute CCRI UPR-M



# MPAs in Puerto Rico

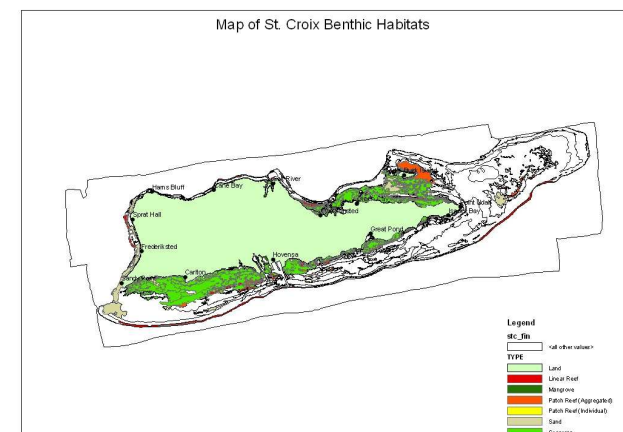
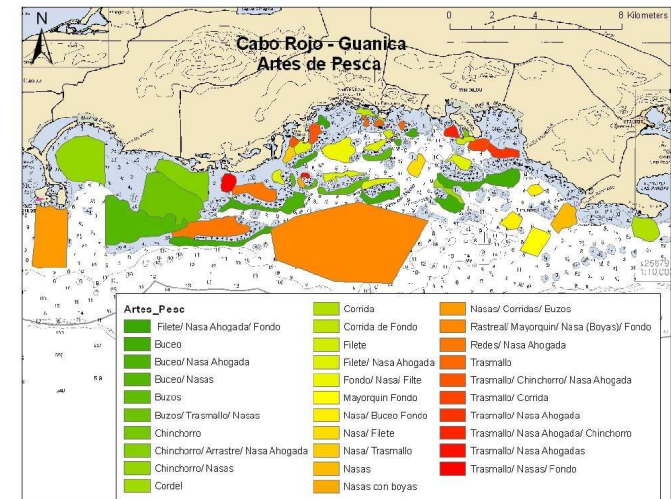


# CIEL, CRES, CCRI, Commonwealth and Federal Management Processes

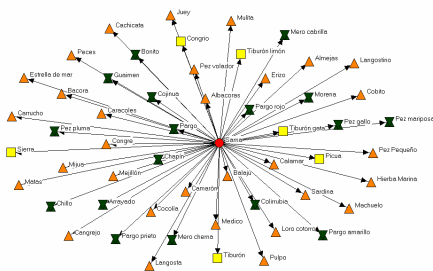
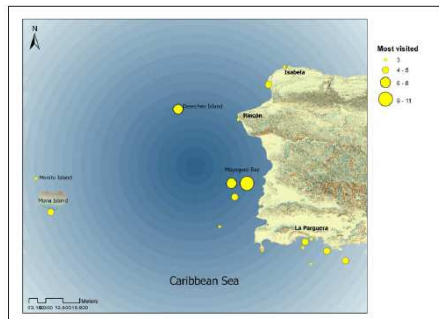
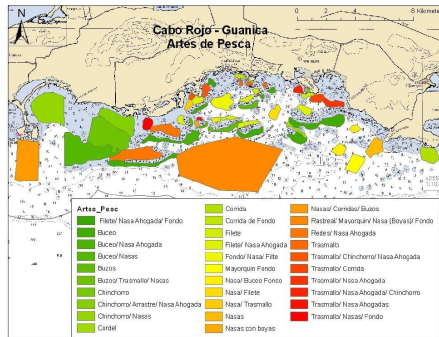


# CRES Data Relevant to MPA Strategies

- Scientific, local and traditional ecological knowledge
- Perceptions and knowledge of fishes and ecosystems.
- Perceptions of management.
- Knowledge of the health of coral reefs and associated organisms.
- Case studies of processes in MPAs: Tres Palmas in Rincón, Canal Luis Peña in Culebra and the East End Marine Park in St. Croix.



# Data to support management decisions by Commonwealth, Federal agencies and NGOs:



- ④ Maps of fishing activities and areas in La Parguera.
- ④ Maps of healthy reefs, and species of coral, based on the local knowledge of dive operators.
- ④ Revised maps of MPA in Puerto Rico.
- ④ Maps of activities, zoning and habitats for Culebra and Rincón.
- ④ Cognitive maps of habitats based on qualitative data.
- ④ Network maps of the trophic web based on the TEK of fishers

# Incorporating Fishermen's Traditional Knowledge into Geographical Information Systems

Manuel Valdes-Pizzini<sup>1</sup>, Idelfonso Ruiz-Valentín<sup>1</sup>, Michelle T. Schärer<sup>1</sup>, William Hernández<sup>2</sup>  
 1- Interdisciplinary Center for Coastal Studies, University of Puerto Rico, Mayagüez Campus.  
 2- U.S. Fish & Wildlife Service, Caribbean Islands NMR, Cabo Rojo, Puerto Rico.

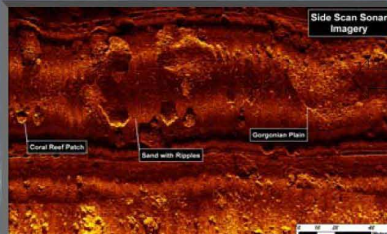


## Spatial display of Fishermen's Ecological Knowledge

Environmental social scientists are increasingly realizing the critical importance of geographical information systems (GIS) in studying the diverse spatio-temporal dimension of human-environmental relationships (Aldenderfer and Maschner, 1996; Conant, 1994) and in employing such knowledge to design and implement resource management strategies (Bowman et al. 2004).

This poster presents the results of an interdisciplinary effort (social sciences and oceanography) in mapping fishing activities. Here we incorporate a GIS database and socio-spatial information, such as local fishermen's Traditional Ecological Knowledge (TEK) and artisanal fishing data (based on field observations of fishing effort) to determine the distribution of fishing effort within the MPA.

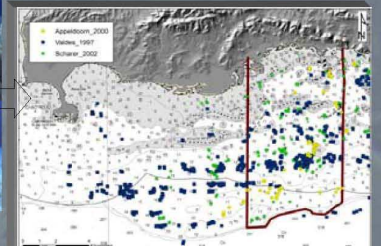
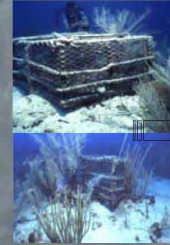
Fishers identified a number of fishing grounds and demarcated sites on the map. Fishing grounds are composed of areas (polygons) or floating spots (point) that are represented in the center figure.



A detailed benthic habitat map was generated over a 60 km<sup>2</sup> area of La Parguera Natural Reserve. A 300 KHz side scan sonar was used to collect 0.15 m<sup>2</sup> resolution imagery that was digitized with the NOAA habitat digitizer extension in Arc View (version 3.2). Twenty one benthic habitats were classified based on visual interpretation at a 4 m<sup>2</sup> minimum mapping unit.

National Oceanic and Atmospheric Administration, National Ocean Service, National Centers for Coastal Ocean Science Biogeography Program, 2001. Benthic Habitats of Puerto Rico and the U.S. Virgin Islands. CD-ROM, Silver Spring, MD: NOAA.

Prada, Martha C. 2002. Mapping Benthic habitats of southwestern Puerto Rico as determined by side scan sonar. PhD Dissertation, University of Puerto Rico, Mayagüez Campus.



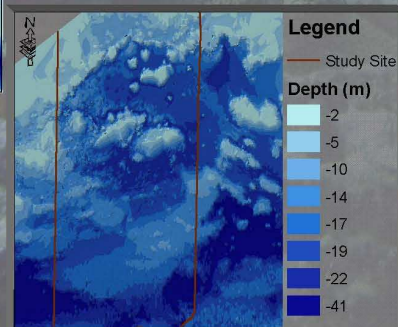
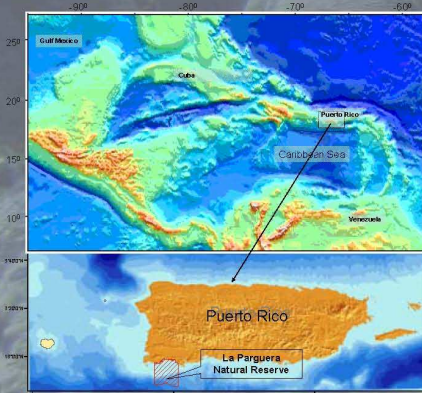
The position of each fish trap was collected in the field with handheld GPS. The coordinates for each trap were plotted in Arc View (version 8.1) through time. Data for this layer are from the following sources:

Appeldoorn R.S., M. Nemeth, J. Vassilides, and M. Scharer. 2000. The Effect of Fish Traps on Benthic Habitats Off La Parguera, Puerto Rico. Report to the Caribbean Fishery Management Council. Hato Rey, Puerto Rico.

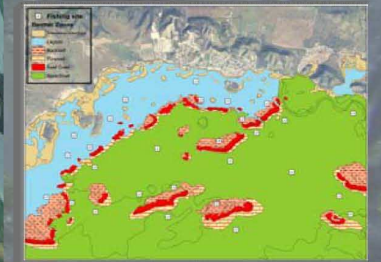
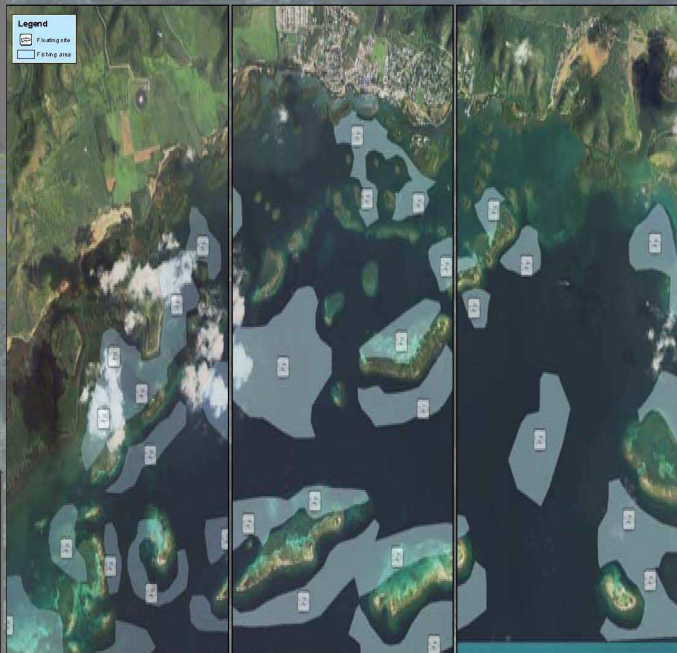
Schärer, M. T., M. C. Prada, R. S. Appeldoorn, R. Hill, P. Sheridan and M. Valdes-Pizzini. 2002. The use of fish traps in Puerto Rico: current practice, long-term changes, and fishers' perceptions. Proceedings of the 55th annual Gulf and Caribbean Fisheries Institute, pages 744-756.

Valdes-Pizzini, M., J. M. Posada, K. Grove and M. Rosado. 1997. Mapping Fishing Grounds Using Global Positioning System (GPS) Technology. Proceedings of the Gulf and Caribbean Fisheries Institute 49:125-139.

## Study site



Using the 3D Analyst extension, a TIN was created from 40 m of resolution bathymetry transfer to shapefile (points) of La Parguera. This TIN was used to provide a visualization of the bottom contour to obtain the slope of the study area



Benthic Habitat and Zone Maps of Puerto Rico, was prepared by National Oceanic and Atmospheric Administration in 1999. This layer are applied for the descriptions of where they are fishing inside of the reserve and how this used zones changes between months.

## Acknowledgements

Thanks to the fishermen of La Parguera, for providing the data used in this study. Research for this study was supported by the University of Puerto Rico Sea Grant Program, and the analysis by the Puerto Rico Coral Reef Ecosystems Studies program (NOAA).





*Lutjanus analis*

Predators

- Negaprion brevirostris*
- Ginglymostoma cirratum*
- Sphyrna barracuda*
- Carcharhinus perezii/limbatus*
- Scomberomorus maculatus/regalis*
- Gymnothorax funebris*

Associated species

Prey

- Hemiramphus brasiliensis*
- Sepioteutis sepioidea*
- Gymnothorax* spp.
- Thunnus* spp.
- "Mollusks"
- Penaeus* spp.
- Harengula* spp.
- Acanthurus* spp.
- Callinectes* spp.
- "Bivalves"
- Jenkinsia*
- "Echinoid"
- Lucina filiosus*
- Hirundichthys speculiger*
- Sparisoma* spp./ *Scarus* spp.
- Strombus gigas*
- Panulirus Argus*
- Octopus* spp.
- "Crabs"
- "Grasses"
- Jenkinsia lamprotaenia*
- Cardisoma guanhumi*
- Harengula humeralis*
- "Hermit Crab"
- Ereaster reticulatus*
- "Fish"
- Haemulon* spp.
- Carpilus* spp.
- Haemulon aurolineatum*
- Panulirus guhatus*
- "Small fish"
- "Sea grass"



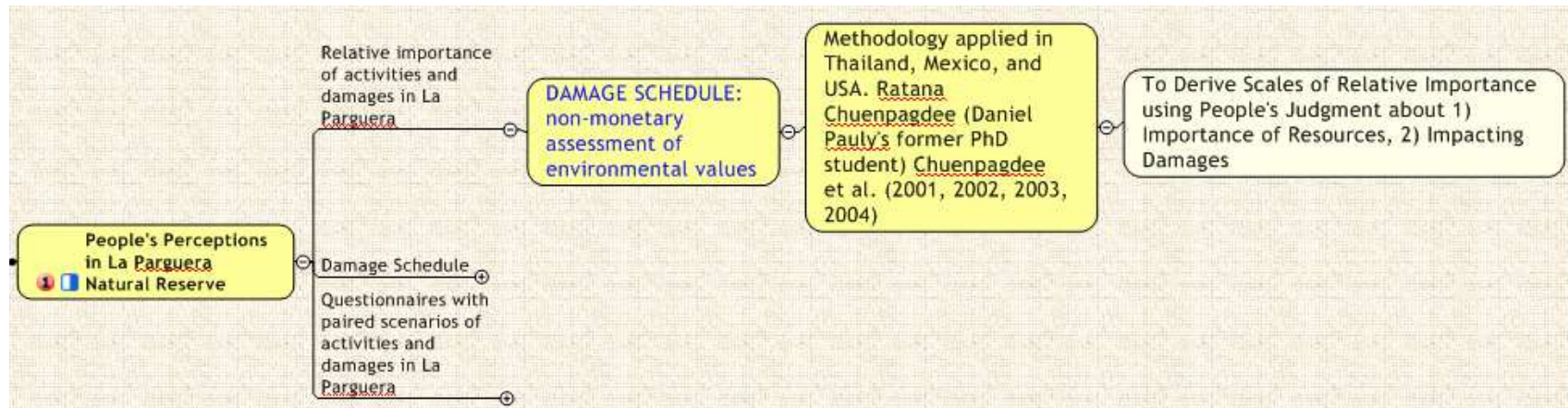
# Fishers views on one MPA

	Strongly Disagree*	Disagree	Neutral	Agree	Strongly Agree	Don't Know
Maintains Spawning Aggregations	4.9	1.2	3.7	4.9	80.5	4.8
Improves quantity of fishes inside	6.1	1.2	2.4	7.3	75.6	7.3
Improves quantity of fishers in adjacent area	3.7	2.5	2.5	7.4	75.3	8.6
Protects species in vulnerable areas	6.1	2.4	2.4	6.1	79.3	3.6
Restores or maintains habitat quality	9.8	4.9	0	6.1	75.6	3.6
Creates problems for my family and myself	42.7	8.5	11.0	7.3	26.8	3.6
Creates problems for communities	17.1	7.3	14.6	7.3	47.6	5.1
Creates employment / investment opportunity	31.3	5.0	11.3	3.8	25.0	23.9

# General MPA findings

- **Between 70% and 90% strongly agree that MPAs meet biological goals in: Tourmaline, Bajo de Sico, La Mona/Monito, Abril La Sierra, and Desecheo.**
- **Less positive about Canal de Luis Peña in Culebra**
- **Puerto Rican fishers had little experience with USVI MPA.**
- **Fishers had mixed views about the social and economic impacts of MPA.**

# DAMAGE SCHEDULE: non-monetary assessment of environmental values



# Damage Schedule

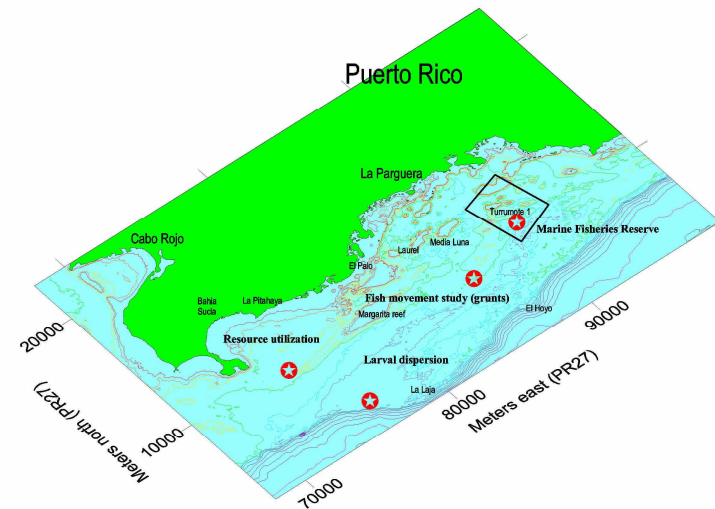
- 150 Interviews
- Managers
- Scientific community
- Tourist operators
- Permanent residents
- Visitors
- Fishers

DAÑOS			
<p>En su opinión muy personal y gratuita, ¿cuál de los siguientes tipos de DAÑOS son más severos en términos de impacto al ambiente y las condiciones sociales y económicas para la comunidad local en La Bodega? Por favor, marque en un círculo SOLAMENTE UN enunciado (A o B en cada par).</p>			
A		B	
Daño al manglar en los cayos	<input type="radio"/>	Daño al manglar en áreas costeras	<input type="radio"/>
Daño al pasto marino en aguas limpias	<input type="radio"/>	Daño a la calidad del agua en áreas limpias	<input type="radio"/>
Daño al manglar en los cayos	<input type="radio"/>	Daño al arrecife coralino en aguas limpias	<input type="radio"/>
Daño al manglar en áreas costeras	<input type="radio"/>	Daño al pasto marino en aguas limpias	<input type="radio"/>
Daño a la calidad del agua en áreas profundas	<input type="radio"/>	Daño al arrecife coralino en áreas profundas	<input type="radio"/>
Daño al manglar en los cayos	<input type="radio"/>	Daño al pasto marino en aguas limpias	<input type="radio"/>
Daño al arrecife coralino en aguas limpias	<input type="radio"/>	Daño al arrecife coralino en áreas profundas	<input type="radio"/>
Daño al manglar en los cayos	<input type="radio"/>	Daño a la fauna bioluminiscente	<input type="radio"/>
Daño al manglar en áreas costeras	<input type="radio"/>	Daño al arrecife coralino en aguas limpias	<input type="radio"/>
Daño al pastoreo marino en aguas limpias	<input type="radio"/>	Daño al arrecife coralino en áreas profundas	<input type="radio"/>
Daño al manglar en los cayos	<input type="radio"/>	Daño a la calidad del agua en áreas limpias	<input type="radio"/>
Daño al arrecife coralino en áreas profundas	<input type="radio"/>	Daño a la fauna bioluminiscente	<input type="radio"/>

ACTIVIDADES			
<p>En su opinión muy personal y gratuita, ¿cuál de las siguientes ACTIVIDADES son más severas en términos de impacto al ambiente y las condiciones sociales y económicas para la comunidad local en La Bodega? Por favor, marque en un círculo SOLAMENTE UN enunciado (A o B en cada par).</p>			
A		B	
Extracción excesiva de botas y jiróns	<input type="radio"/>	Pesca recreativa (bote, redes, trapajo)	<input type="radio"/>
Extracción salina	<input type="radio"/>	Disposición de desechos (sólidos y líquidos)	<input type="radio"/>
Pesca comercial (bote, redes, trapajo)	<input type="radio"/>	Actividades científicas	<input type="radio"/>
Extracción excesiva de botas y jiróns	<input type="radio"/>	Pesca recreativa (bote y anzuelo, deportivo)	<input type="radio"/>
Pesca comercial (bote, redes, trapajo)	<input type="radio"/>	Buque recreativo	<input type="radio"/>
Disposición de desechos (sólidos y líquidos)	<input type="radio"/>	Desarrollo urbano	<input type="radio"/>
Pesca comercial (bote, redes, trapajo)	<input type="radio"/>	Pesca recreativa (bote y anzuelo, deportivo)	<input type="radio"/>
Extracción excesiva de botas y jiróns	<input type="radio"/>	Buque recreativo	<input type="radio"/>
Pesca comercial (bote, redes, trapajo)	<input type="radio"/>	Disposición de desechos (sólidos y líquidos)	<input type="radio"/>
Pesca recreativa (bote y anzuelo, deportivo)	<input type="radio"/>	Buque recreativo	<input type="radio"/>
Desarrollo urbano	<input type="radio"/>	Actividades científicas	<input type="radio"/>

# Case study: La Parguera

- ⊕ History of contentions and local claims
- ⊕ Process and lack of incorporation of stakeholders
- ⊕ Assumptions and questions on MPA
- ⊕ Patterns of resource use
- ⊕ Co-management ahead of time
- ⊕ Local politics
- ⊕ Environmental justice and coastal development





# Support to Management Plans

## Reserva Natural Canal Luis Peña, Culebra

- \*Review of the scientific and socioeconomic data
- \*Analysis of data and reports (of Edwin Hernández Delgado)
- \*Preparation of a Management Plan Draft
- \*Planning to apply Damage Schedule
- \*Lessons Learned

## Reserva Marina Tres Palmas, Rincón

- \*Involvement of stakeholders in the development of the management plan
- \*Planning to apply Damage Schedule
- \*Lessons Learned

## Reserva Natural La Parguera, Lajas

- \*Planning and application of the Damage Schedule
- \*Preparation of the case study on Turrumote
- \*Compilation of fieldnotes and documents on the failed attempt to establish a No-take zone (Turrumote)
- \*Review of the designation document for the Turrumote No-take zone
- \*Examination of the public hearings on the Special Planning Area designation (APE)
- \*Design of a strategy to engage in the process to develop a No-Take Zone

**Support to NOAA and the Department of Natural and Environmental Resources (DNER) in the design of a strategy for priorities in the development and implementation of management plans for MPA.**

**A set of priorities was developed.**





# First Draft of the Management Plan for the Luis Peña Marine Reserve (a no-take reserve) in Culebra. In collaboration with Sea Grant, DNER, the municipality and the local NGOs.

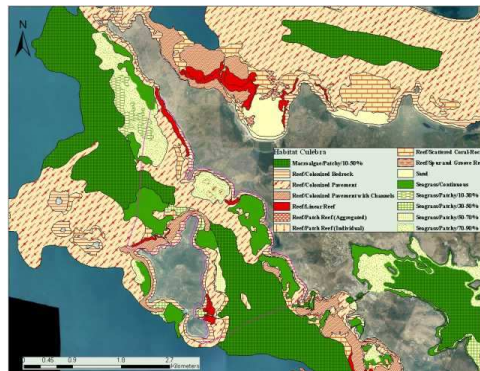
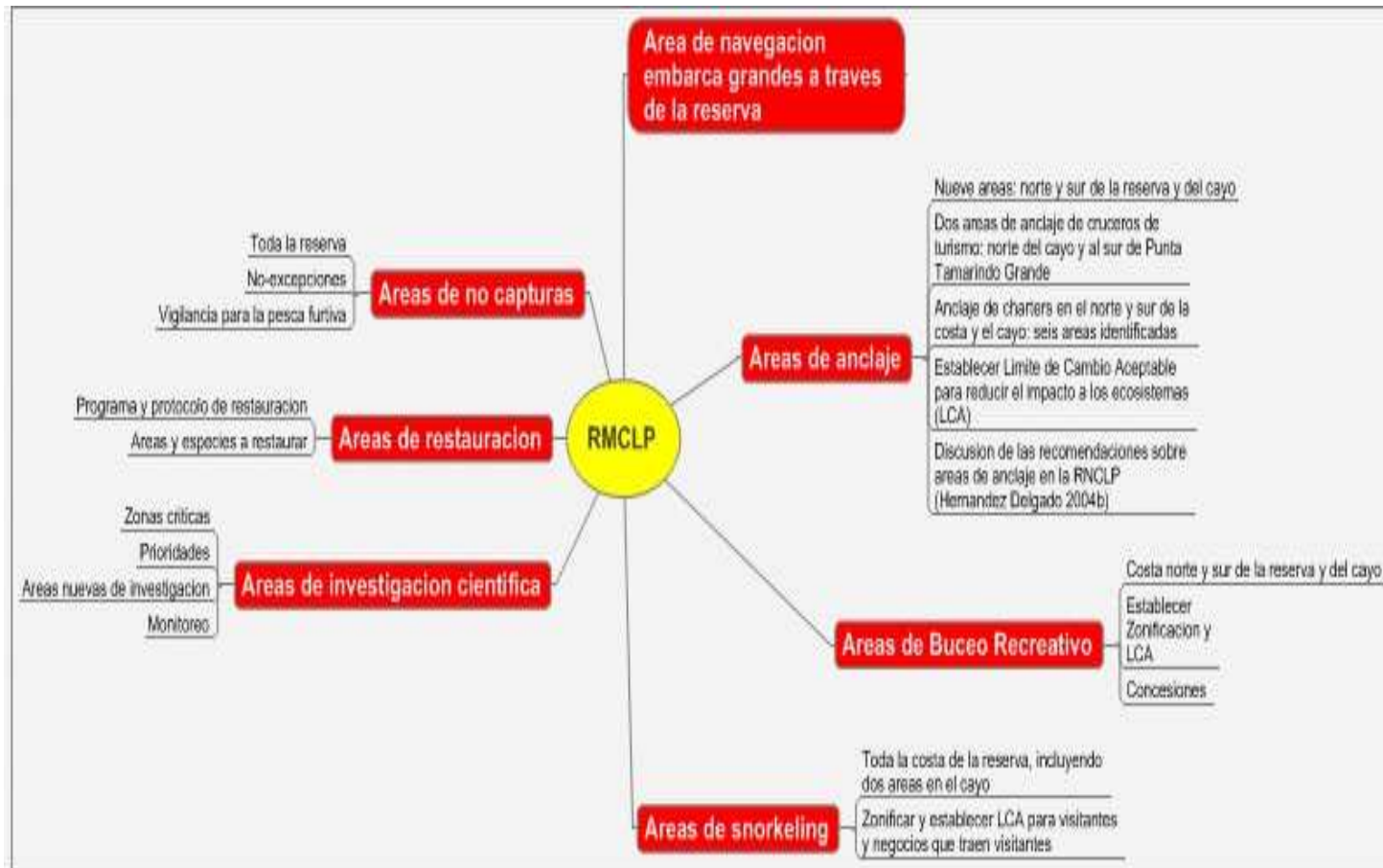
## Plan de Manejo de la Reserva Natural Canal Luís Peña, Culebra



Documento base para el plan de manejo  
Primer Borrador

Culebra, Puerto Rico  
Octubre 28 de 2005





**A bilingual (Spanish and English) web log on MPA in Puerto Rico and the conservation of coral reefs and the local fisheries: <http://www.amp-pr.org/blog> (supported by CCRI and the College of Arts and Sciences, UPR-Mayagüez)**

## Áreas Marinas Protegidas en Puerto Rico y el Gran Caribe

### Caribbean Marine Reserves Research and Monitoring Workshop / Taller Caribeño sobre Investigación y Monitoreo en las Reservas Marinas

July 18th, 2006

Published by / Publicado por: Manuel Valdés Pizzini  
From / Desde: St. John, USVI



Gary Davis, Visiting Chief Scientist, NPS served as facilitator of the workshop.

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1 visitor online



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28	29	30	31			

« Jul

# MPA Blog Productivity

- July 2005-2006
- 151 entries
- 12-13 per month
- 57 links to organizations and programs
- 14 links to MPAs in USA and the Caribbean
- 31 references and links to on-line publications
- 23 on-line peer reviewed publications on fisheries and MPAs



# Visitors

Puerto Rico	<b>4676</b>
USA	<b>3943</b>
Mexico	<b>823</b>
Spain	<b>340</b>
Venezuela	<b>149</b>
Colombia	<b>147</b>
Chile	<b>132</b>
Peru	<b>91</b>
Argentina	<b>83</b>
United Kingdom	<b>60</b>
Dominican Republic	<b>54</b>
Ecuador	<b>50</b>
South Korea	<b>43</b>
Costa Rica	<b>35</b>
Portugal	<b>35</b>
France	<b>28</b>
Panama	<b>26</b>
Germany	<b>22</b>
Canada	<b>22</b>
Brazil	<b>20</b>
Others	<b>221</b>

# A bilingual (Spanish and English) web log of spawning aggregations in Puerto Rico and the Caribbean:

<http://www.amp-pr.org/spag>

## Agregaciones Reproductivas de Peces: Caribe y Golfo de México

### La pesquería del mero Tigre (*Mycteroperca tigris*) en Isla de Vieques, Puerto Rico / The Tiger grouper fishery off Vieques Island, Puerto Rico

July 27th, 2006



Photo by Brian Shaw

Publicado por Alfonso Aguilar-Perera

Recientemente, la pesquería del mero Tigre (*Mycteroperca tigris*) en Vieques, Puerto Rico, ha sido reseñada por Matos-Caraballo, J. Posada y B. Luckhurst (2006). Los desembarques pesqueros provenientes de

August 2006

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14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

« Jul

### My BlogMap!



# SPAG Blog Productivity

- October 2005-2006
- 35 posts
- 30 links
- 7 on-line publications
- 12 peer reviewed publications
- Society for the Conservation of Reef Fish Aggregations (SCRFA) Newsletters



# SPAG Visitors

Mexico	<b>638</b>
USA	<b>599</b>
Puerto Rico	<b>563</b>
Venezuela	<b>204</b>
Spain	<b>173</b>
Colombia	<b>120</b>
Canada	<b>100</b>
Uruguay	<b>98</b>
Brazil	<b>55</b>
Peru	<b>42</b>
Unknown	<b>109</b>
Others	<b>414</b>



# Other related blogs:

## ANTROPESCA

Curso de perspectivas socioculturales de la pesca a escala global, SOCI 5007 Departamento de Ciencias Sociales, Facultad de Artes y Ciencias, UPR en Mayagüez, Manuel Valdés Pizzini (mvpizzini@uprm.edu)

### La tragedia de los comunes

February 13th, 2006

En esta parte del curso discutiré "la tragedia de los comunes", concepto acuñado por Garret Hardin. Yo prefiero hablar de la tragedia del acceso abierto y en clase explicaré de que se trata. Tienen asignado leer el artículo que se accede pulsando aquí.

He estudiado un caso: el de los corrales de pesca, que ilustra los elementos fundamentales de esa discusión. Sin embargo, el escenario internacional se presta para un análisis extenso de esos procesos.

Uno de los casos más prominentes de la lucha entre las naciones por los abastos pesqueros es lo que se conoce como "la guerra del fletán". Este pez (*Reinhardtius hypoglossoides*, halibut de Groenlandia, fletán negro) de la familia de los pleuronectiformes (peces achatados, planos con los dos ojos en un costado) abunda en los mares el norte.



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- » February 2006
- » January 2006

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- » Conferencias (6)
- » Lecciones (3)
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- » Juan Freire

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- » Puntos de Referencias Móviles

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## CULEBRA, PUERTO RICO

### Plan de Manejo para la Reserva Natural Canal Luis Peña, Culebra /Management Plan for the Canal Luis Peña Natural Reserve, Culebra

FRIDAY 4TH NOVEMBER 2005 - 9:48:28 PM



Publicado por Alfonso Aguilar-Perera y Manuel Valdés-Pizzini

El programa Sea Grant y el Centro Interdisciplinario de Estudios del Litoral (CIEL), ambos de la Universidad de Puerto Rico-Recinto Mayagüez están a cargo de delinear el Plan de Manejo de la Reserva Natural Canal Luis Peña, al este de Puerto Rico. Culebra es una pequeña isla localizada

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**PAGES**

**CATEGORIES**

General

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November 2005

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## Centro Interdisciplinario de Estudios del Litoral

HOME

### Centro Interdisciplinario de Estudios del Litoral (Center for Interdisciplinary Coastal Studies)

Publicado por Alfonso Aguilar-Perera y Manuel Valdés-Pizzini

El Centro Interdisciplinario de Estudios del Litoral (CIEL) surgió como una iniciativa para abordar aspectos interdisciplinarios concernientes a la integración de sociología y ecología en el manejo de la zona costanera de Puerto Rico. Ideado y moderado por el Dr. Manuel Valdés-Pizzini, el CIEL incorpora aspectos de conservación de recursos marinos y costeros, impulsa la implementación de Áreas Marinas Protegidas integrando sociedad, economía, ecología y conocimientos tradicionales. CIEL apoya planes de manejo de AMPs, específicamente la Reserva Marina Tres Palmas, Rincón y la Reserva Natural Canal Luis Peña, Culebra, e iniciativas del Departamento de Recursos Naturales de Puerto Rico y la Agencia Nacional Atmosférica y Oceánica (NOAA, por sus siglas en inglés) y cuenta con el apoyo económico del Decanato de Artes y Ciencias de la Universidad de Puerto Rico, recinto Mayagüez, el Instituto Caribeño de Arrecifes de Coral (ICARI) y el programa Estudios Ambientales de Arrecifes Corales (SEAS). CIEL cuenta con un personal calificado compuesto por investigadores y estudiantes de varias disciplinas: Antropología (Manuel Valdés), Ciencias Marinas (Michelle Schaner, Idelfonso Ruiz, Diana Beltrán, Alfonso Aguilar), Biología (Mena Rodríguez, Taina Rivera, Prudencio Martínez), Ingeniería Química (Idalis Rodríguez), Psicología (Jomaira Ross), Sociología (Melody Fonseca, Jaime Baruch), Planeación Ambiental (Carlos Carro) y Administración (Jessica Rodríguez).

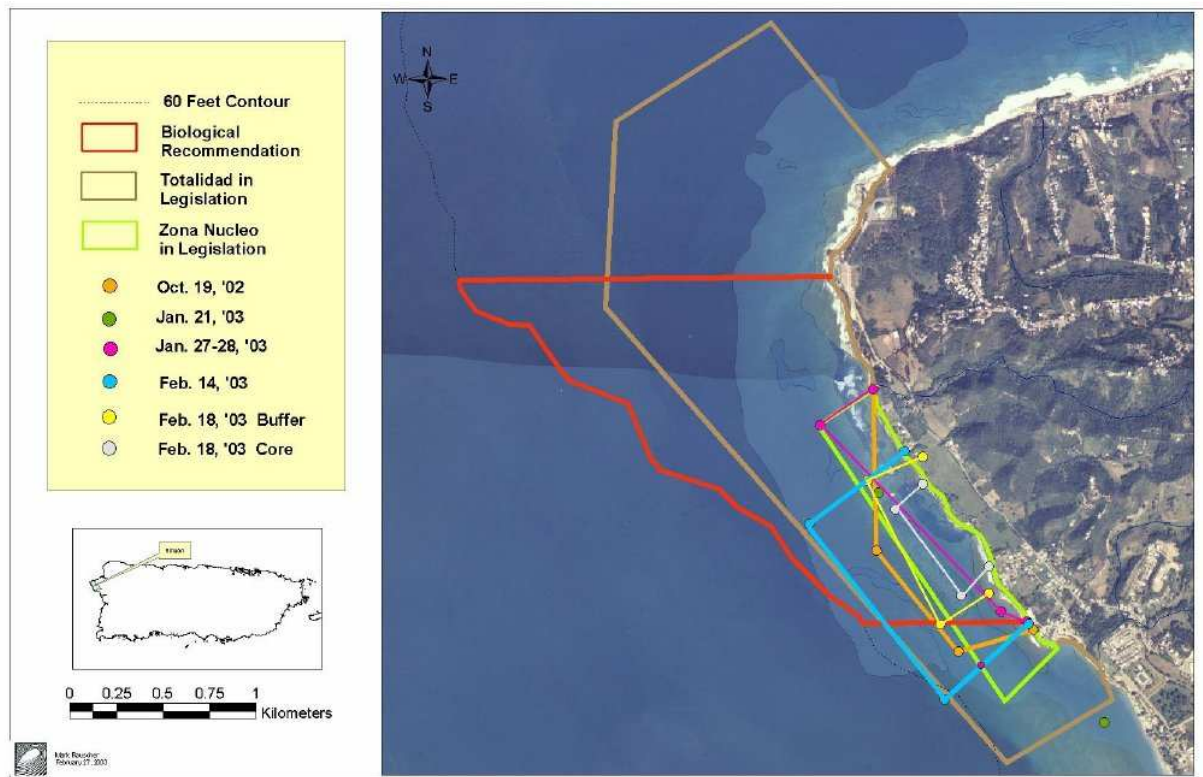
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**Links**

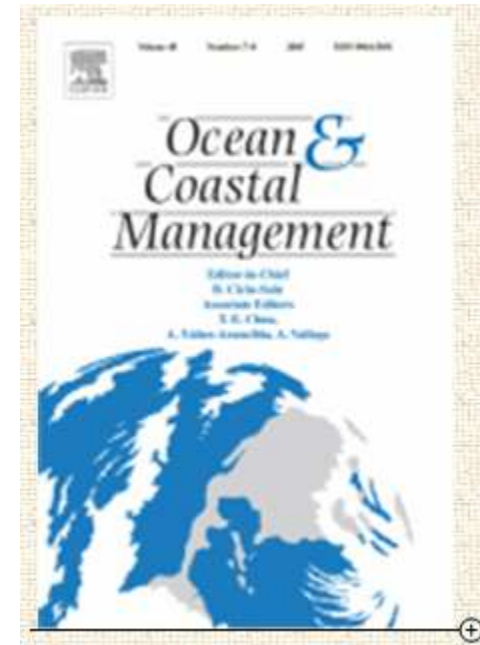
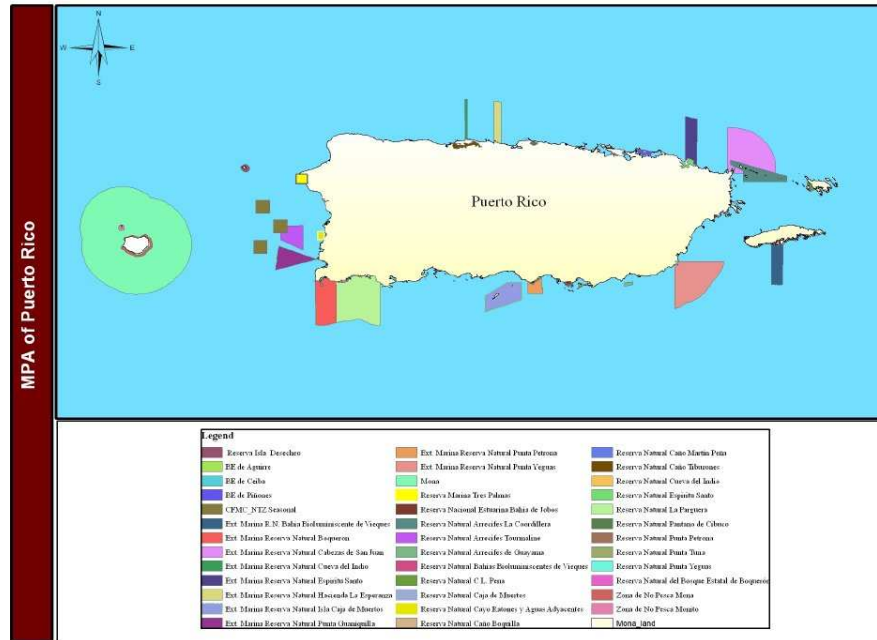
- » Agregadores Reproductor de Feeds: Caribe y Golfo de México
- » Área: Marinas Protegidas: Puerto Rico y Canal Luis Peña
- » Área y Ciencias UPRM
- » Anillo y Tecnología de Aprendizaje
- » Plan de Manejo de Culebra, Puerto Rico

# A Participatory Process for the Development of the Management Plan for Tres Palmas Marine Reserve in Rincón (version 3 of the plan is on its way). In collaboration with Surfrider Foundation, Sea Grant, DNER, the municipality and the local NGOs.



# Analysis and clarification of the legal framework and policy development and implementation strategies for MPA in Puerto Rico

Submitted to Ocean and Coastal Management



# On-going review of the Compilation of Laws, Documents and Maps of MPA

## NOAA's Inventory of Marine Managed Areas.



COMPENDIO DE DOCUMENTOS LEGALES DE ÁREAS MARINAS MANEJADAS EN PUERTO RICO

SUMMARY OF LEGAL DOCUMENTATION FOR MARINE MANAGED AREAS OF PUERTO RICO

COSTAS UPR MAYAGÜEZ  
2004



Cayo Enrique, Reserva Natural La Parguera, Lajas

Schärer, M. T., M. Valdés-Pizzini, M. Rivera-Velázquez, M. Almodóvar and A. Granell, (2004) Summary of legal documentation for marine managed areas of Puerto Rico. Sea Grant College Program, University of Puerto Rico, Mayagüez, Puerto Rico, 243 pages.



# Paper Presentation 2005

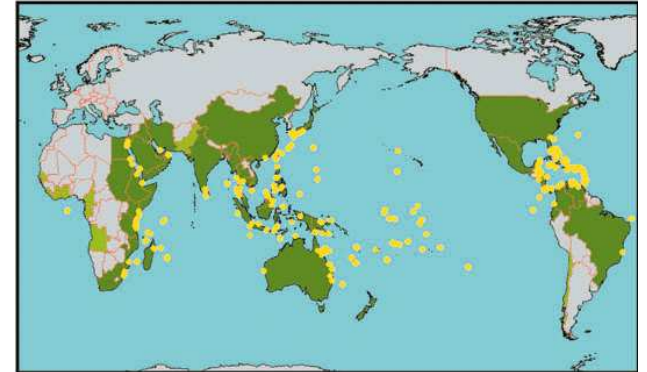
## **Much ado About Nothing: Critical Annotations on Stakeholder Participation Schemes in Fisheries Management and MPA Development**

Manuel Valdés Pizzini, Alfonso Aguilar and Michelle Scharer  
Centro Interdisciplinario de Estudios del Litoral  
Universidad de Puerto Rico, Mayagüez

Fishery and social scientists, as well as managers have been on a frantic search for a blueprint for the effective participation and collaboration of key stakeholders in the sustainable use and effective management of marine ecosystems and resources. Yet, the recipe seems to be elusive due the peculiarities and history of each site and the background of the participants involved. During the last 10 years, we devoted time and effort to the understanding of such processes throughout the Puerto Rico and the Wider Caribbean. This paper presents a protocol for public participation in fisheries management and a conceptual map for the incorporation of stakeholders into the design and implementation of MPAs. Something needs to be done, and these notes provide guidelines based on experiences in three MPAs in Puerto Rico: Reserva Natural La Parguera, Reserva Marina Tres Palmas and Reserva Natural Canal Luis Peña, as well as lessons learned from our studies in other MPAs in Puerto Rico, USVI and the Wider Caribbean. Results are also based on interdisciplinary approaches applied internationally, and our own work with the social dimensions of fisheries management.

# In preparation

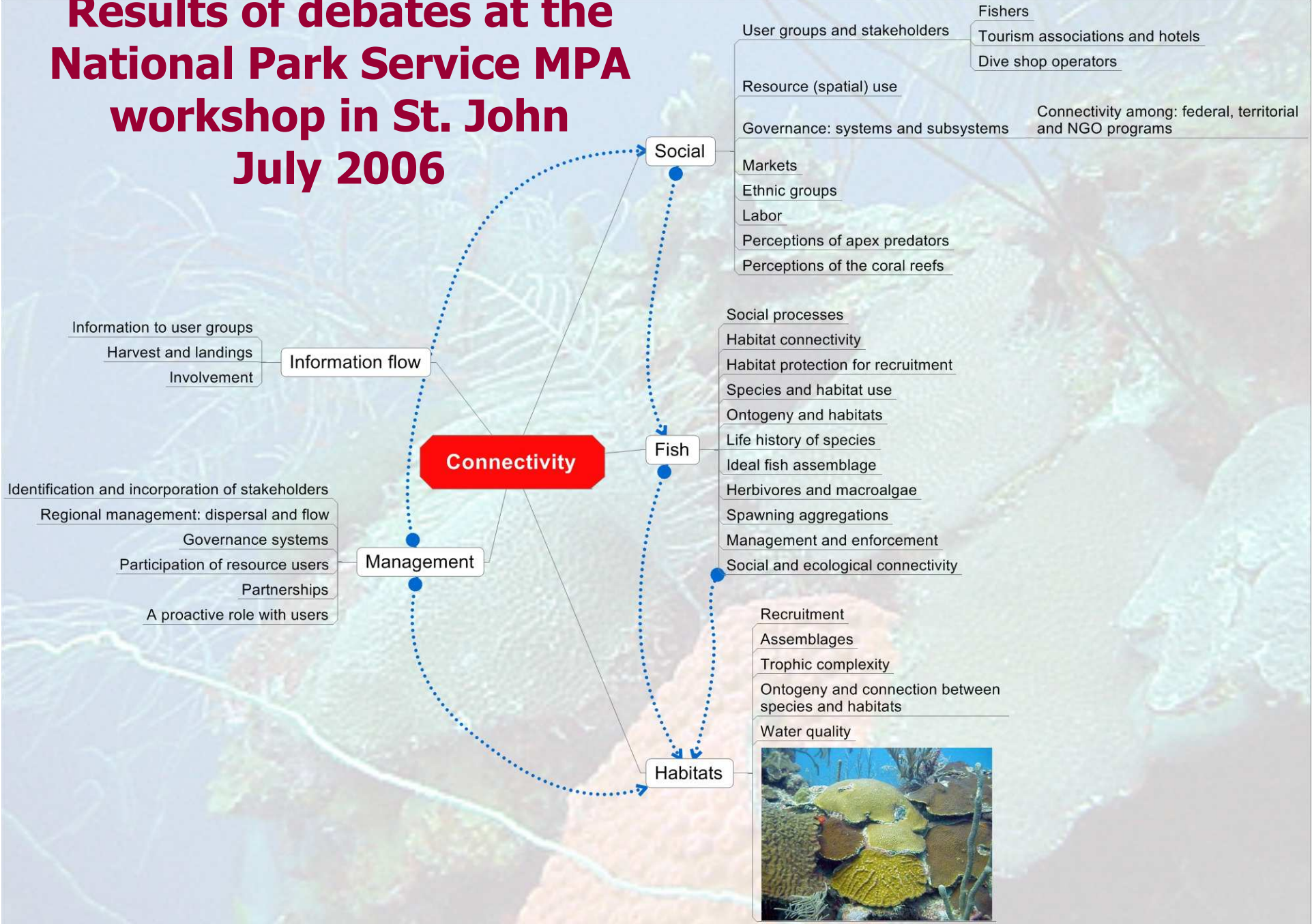
- Case study of La Parguera Marine Reserve and the Turrumote effort
- Marine Managed Areas Inventory of Puerto Rico: A comprehensive Database of Coastal Resources
- Marine Reserves in Puerto Rico (publication and short video)
- El Nuevo Día Newspaper
- A Blueprint for the Appropriate Design and Implementations of MPAs



# Practical lessons learned about MPA development and implementation

- Case studies
- A well structured plan
- Capacity building for co-management
- History: consumption, labor, policies, regional processes
- Resource use and traditional ecological knowledge (TEK)
- Policy and institutional arrangements
- Language and concepts
- Identification of stakeholders, issues and problems
- Appropriate forms of engagement
- Engagement of the community through education
- Connectivity: human, ecosystems and management

# Results of debates at the National Park Service MPA workshop in St. John July 2006





# Academics

- ⊕ Interdisciplinary focus and mentorship
- ⊕ A Post-doctoral Fellow: Alfonso Aguilar
- ⊕ Masters in Planning: Carlos Carrero
- ⊕ Ph.D. students in Marine Science: Michelle Schärer and Idelfonso Ruíz
- ⊕ Masters students working with MPAs: Diana Beltrán, Taína Rivera and Milena Benavides
- ⊕ Research on MPAs for graduate and undergraduate students: Prudencio Martinez, Jomaira Ross and Jaime Banuchi
- ⊕ Thesis on MPA related processes
- ⊕ Ph.D. Exchange Fellow: María Fernández (Spain)



# CIEL Team

<b>Jaime Banuchi</b>	<b>Sociology</b>
<b>Jomaira E. Ross Casiano</b>	<b>Psychology</b>
<b>Carlos J. Carrero Morales</b>	<b>Planning</b>
<b>Alfonso Aguilar</b>	<b>Marine Sciences</b>
<b>Michelle Scharer</b>	<b>Marine Sciences</b>
<b>Diana Marcela Beltrán</b>	<b>Marine Sciences</b>
<b>Idelfonso Ruiz Valentín</b>	<b>Marine Sciences</b>
<b>Idaliz Rodríguez Dátil</b>	<b>Engineering</b>
<b>Jessica M. Rodríguez</b>	<b>Business</b>
<b>Taína Rivera Miranda</b>	<b>Biology</b>
<b>Prudencio Martínez Mengel</b>	<b>Biology</b>
<b>Milena Benavides</b>	<b>Biology</b>
<b>Carlos Garcia Quijano</b>	<b>Anthropology</b>
<b>Manuel Valdés Pizzini</b>	<b>Anthropology</b>



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