

## Information and Science For Informed Decision Making

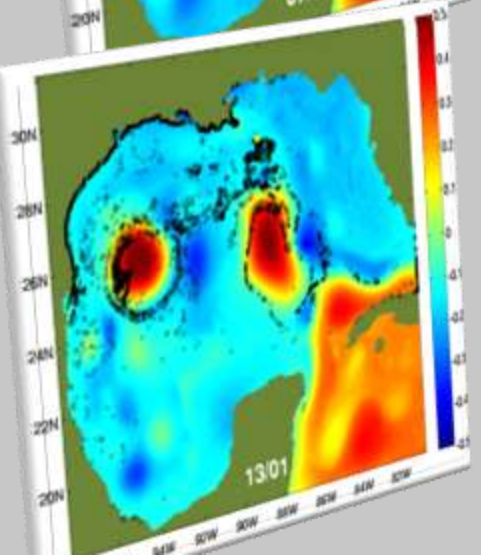
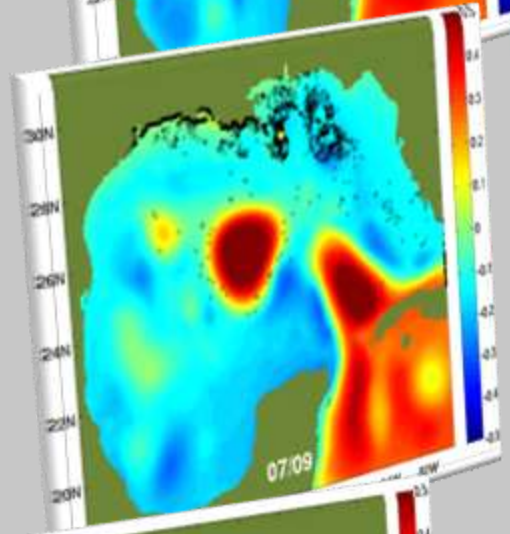
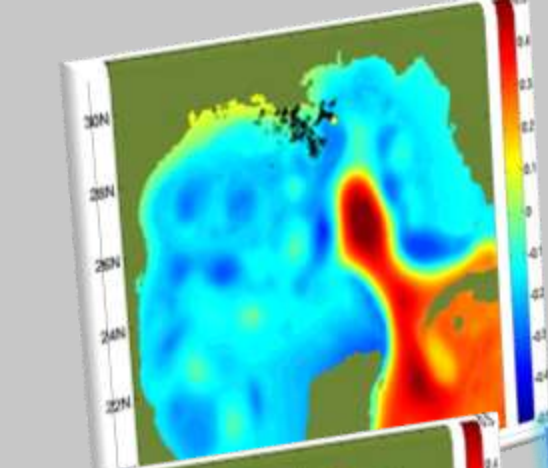
Dr. Porfirio Álvarez-Torres  
GoM LME Project  
Chief Technical Advisor

## Expert Consultation on Operationalisation of the Caribbean Sea Commission

University of the West Indies Cave Hill Campus,  
Barbados  
7-8 July 2010

**OUTLINE**

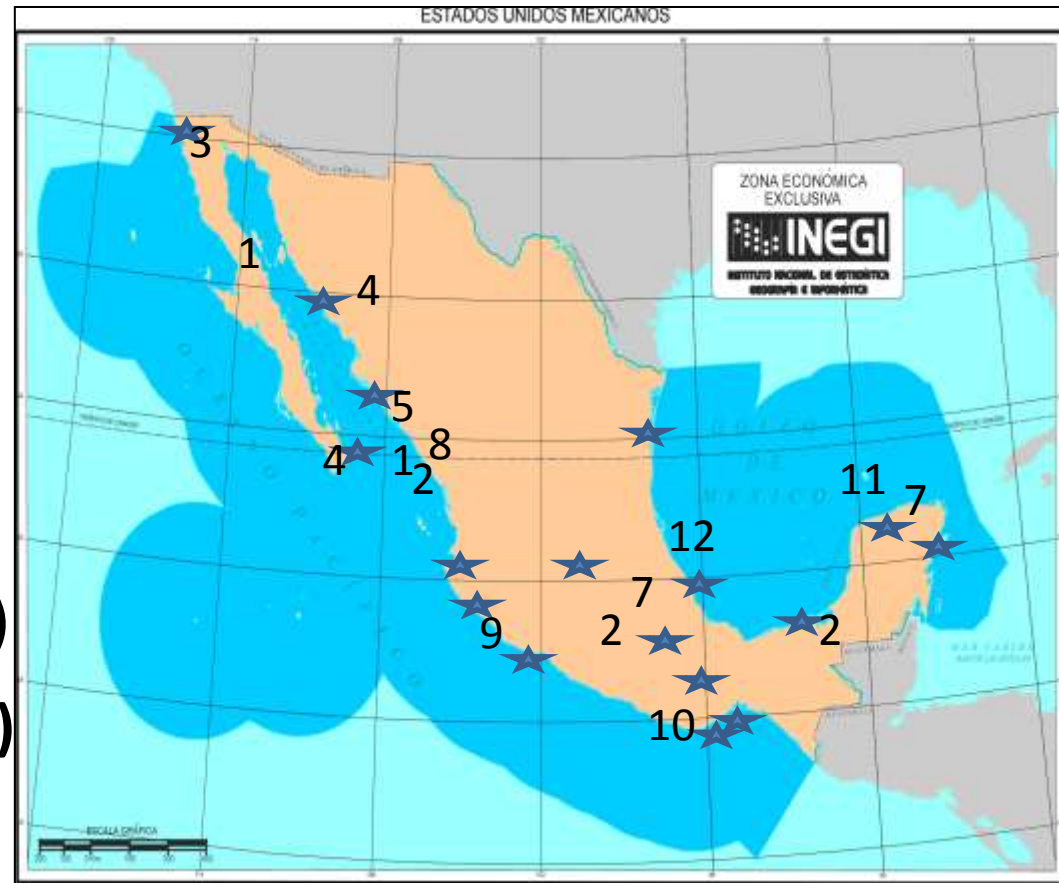
1. Scientific Research: Academia, NGOs and Government
2. Investment in Science and Technology
3. Informed Decision Making
4. Research and Science for Ocean Governance
5. Ocean Policy Making
6. The GoM LME connectivity



# RESEARCH INSTITUTIONS



1. National Fisheries Institute (1962) ★
2. ICMYL –UNAM (1973)
3. CICESE (1973)
4. CIBNOR (1975)
5. CIAD (1976)
6. CICIMAR (1976)
7. CINVESTAV-IPN (1980)
8. FACIMAR (U Sinaloa) (1980)
9. FACIMAR (U. Colima) (1980)
10. Universidad del Mar (1991)
11. Universidad Marista (1996)
12. Universidad Veracruzana (Fisheries Ecology) (2000)





# LOCATION OF CONACYT RESEARCH CENTRES










Posgrados CPI's    Especialidad 4    Maestría 50    Doctorado 31

Fuente: DADyFCyT

# RESEARCH CENTERS IN COASTAL ZONES



Research topics	INSTITUTION						
	 CIAD, A.C.	 CIBR	 CICESE	 INTECOL	 CIOY	 CENTRO-GEO	 ECOSUR
Pathology and nutrition (fish and crustaceans)	√		√				
Biotechnology of marine organisms	√		√				
Eco-toxicology, (water, sediments, and effluent analyses)	√	√	√				
Conservation and Management of Natural Resources & Biodiversity	√	√	√	√	√	√	√
Water Quality & Management					√		
Benthic Structure & Functions			√				√
Taxonomy (marine & continental zooplankton)			√				√
Oceanography			√				
Territorial Analysis & Planning		√		√		√	
Environmental Impact			√	√		√	
Fisheries Ecology & Management		√					



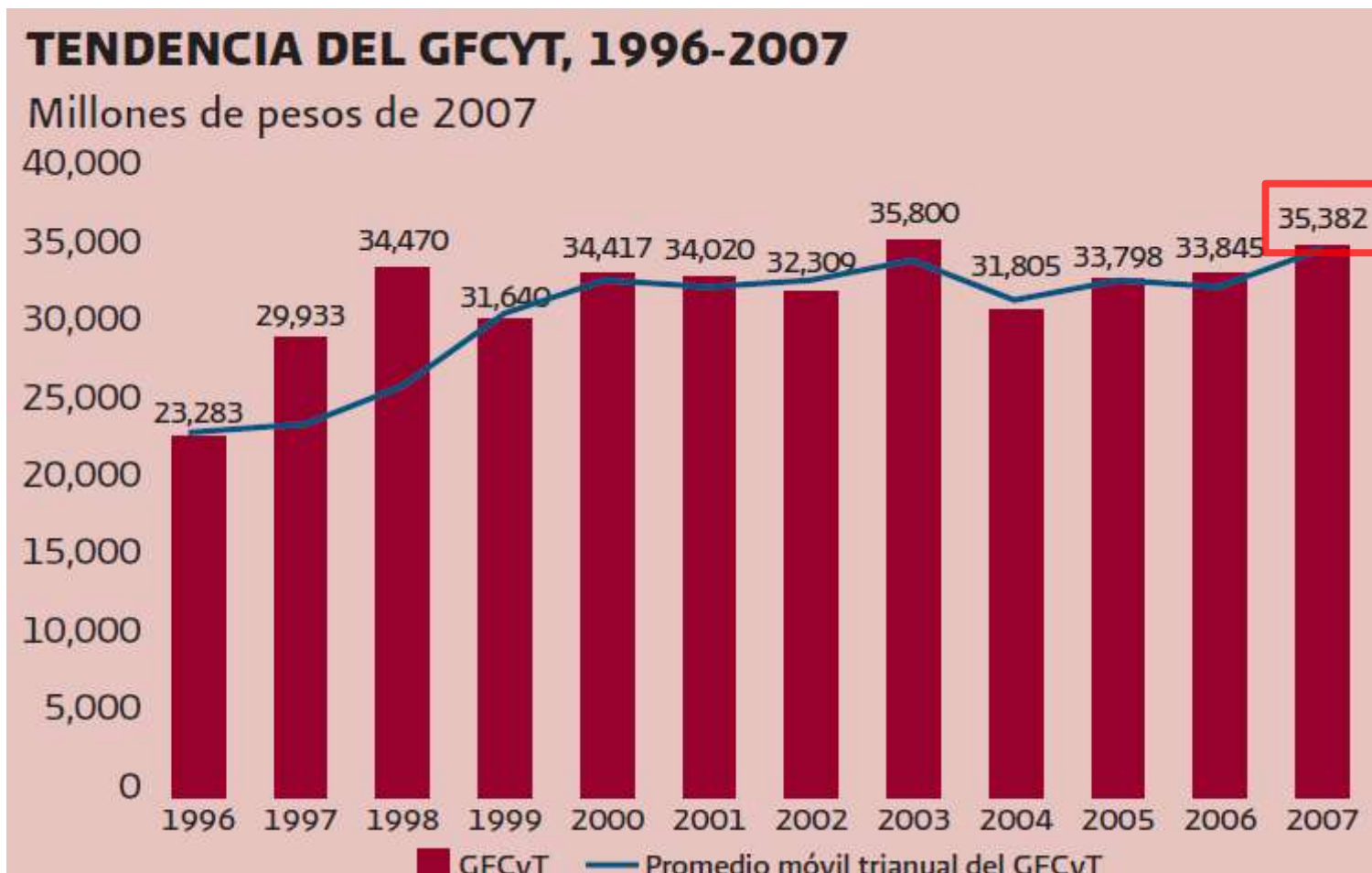
## CONACYT

### TOTAL NATIONAL NUMBER OF RESEARCHERS

Researchers 2010	#
Physics or Mathematic Sciences and Earth Sciences	2708
Biology and Chemistry	2904
Medicine and Health Science	1592
Humanities and Behavior Sciences	2465
Social Sciences	2616
Bio technology and Agricultural Sciences	1866
Enginnering	2447



# Total Federal Expenditure on Science and Technology GFCYT



SOURCE: SHCP, Cuenta de la Hacienda Pública Federal, 1996 - 2007  
INEGI, Sistema de Cuentas Nacionales de México.



## Research and Experimental Development Expenditure GIDE/PIB



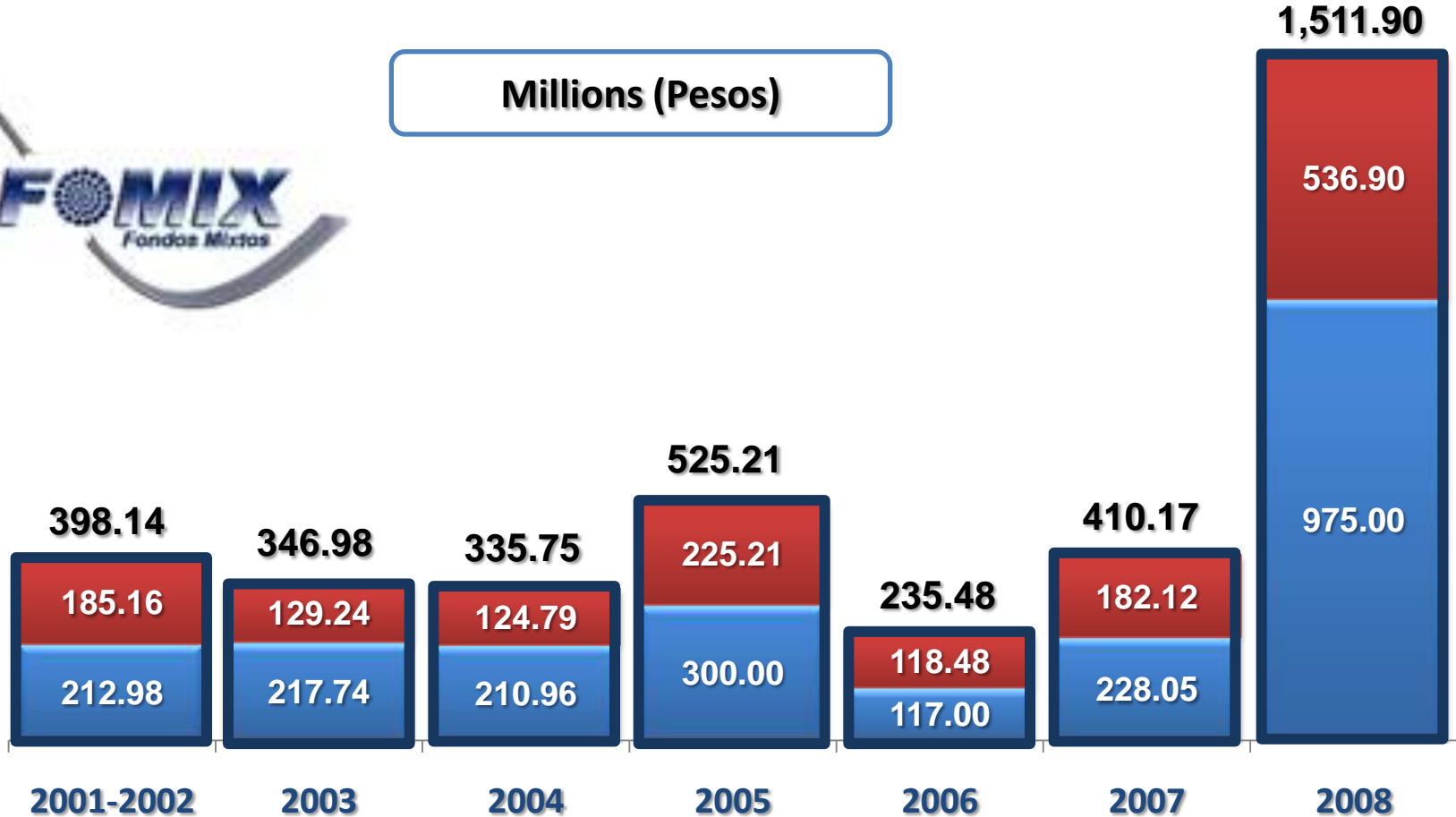
SOURCE: CONACYT-INEGI, Encuesta sobre Investigación y Desarrollo Experimental 2002, 2004 y 2006.  
CONACYT, Encuesta sobre Investigación y Desarrollo de Tecnología, 2000.



# CONACYT MISCELLANEOUS FUNDS



Millions (Pesos)



State Governments and municipalities	40%	1,501.90
CONACYT	60%	2,261.73

**Total** → **3,763.63**

# THEMATIC RESEARCH NETWORKS CONACYT



- **Water Network**

- To develop a water research program in Mexico
- To elaborate a national project in science and technology for water research

<http://red-tematica-conacyt.blogspot.com>

- **Environment and Sustainability Network**

- Research and monitoring about functions and structure of marine ecosystems considering human population interactions

<http://www.mexlter.org.mx/ReMAS>

- **Network for Ecosystems**

- The relation between functions and structure of ecosystems
- Ecosystems dynamic and changes in time
- The relation between ecosystem services and human societies

<http://www.ecored.org.mx/>

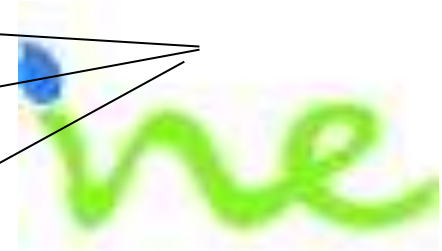
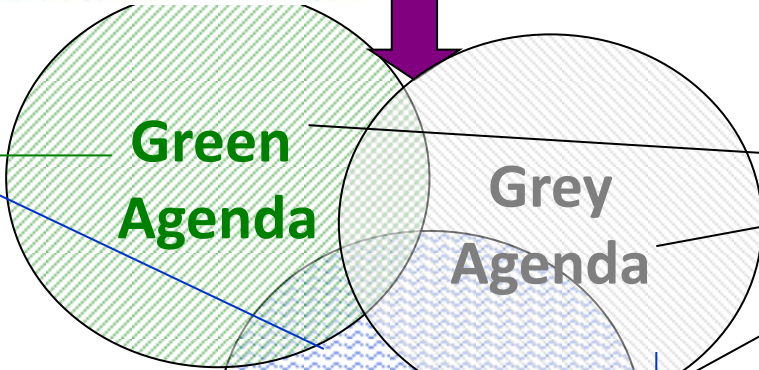


# NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY



Consejo Nacional de Ciencia y Tecnología

Responsible for tailoring the policy for science and technology in Mexico.



# NATIONAL COORDINATING COMMISSION FOR OCEANOGRAPHIC RESEARCH

## CONACIO





# INTER-MINISTERIAL COMMISSION FOR THE INTEGRATED MANAGEMENT OF OCEANS AND COASTS

**SEMARNAT**



SECRETARÍA DE  
MEDIO AMBIENTE Y  
RECURSOS NATURALES

**SEDESOL**



SECRETARÍA DE  
DESARROLLO SOCIAL

**SRE**



SECRETARÍA  
DE RELACIONES  
EXTERIORES

**SENER**



SECRETARÍA  
DE ENERGÍA

**SECTUR**



SECRETARÍA  
DE TURISMO



**SEMAR**



SECRETARÍA  
DE MARINA

**SEGOB**



SECRETARÍA  
DE GOBERNACIÓN

**SAGARPA**



SECRETARÍA DE AGRICULTURA,  
GANADERÍA, DESARROLLO RURAL,  
PESCA Y ALIMENTACIÓN

**SCT**



SECRETARÍA DE  
COMUNICACIONES  
Y TRANSPORTES

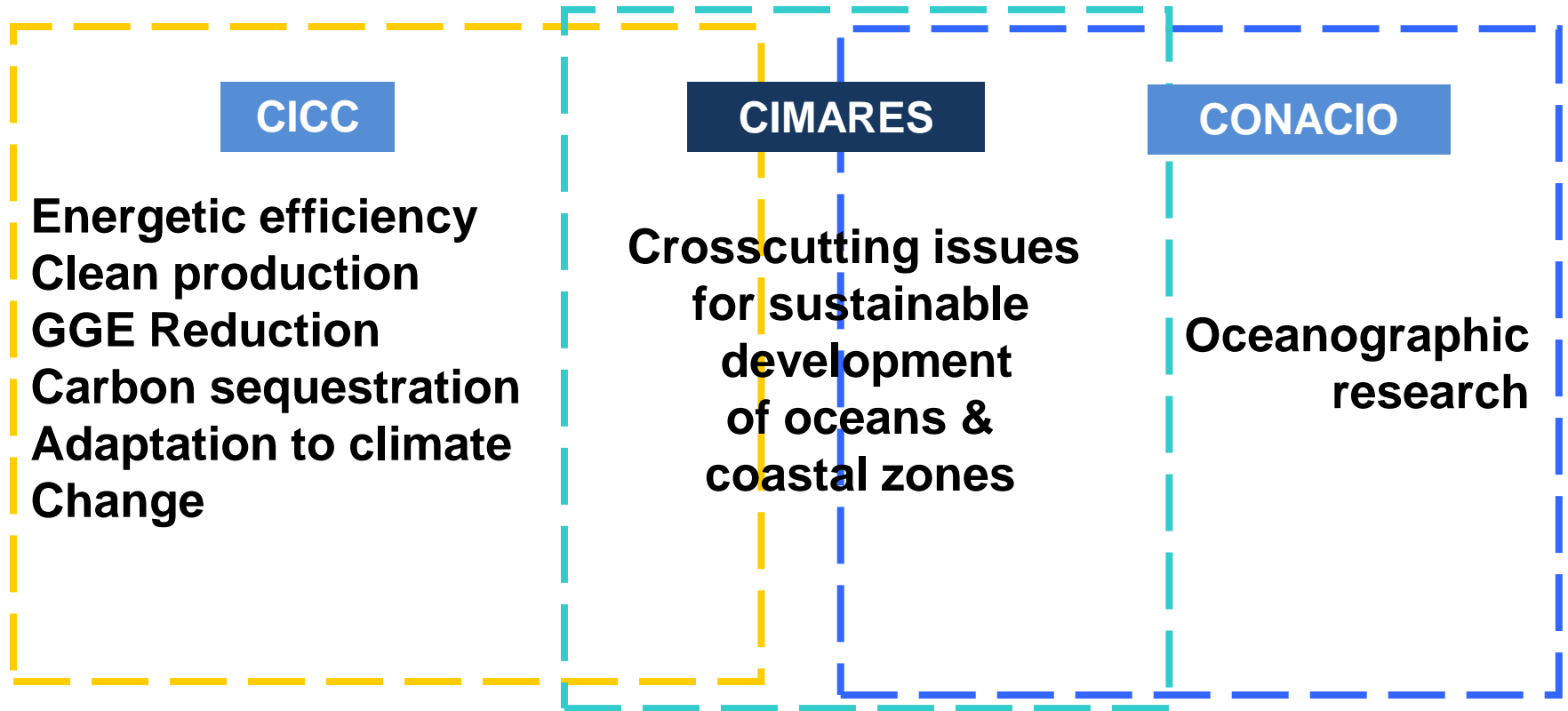
**SE**



SECRETARÍA  
DE ECONOMÍA



# FEDERAL ESTABLISHED COMMISSIONS & THEIR LINKAGES



# Interministerial Commission for the Sustainable Management of Oceans and Coasts of Mexico



SECRETARÍA DE  
MEDIO AMBIENTE Y  
RECURSOS NATURALES

SEMARNAT



## Sub-commissions

**Marine Spatial  
Planning**

**Integrated Assessment &  
Sustainable Use of  
Oceans and Coasts**

## Working Groups

**Strengthen  
Land & Sea Use Planning,  
National, Regional, Local**

**A**

**International  
Affairs & Good  
Practices**

**Legal  
Framework**

**B**

**Sustainable  
Productive  
Investment**

**Productive Sectors  
Development**

**C**

**Degradation, Risk,  
Vulnerability upon  
Climate Change**

**Ecosystems,  
Biodiversity and  
Pollution**



## MEMBERS OF THE COMMISSION

<b>SEMARNAT</b> SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES		<b>SEDESOL</b> SECRETARÍA DE DESARROLLO SOCIAL		<b>SRE</b> SECRETARÍA DE RELACIONES EXTERIORES		<b>SENER</b> SECRETARÍA DE ENERGÍA		<b>SECTUR</b> SECRETARÍA DE TURISMO	
<b>SEMAR</b> SECRETARÍA DE MARINA		<b>SEGOB</b> SECRETARÍA DE GOBERNACIÓN		<b>SAGARPA</b> SECRETARÍA DE AGRICULTURA, GANADERÍA, DESARROLLO RURAL, PESCA Y ALIMENTACIÓN		<b>SCT</b> SECRETARÍA DE COMUNICACIONES Y TRANSPORTES		<b>SE</b> SECRETARÍA DE ECONOMÍA	

## INVITED INSTITUTIONS

**GOBIERNOS DE LOS ESTADOS COSTEROS**

**PRODUCTIVE SECTORS  
CÁMARAS SECTORIALES**

**MUNICIPALITIES**

### NGOs

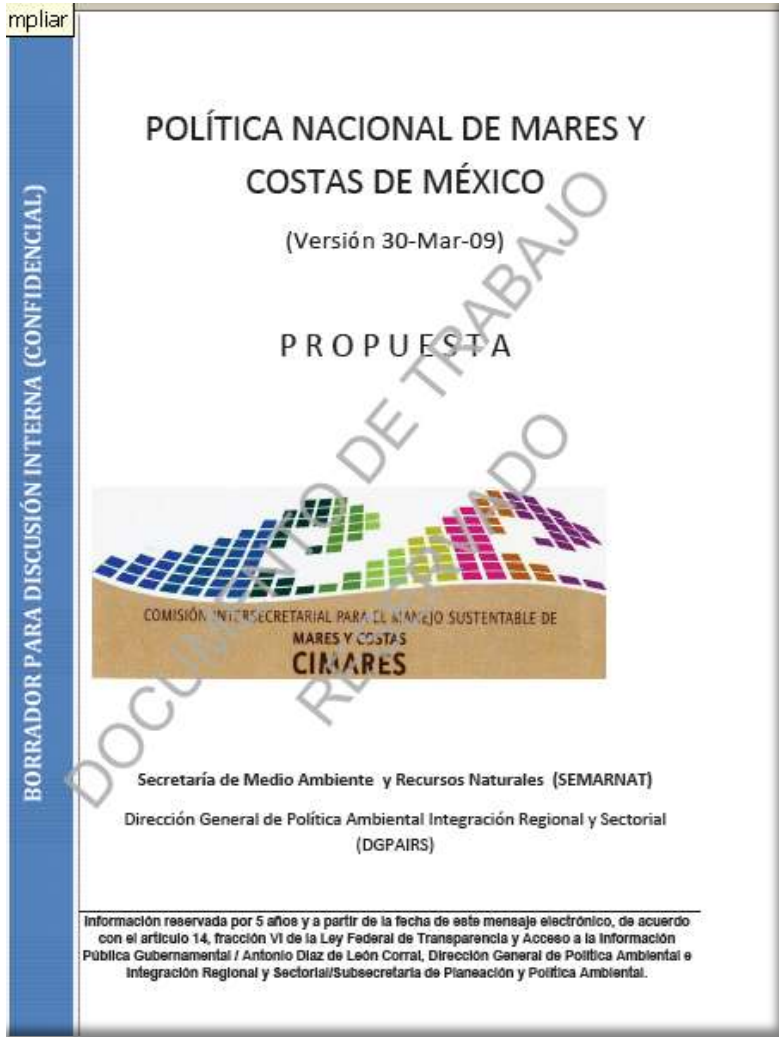
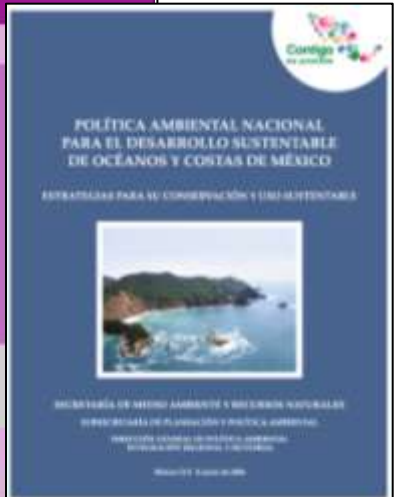
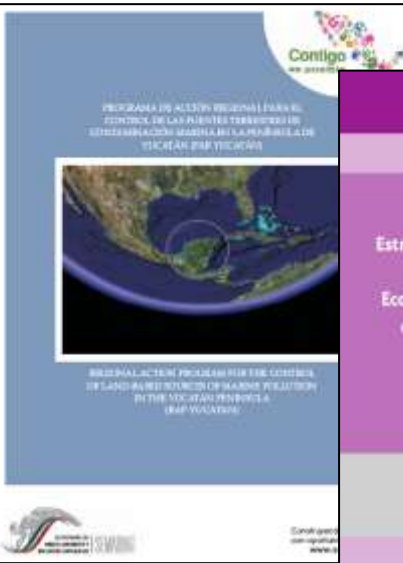
TNC, Pronatura, WWF,  
Amigos de Sian Ka'an, FMCN,  
CEMDA

### ACADEMIA

UABC, UABCS, CICESE, CIBNOR,  
USON, CIDESON, UAS, CIAD, UAN,  
UDEG, UCOL, UAGRO, UMAR,  
UNACH, UAT, UV, UJAT, UACAM,  
UQROO, UADY, CICY, ECOSUR,  
UNAM, UAM, IPN

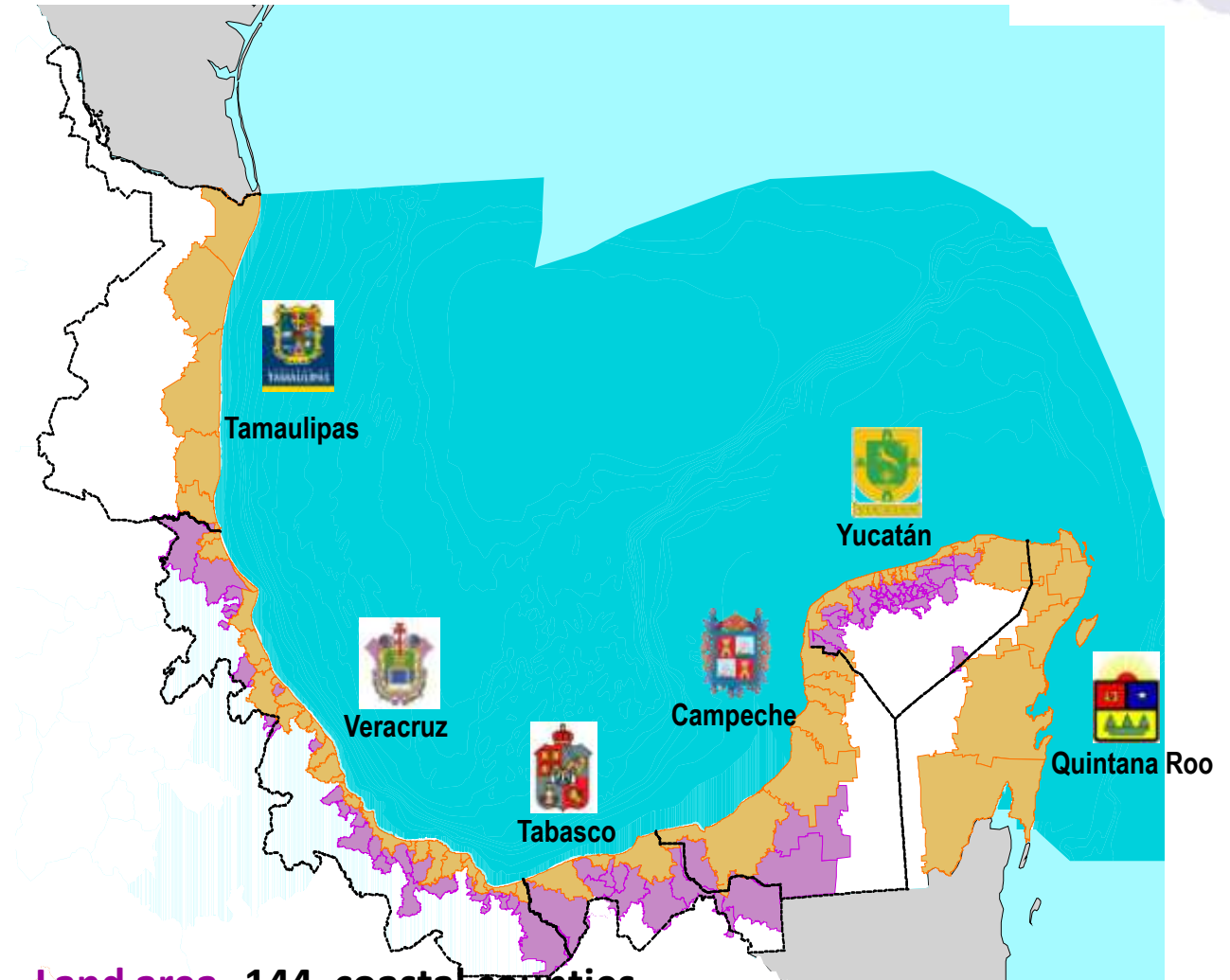


# Scientific Research and Informed Decision Making



# Regional Sea and Land Use Process in the Gulf of Mexico

<b>SEMARNAT</b> SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES	<b>SRE</b> SECRETARÍA DE RELACIONES EXTERIORES
<b>SEDESOL</b> SECRETARÍA DE DESARROLLO SOCIAL	<b>SENER</b> SECRETARÍA DE ENERGÍA
<b>SECTUR</b> SECRETARÍA DE TURISMO	<b>SEGOB</b> SECRETARÍA DE GOBIERNO
<b>SEMAR</b> SECRETARÍA DE MARINA	<b>SAGARPA</b> SECRETARÍA DE AGRICULTURA, GANADERÍA, DESARROLLO RURAL, PESCA Y FOMENTO
<b>SCT</b> SECRETARÍA DE COMUNICACIONES Y TRANSPORTES	<b>SE</b> SECRETARÍA DE ECONOMÍA



**Land area.-144 coastal counties**

**Marine area.- EEZ of Gulf of México and Caribbean Sea**

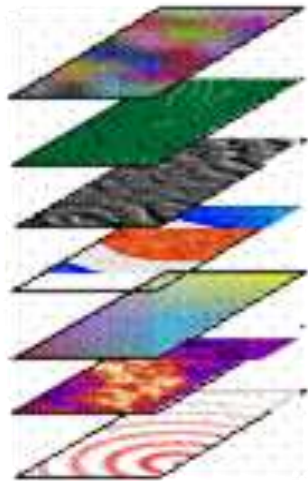
# Land and Sea Use Planning information



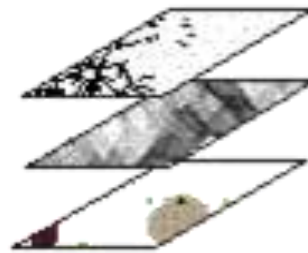
SECRETARÍA DE  
AMBIENTE Y

SEMARNAT

## Assets and natural resources



- Geological and Meteorological Risks
- Agriculture and Livestock Production Suitable Areas
- Conservation and Tourism Suitable Areas
- Fisheries and Aquaculture Suitable Areas
- Population Distribution and Natural Resources Availability
- Deteriorating Activities at Regional Level
- Water Supply and Reuse possibilities



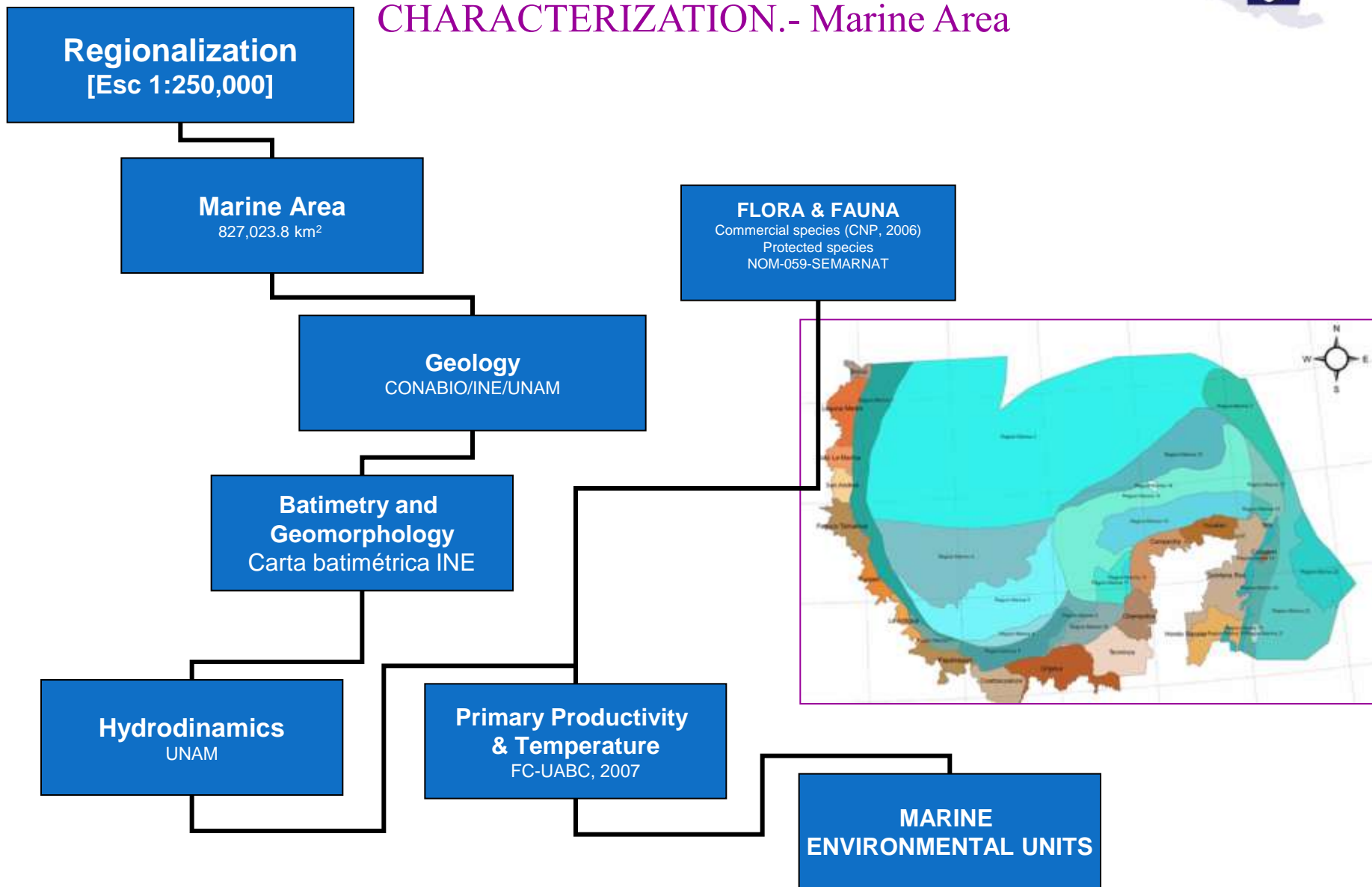
## Tracking all possible social changes

- Poverty, welfare, and social marginalization
- Land ownership and use
- Public and Private Regional programs for development and investment,

# LAND AND SEA USE PLANNING PROCESS



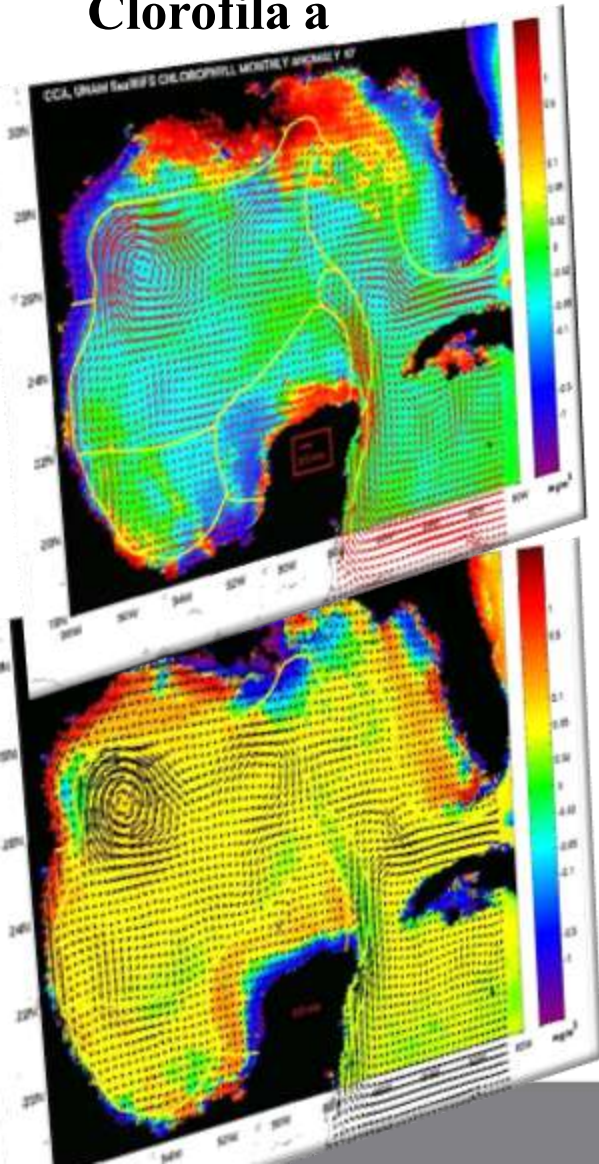
## CHARACTERIZATION.- Marine Area



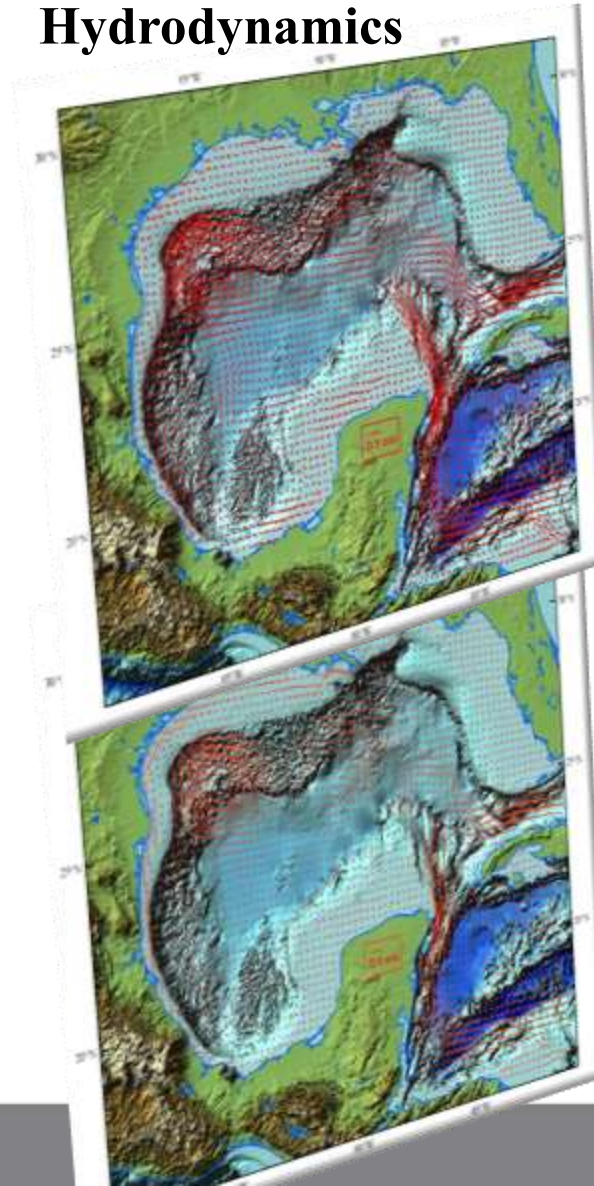


# Gulf of Mexico, caracterizacion, diagnostic, prognostic, & modelling.

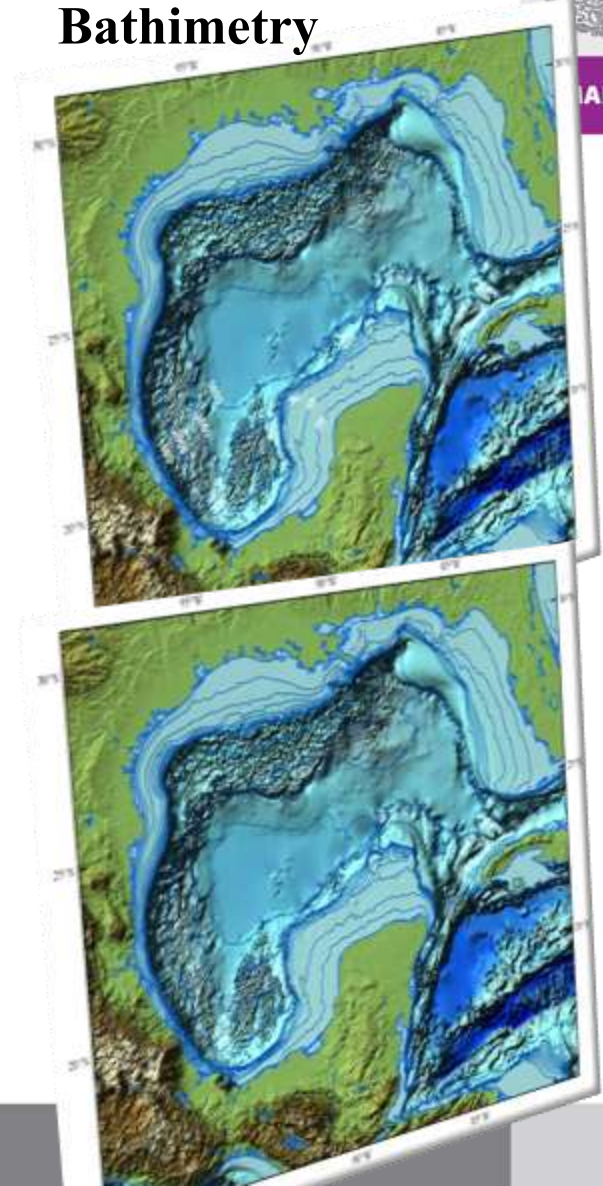
Clorofila a



Hydrodynamics



Bathymetry



# LAND AND SEA USE PLANNING PROCESS

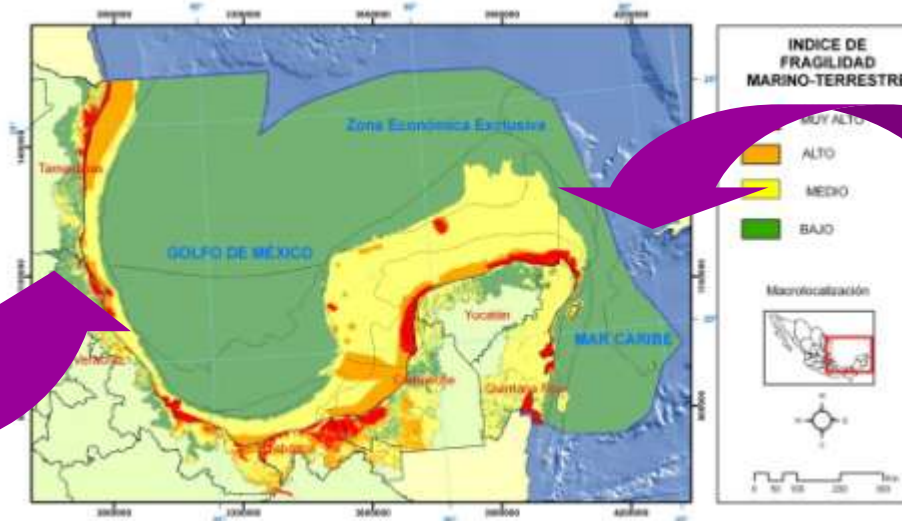


SEMARNAT

SECRETARÍA DE MEDIO AMBIENTE Y RECURSOS NATURALES

## Fragility Index

Geomorphology  
Vegetation  
Climate  
Precipitation  
Slope



Coral Reefs  
Islands  
Coastal areas  
Batimetry  
Current intensity

## Pressure Index

### Primary Sector

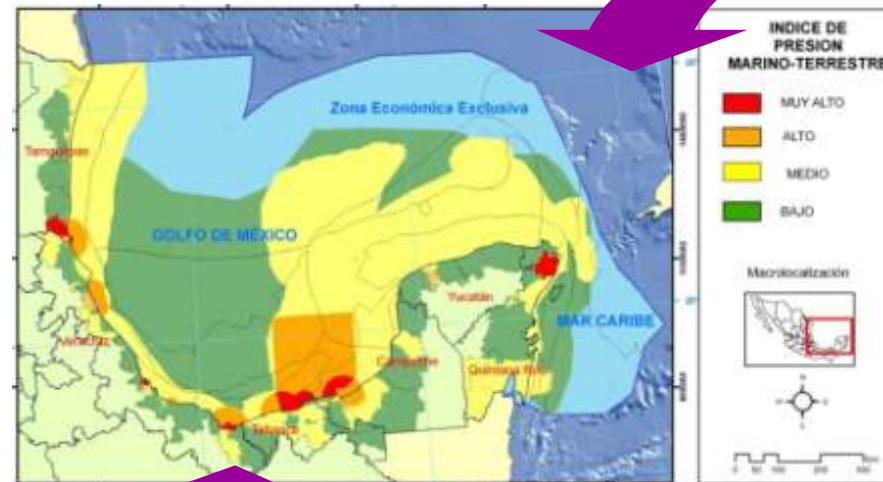
Agriculture, fisheries and livestock

### Secondary Sector

Oil production activities and energy production

### Tertiary Sector

Services, harbor storage facilities and oil distribution, Tourism Activities & Maritime transportation.



- Main River Runoff
- Fisheries overexploitation
- Degradation processes
- Ports and Oil activities





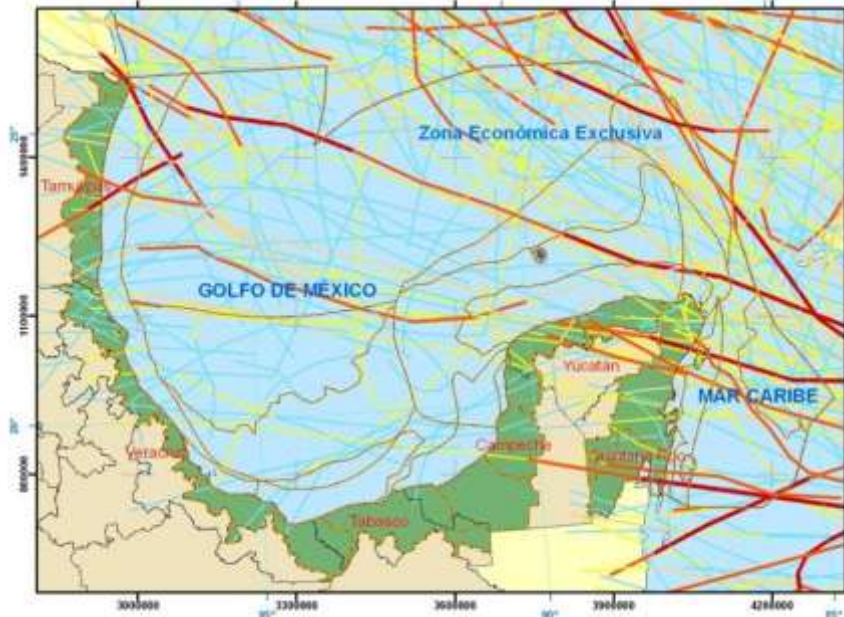
SEMARNAT

# Most threatened regions (sea level rise)

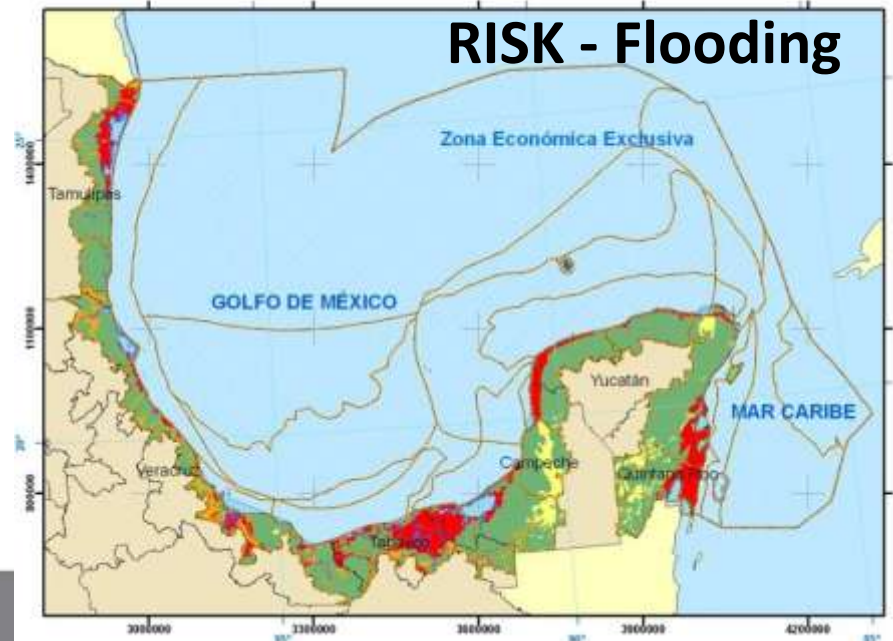
- ✓ Northern areas of Tamaulipas
- ✓ Southern tip of Veracruz
- ✓ Deltaic plain Grijalva-Usumacinta system in Tabasco, and
- ✓ Coastal areas of Campeche, Yucatan and Quintana Roo



## Historical hurricane paths



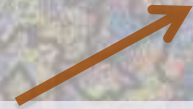
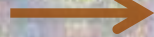
## RISK - Flooding





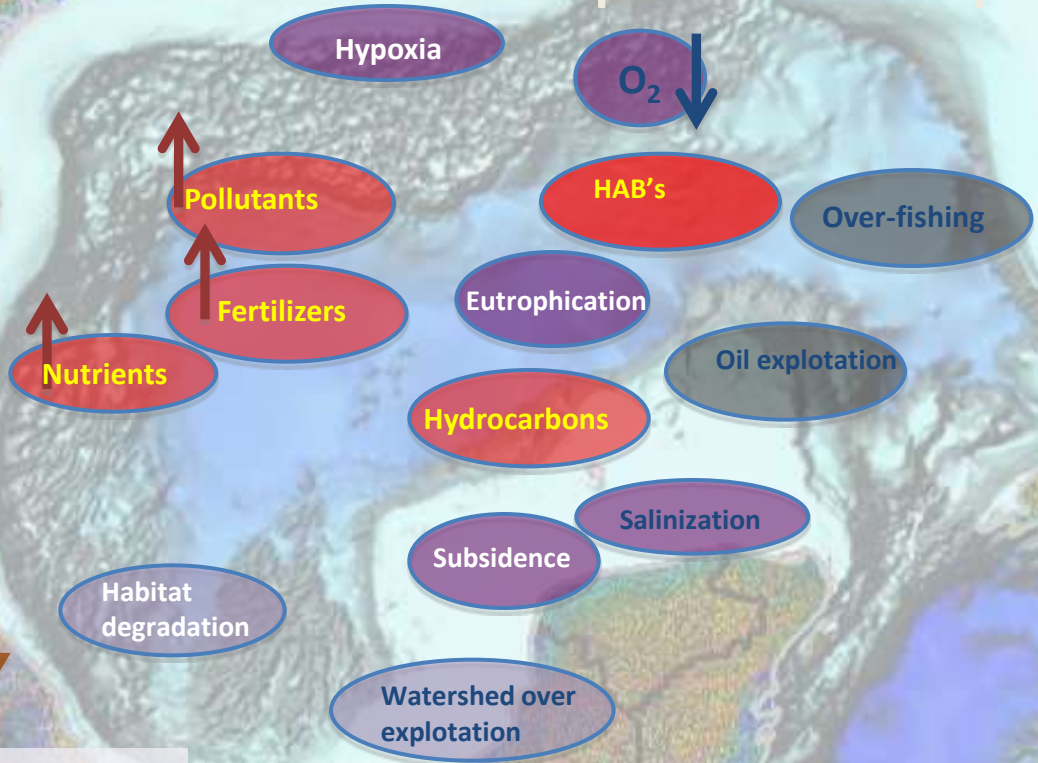
# Main degradation drivers cause-impact relationship

**WASTES**  
-Industrial  
-Agriculture  
-Urban

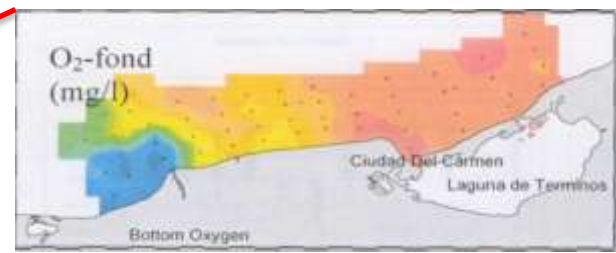
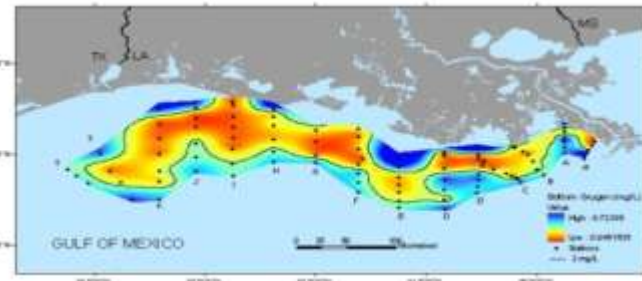


## PRESSURE

- Deforestation
- Erosion
- Land use change
- Basin deterioration
- Load capacity decrease
- Watershed overexploitation
- Water and basins pollution









# GoM-LME Project Components

## 1. Transboundary Diagnostic Analysis (TDA)

Productivity

Fish Stocks- Fisheries

Monitoring & Ecosystem Health

Governance

Socioeconomics

Climate Change and Sea Level Rise

## 2. Strategic Action Programme (SAP)

Pollution Reduction and Control

Living marine resources

Ecosystem Conservation

Education and Outreach

## National Action Programme (NAP)

### 3. Pilot Projects

Joint Assessment and Monitoring of Coastal Conditions in the GoM

Enhancing Shrimp Production through Ecosystem Based Management

Enhanced Natural Habitat Conservation in the Coastal and Marine Areas of the GoM  
LME



## 5. Coordination

## 4. Monitoring & Evaluation (Indicators)

GoM Ocean Joint Assessment  
Based on country in-kind contributions  
NOAA & SEMARNAT



## GoM-LME Project Main OBJECTIVES SAP/NAP construction

Reduction of pollutants  
and excessive nutrient loads

Recovery of over-exploited  
marine resources

Rehabilitation of marine and  
coastal ecosystems

### SAP/NAP IMPLEMENTATION





# Gulf of Mexico LME

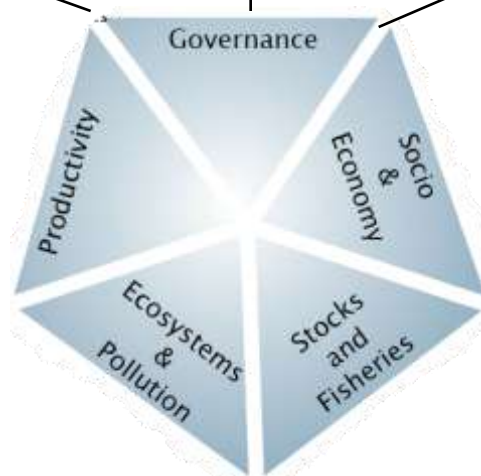
## Existing collaborative efforts



- International Agreements**
- ICCAT,
  - IOCARIBE,
  - MEX-US-Gulf of Mexico Fisheries
  - Canada, Mex US Trinational commission
  - NAFTA's Commission for Environmental Cooperation (CEC) (MEX-US-CAN)
  - SPPS (North America Security & Prosperity Partnership Strategy)

- National Strategy for Land and Sea Use Planning;
- Environmental Policy for Oceans and Coasts;
- Inter-ministerial Commission for the Sustainable Development of Oceans and Coasts (CIMARES)
- National Policy for Oceans and Coasts;
- Estrategy for Mangrove rehabilitation
- Estrategy for Marine Biodiversity
- Estrategy for Best Management Practices in coastal areas
- Regional Program of Action Yucatán Peninsula (LBS Protocol, Cartagena Convention)

- Fishery Management Councils;
- Gulf of Mexico Governors Alliance;
- Gulf Regional Collaboration;
- EPA Gulf of Mexico Program;
- US Legislative Mandates (Magnuson Stevens, ESA, MMPA etc);





# GoM LME Strategic Action Program (SAP)

## Output

The Strategic Action Programme (SAP) and National Action Programmes (NAPs) formulated and endorsed.



Indicator

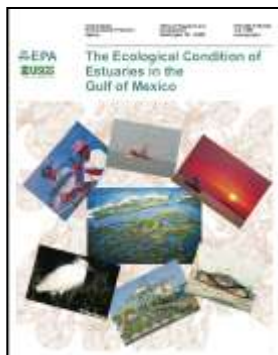
- SAP and NAPs formulated and endorsed at ministerial level in both countries
- Regional, national, and local policy, legal, and institutional reforms adopted

Baseline

A regional SAP will not be completed and endorsed under baseline conditions.

Target

SAP and respective NAPs completed and endorsed at Appropriate levels (federal, state)



# Coordination, integration of science and technical advise in the GoM LME



**Coordinación  
Proyecto  
GoM-LME**

**Project Steering  
Committee**



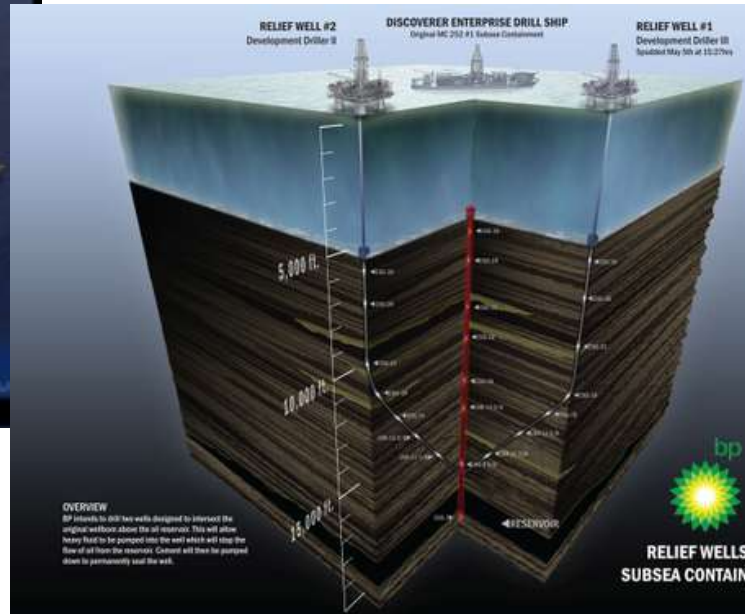
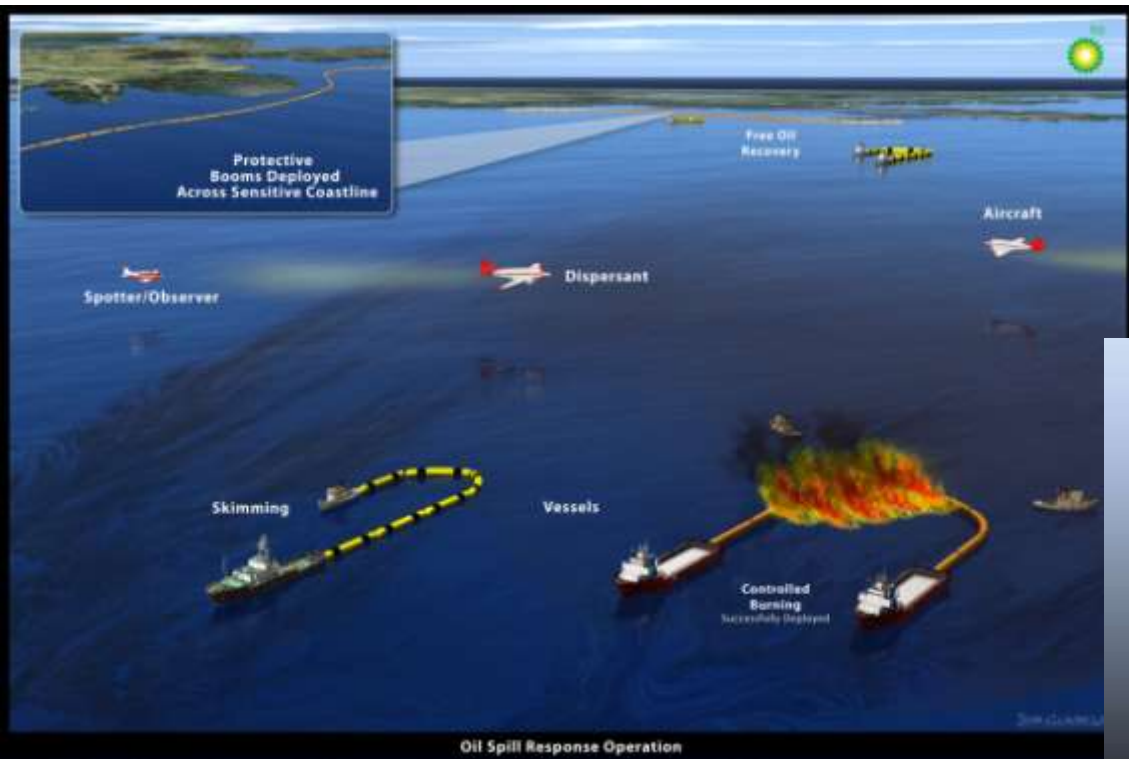
**Intersectoral  
Coordination (ISCs)  
includes private  
sector**



**Regional Technical  
Advisory  
Group  
(R-TAG)**



# DWH

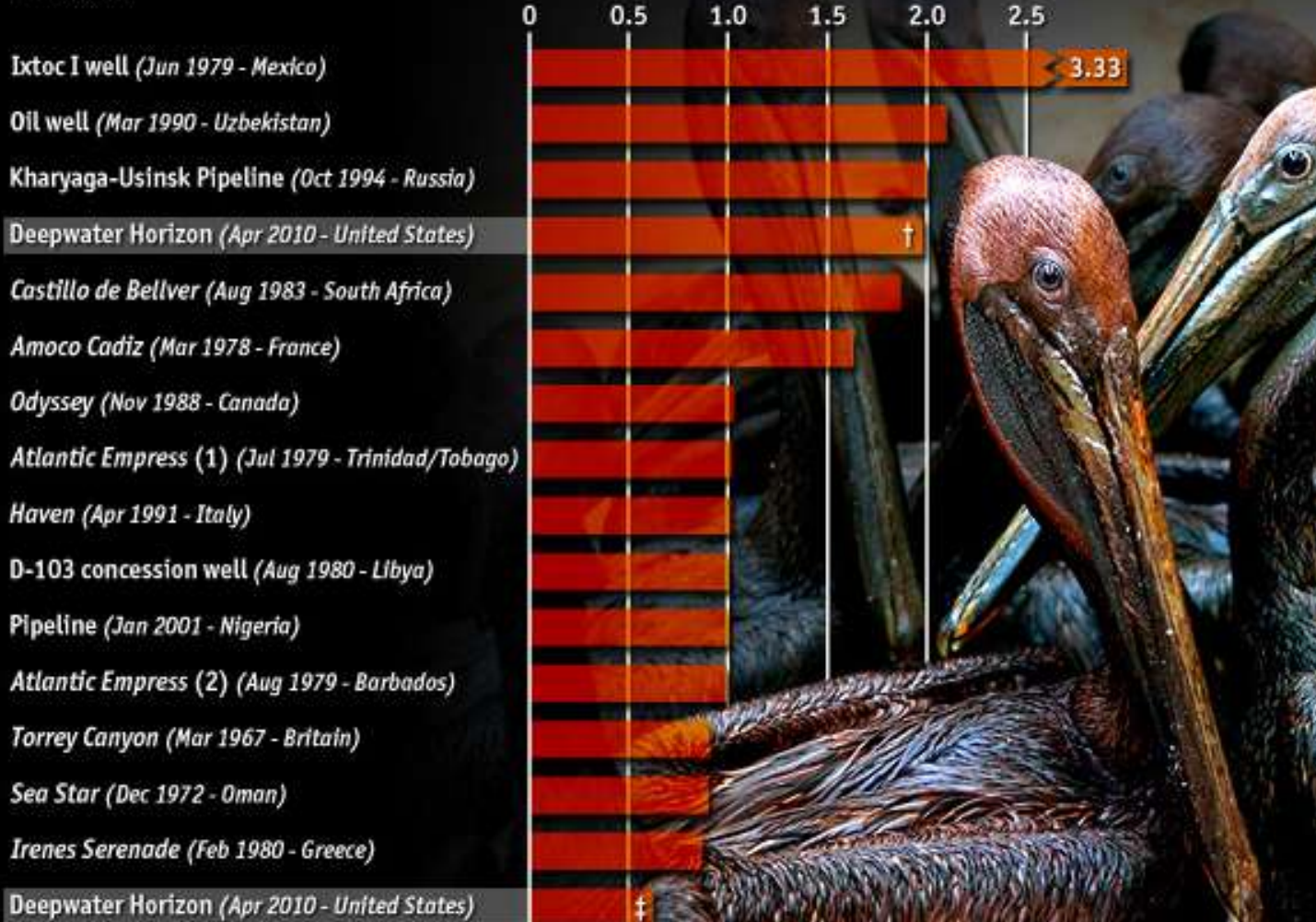






# Largest oil spills\*

Barrels, m



Sources: Environmental Research Consulting; US Department of the Interior; BP; The Economist

\*Excluding military attacks †Upper estimate ‡Lower estimate





## A history of Oil Spills



	<b>IXTOC I - 1979</b>	<b>EXXON VALDEZ - 1989</b>	<b>DEEPWATER HORIZON - 2010</b>
<b>Place</b>	Sonda de Campeche. Gulf of Mexico	Prince William Sound, Alaska, USA	Gulf of Mexico. USA
<b>Spill</b>	3.3 million barrels	2.62 million barrels	About to exceed Ixtoc 1 3 months estimation
<b>Cause</b>	High pressure explosion and fire	Fail manouvers of oil tanker	High pressure explosion and fire
<b>Damage</b>	Mexican waters and transboundary impact on South Texas coasts	Alaska coasts, 1,609 kms affected	Under assessment (NOAA, EPA) extensive damage to marine and coastal resources
<b>Duration</b>	3/June/79 – 24/March/80	24/March/89 – 31/July/89	20/April/2010 – Till now



Louisiana

Mississippi

Alabama

Florida

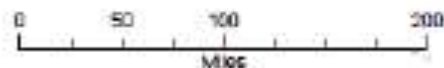
Well bore location

Detached Loop Current eddy

# Deepwater Horizon MC252

## Loop Current Location Relative to Oil Slick

May 31, 2010



Slick location derived by NOAA NESDIS from analysis of ENVISAT ASAR data acquired on May 30, 2010 at 2239 CDT. COSMOS SKYMED data acquired May 31, 2010 at 0638 CDT and RADARSAT-2 data acquired May 30, 1909 CDT. A composite of data acquired May 30th fills in areas where no near imagery is available. These data are from COSMOS SKYMED-2 & 3, ENVISAT MERIS and RADARSAT 1 & 2.

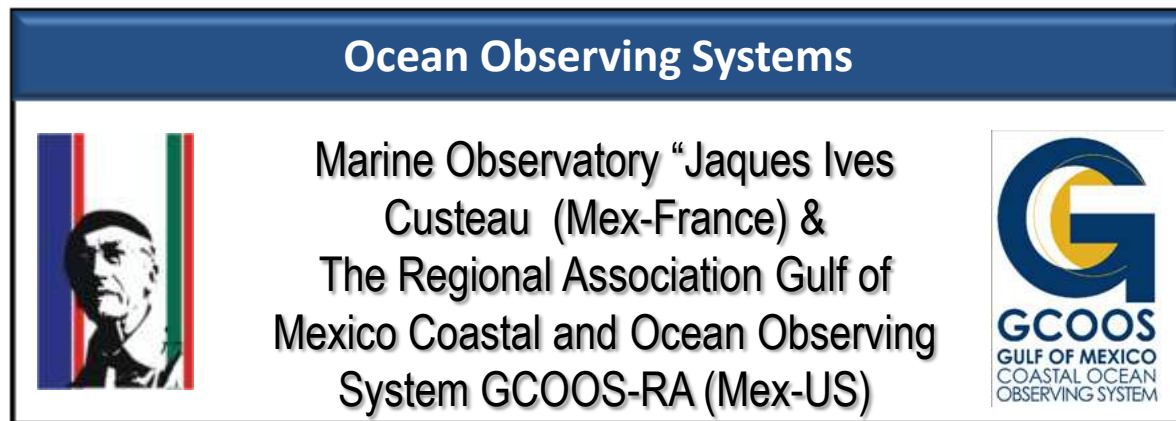
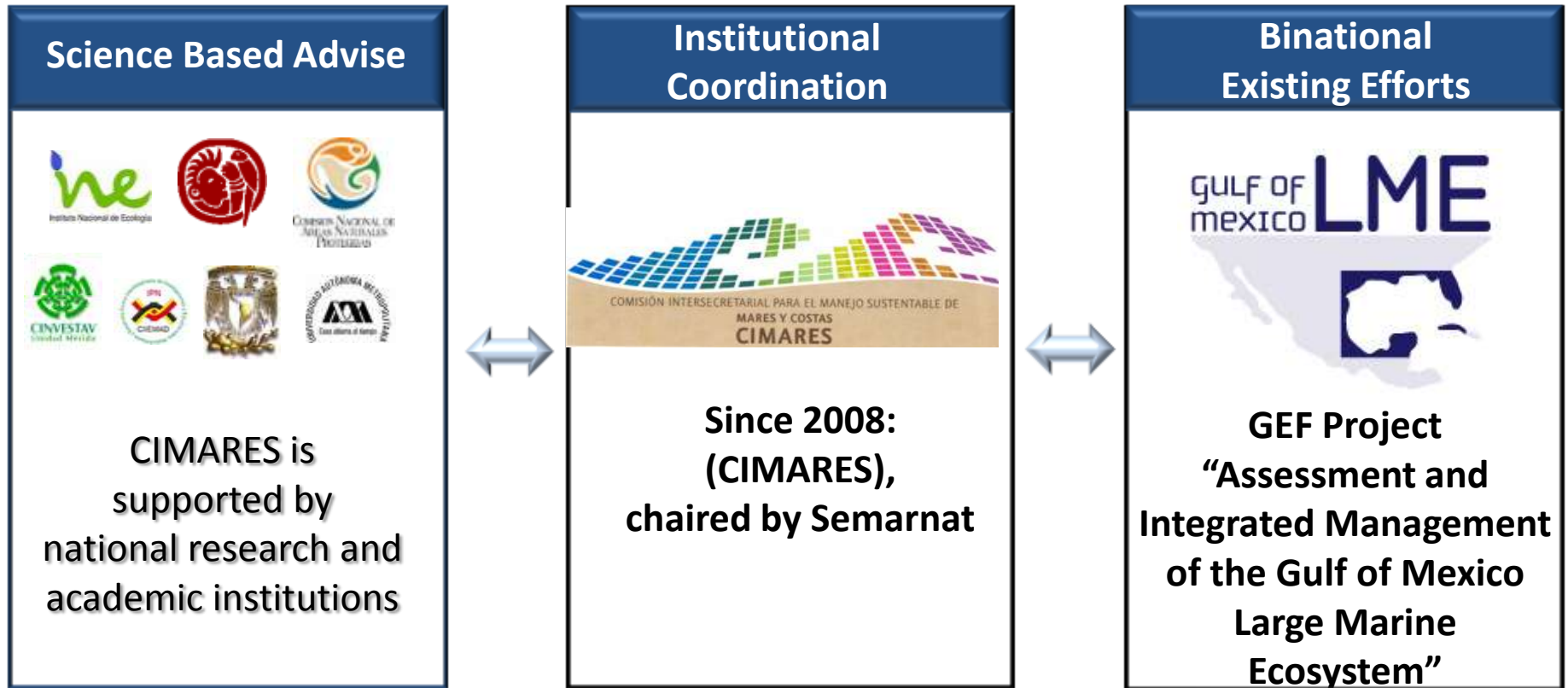
Loop Current and eddy analysis updated on May 31, 2010 by NOAA/AOML from satellite altimetry-derived sea surface height fields obtained from NASA and ESA. Note that in this analysis, the northern portion of the Loop Current continues to be separated from the main Current. There is a high probability that it will re-attach to the main current over the next few days.









# Mexico's preparedness plan of action





# Wide Expert Consultation



## Síntesis de Opinión de Expertos

**Derrame de Petróleo Deepwater Horizon en el Golfo de México**

*Proyecto GEF  
"Gran Ecosistema Marino del Golfo de México"  
(GoM LME-ONUDI)*

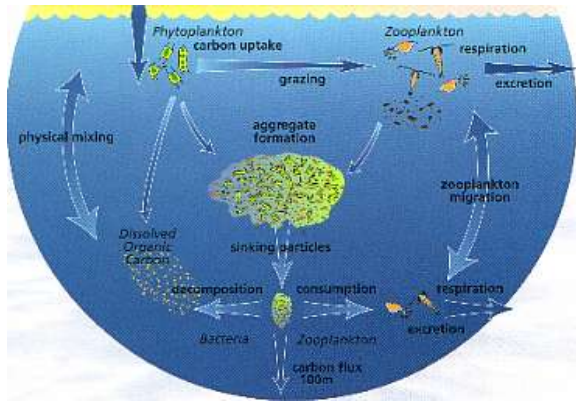
*Comisión para el Manejo Sustentable de los Mares y las Costas de México (CIMARES)*

Mayo de 2010



# Marine life, natural processes and ecosystem connectivity

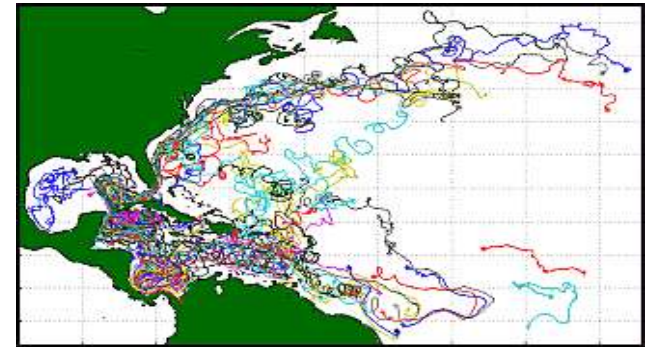
## Food source to the marine bottom



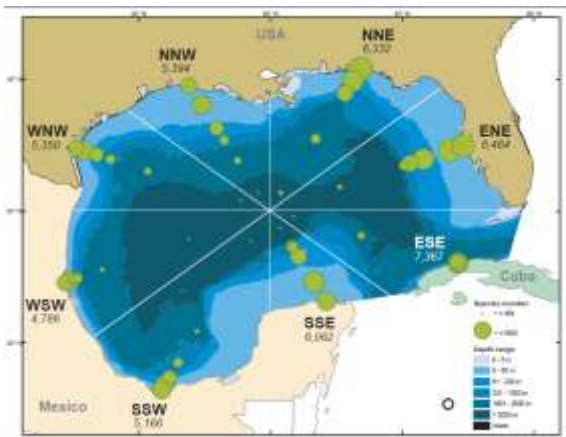
## Wetlands



## Benthic larvae connectivity



## General distribution of species richness in the GoM



## Shore impact



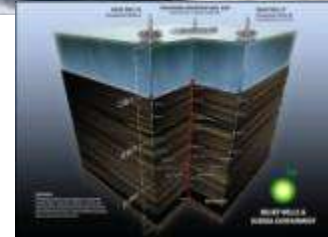
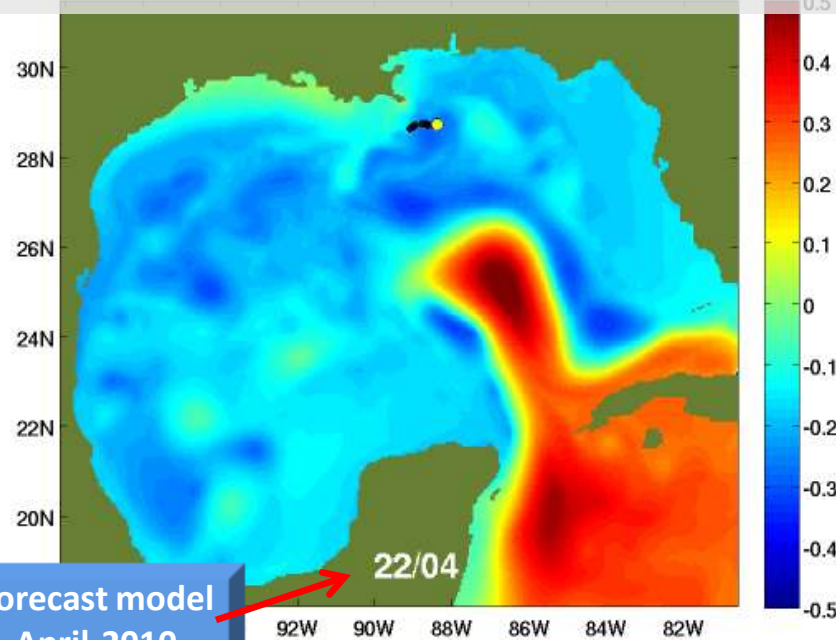
## Turtle nesting and feeding areas







# Deepwater Horizon oil spill in the GoM LME, One year marine current and suspended particles forecast model (Apr 2010- Apr 2011)



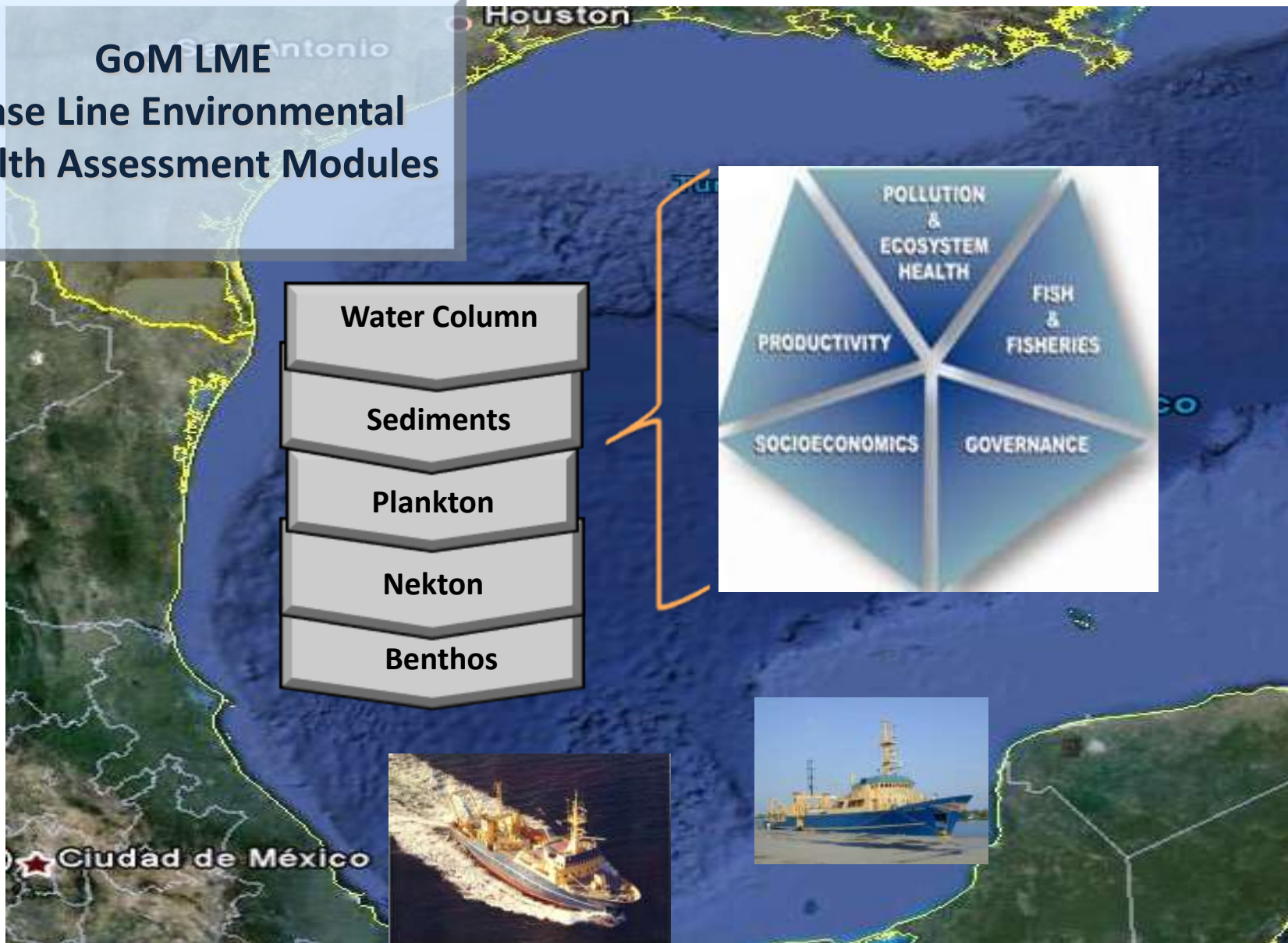
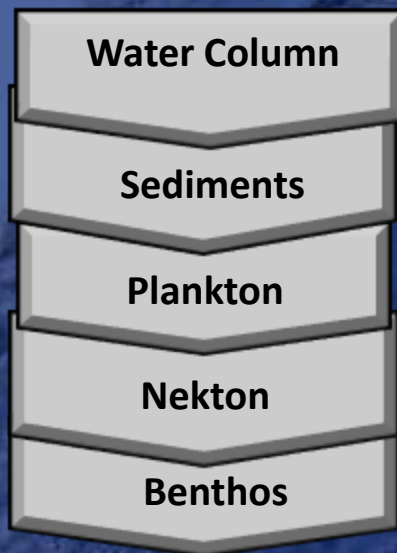
Call for a GoM-LME  
Joint assessment,  
base line and  
long term monitoring





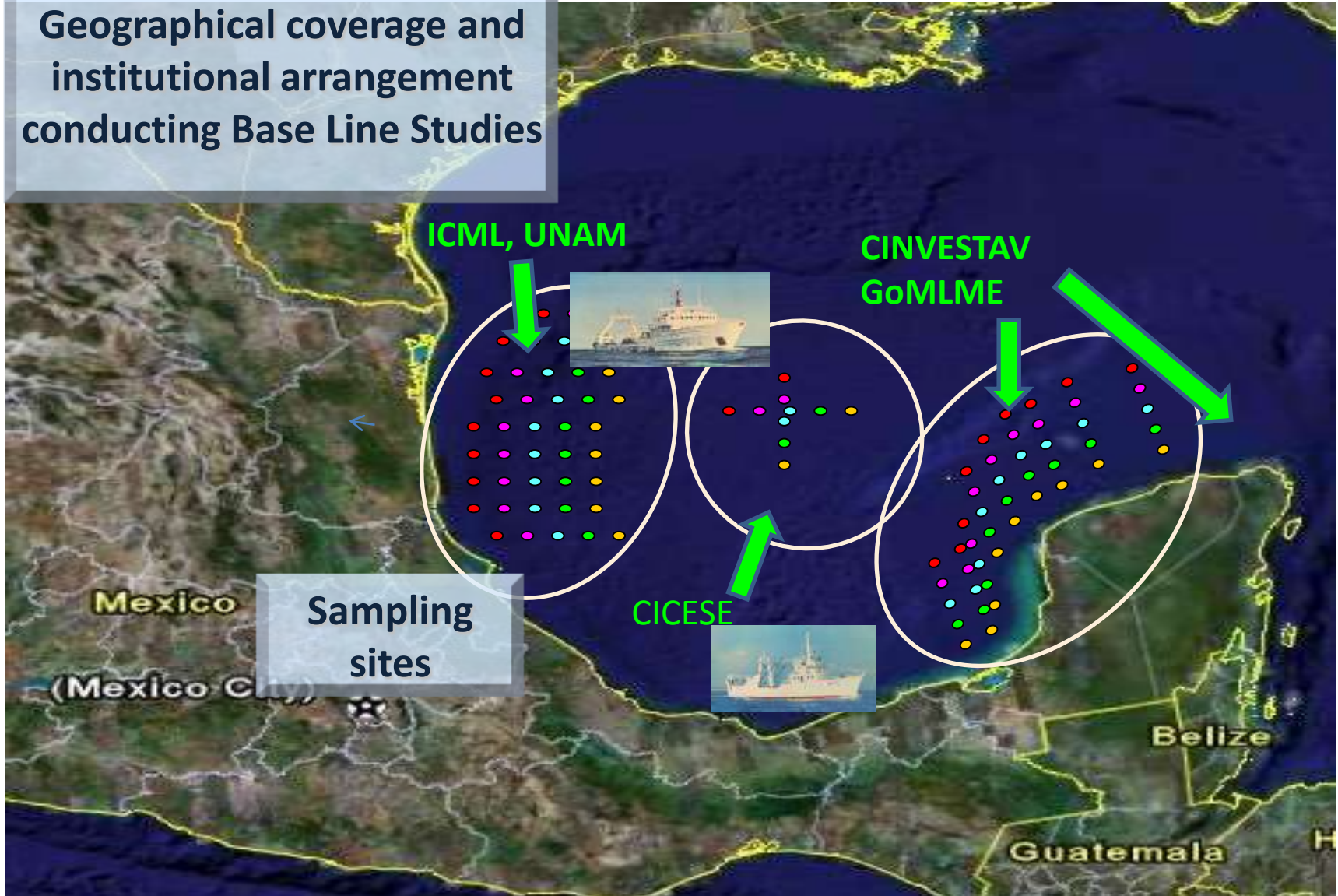
## GoM LME

### Base Line Environmental Health Assessment Modules





## Geographical coverage and institutional arrangement conducting Base Line Studies





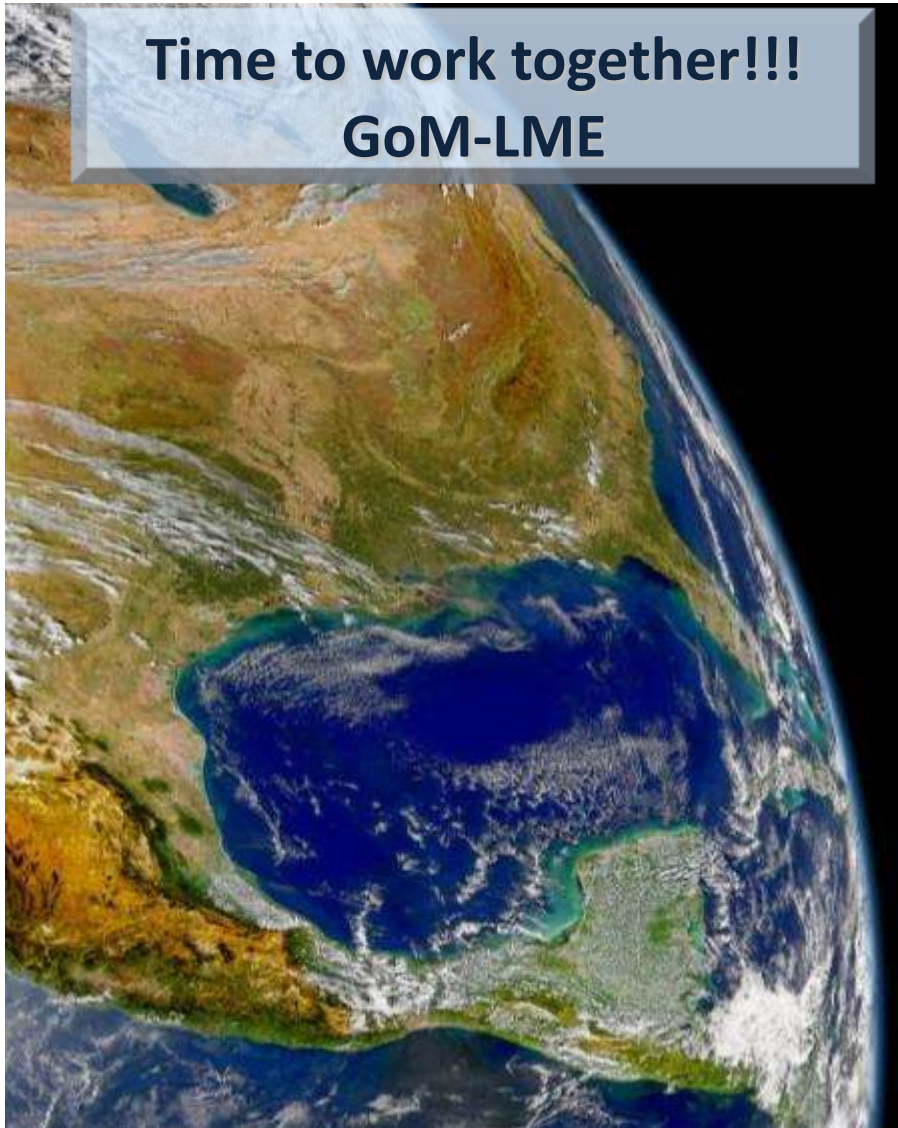


**Coastal Ecosystems  
Environmental Health  
Base Line Assessment**





**Time to work together!!!  
GoM-LME**



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**Thanks for your attention!**



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