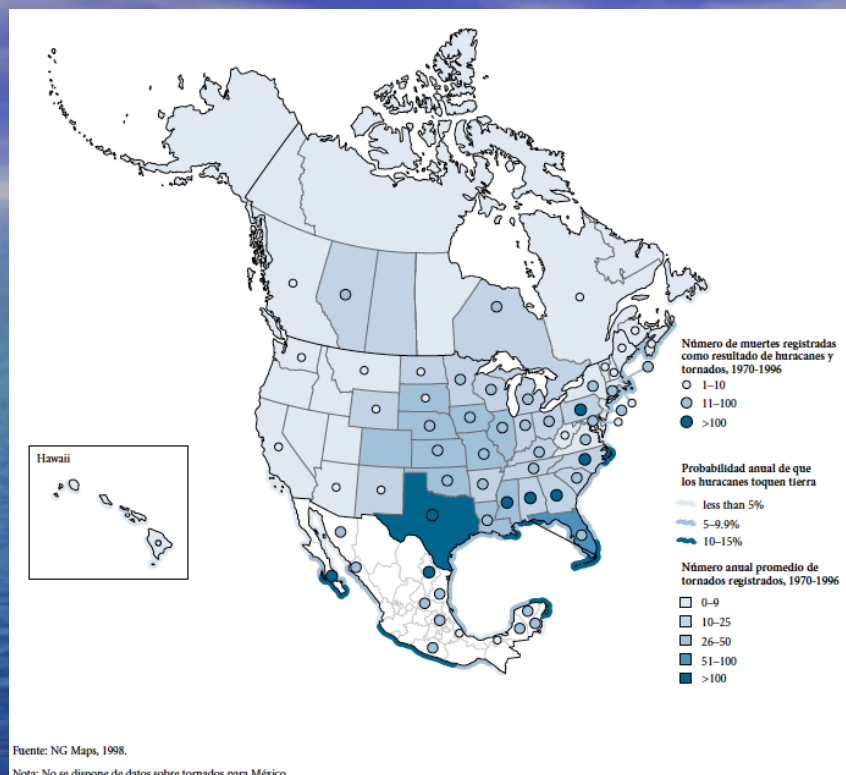


Strengthening collaboration and partnership to achieve resiliency in Gulf of Mexico coastal communities



Porfirio Alvarez Torres, PhD.

Researcher at the National Polytechnic Institute

Executive Secretary

Consortium of Marine Research Institutions of the Gulf of Mexico and the Caribbean

CiiMar-GoMC

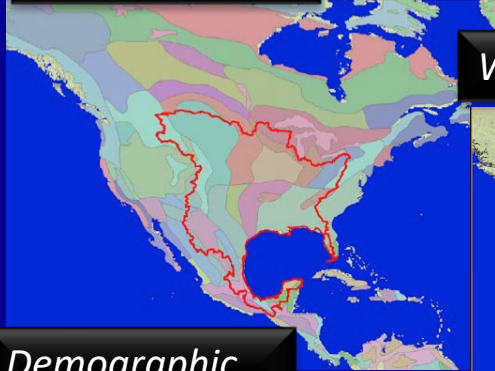
Arlington, Virginia, U.S.

6 November 2014



TRANSBOUNDARY CONNECTIVITY:
REGIONAL, ENVIRONMENTAL, ECOSYSTEMIC,
SOCIAL, ECONOMIC, & POLITICAL

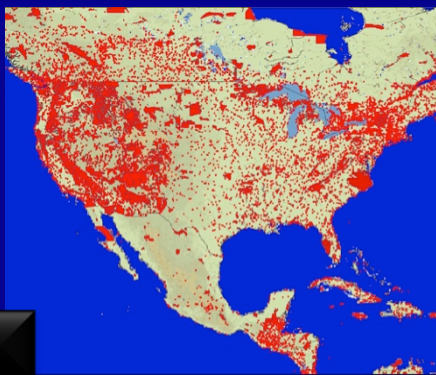
Ecoregions



Watersheds



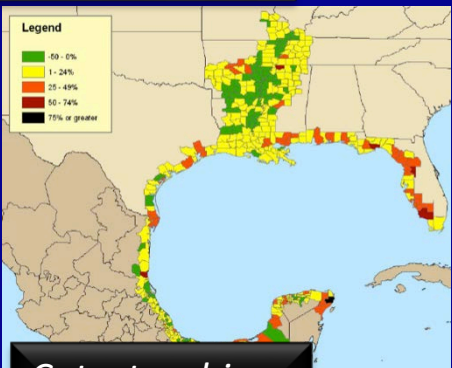
Terrestrial Protected Areas



Marine Protected Areas



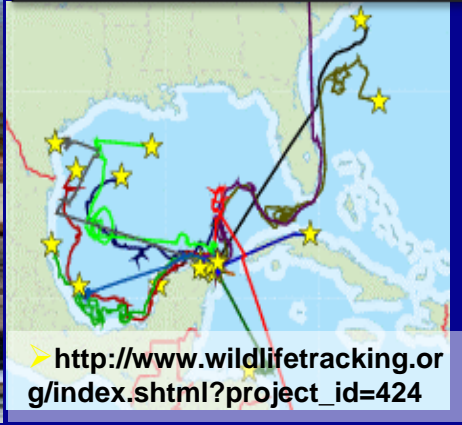
Demographic



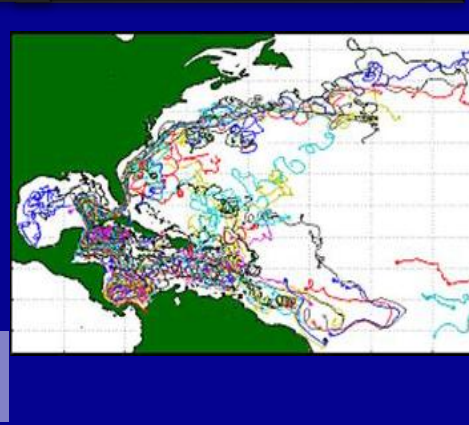
Invasive species



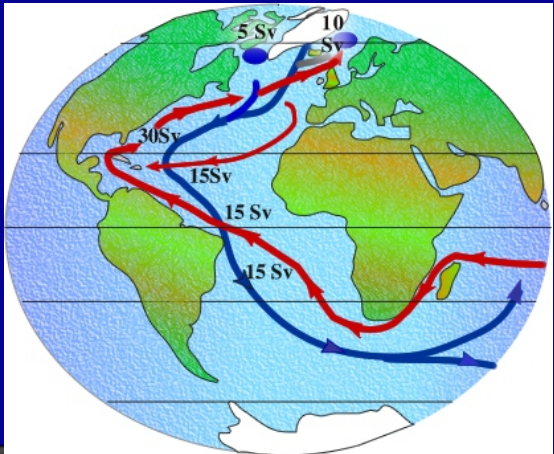
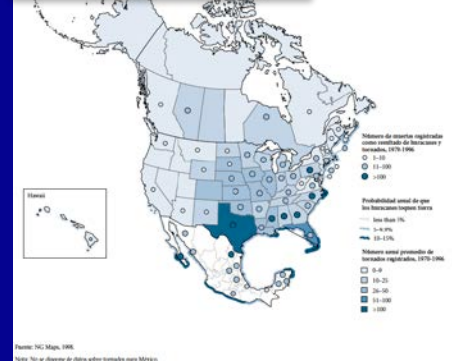
Migratory paths



arval distrubution



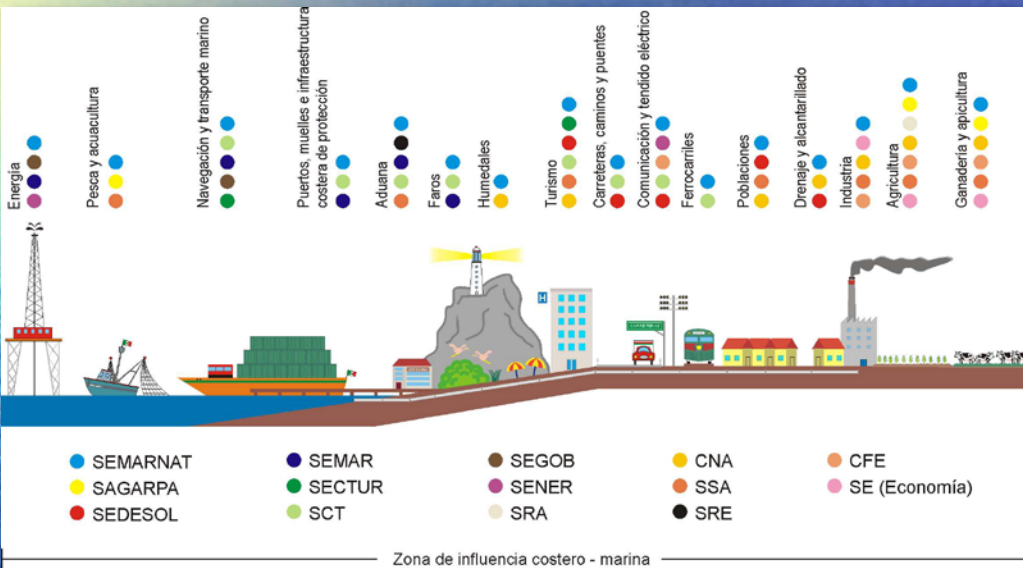
Catastrophic



http://www.wildlifetracking.org/index.shtml?project_id=424

Who does what in coastal areas?

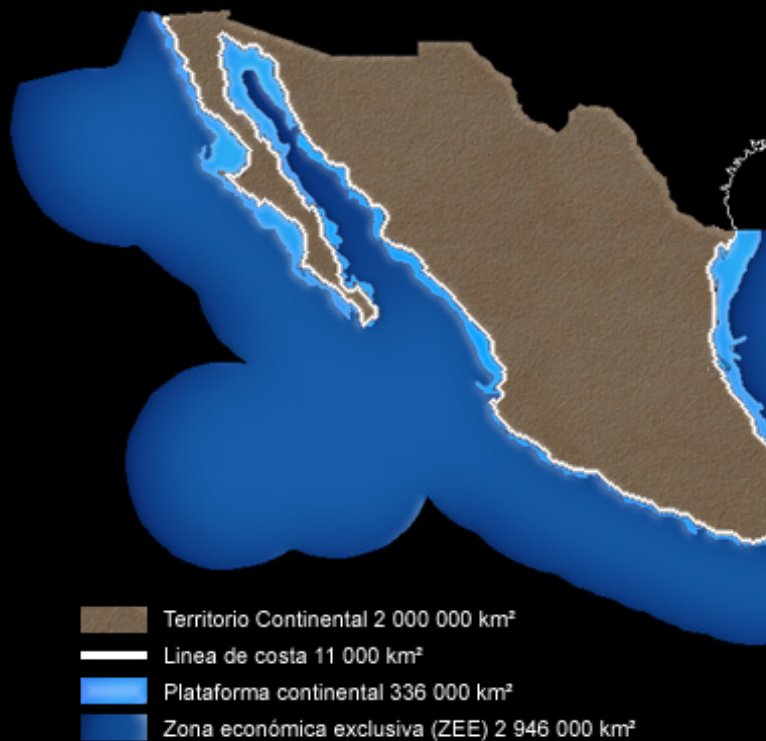
Poor federal policy integration in coastal zones as a barrier to implement CC ADAPTATION POLICIES



Too many users, increasing pressure

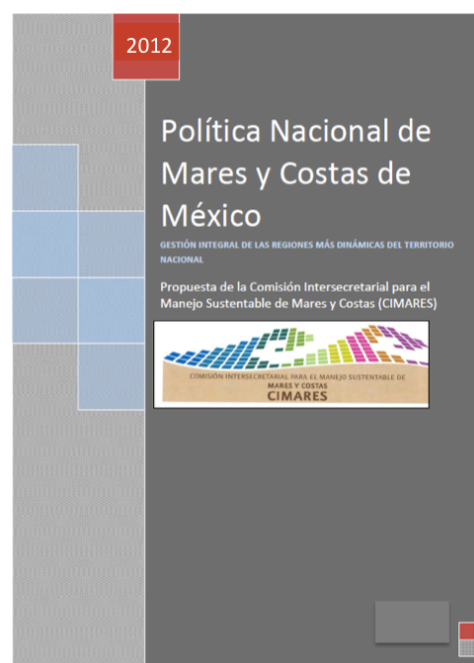
- Lack of law enforcement
- Cumulative impacts

✓ Need to recognize coastal areas great value

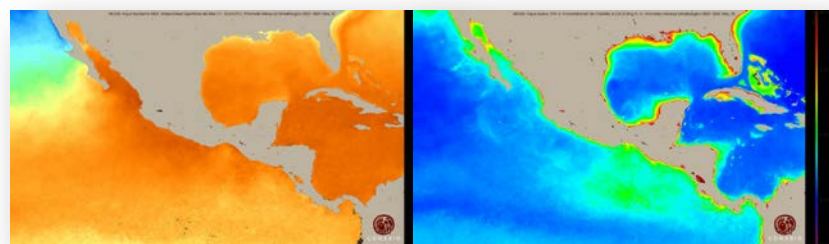


What we are trying to do:

Ocean Policy & Adaptation to climate change



- Vulnerability and impact assessments
- Implementation of coastal protection measures
- Evaluation of costs and benefits



Consortio de Instituciones de Investigación Marina
del Golfo de México y del Caribe

**Working together towards threats,
challenges and risks in coastal areas
to enhance community resiliency**

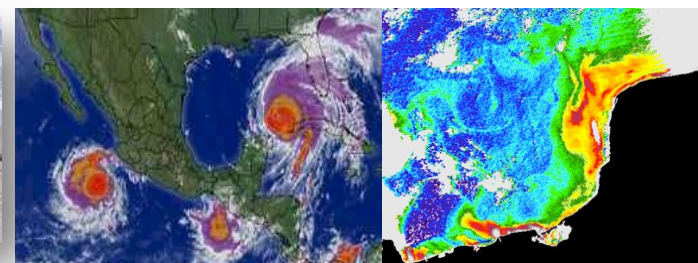
LUMCON	●
UAT	●
CIDIPORT	●
UV	●
ICMyL	●
UJAT	●
UNACAR	●
UAC	●
EPOMEX	●
UADY	●
CINVESTAV	●
CCGSS	●
IPN	●
ITBOCA	●
CONABIO	●
SEMAR	●
ECOSUR	●
UQROO	●



**Storm surge
Marine
Transgression**



Hurricanes



**Pollution
HABs, Hypoxia,
Marine debris**

**Sea Level Rise
Flooding**



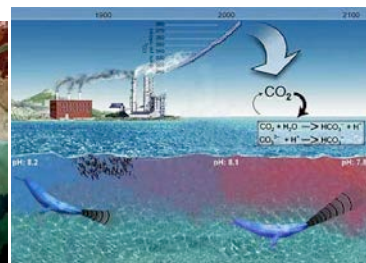
Erosion



**Sediment
management**



**Ocean
acidificatio**



Invasive species





MISSION

Integrate, organize and enhance institutional efforts conducting scientific research to generate appropriate diagnostics and propose and implement sustainable solutions to the environmental, social and economic problems of the Gulf of Mexico region.



VISION

To be recognized as a high level and scientific authority organization committed to strengthening the sustainable development and integral well-being of the Gulf of Mexico.



ACTIONS →

Marine Biodiversity

Habitat

Pollution

Ecosystem health

Monitoring

COOS
Coastal & Ocean
Observing System

Bilateral Cooperation
Strategies

SHORT TERM

Immediate
attention
actions

Impact
mitigation
strategy

Oceanographic
cruises:
Physical,
chemical
and
biological

NEAR TERM

Conservation
and recovery
actions
Environmental,
economic and
humal health
damages
assessment
Permanent
monitoring

LONG TERM

Long term actions implementation with an
ecosystem and integrated joint vision of the
GoM (México – U.S.)

Marine observatory, joint data bases, buoys, HF radars, antennas, radio frequency, etc

Scientific workshops, MPA network, education, capacity building, public participation

**MEX US
Contingency Plans
(Oil spills)**

EPA Gulf of Mexico Program

NAS Gulf of Mexico Long Term Research Program

GOMA Working Plan

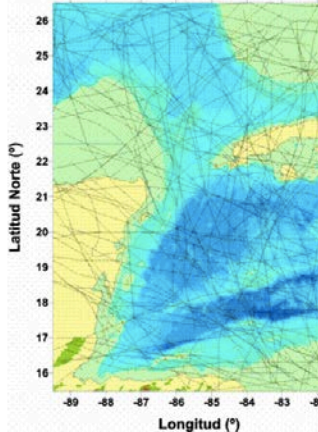
Strategic Actions

Economic burden to people and communities

Trayectorias más Frecuentes
en el área de estudio

All recorded hurricane paths
1949 - 2001

Trayectorias Históricas
frente a la Península de Yucatán



Insurance
coverage (million
dollars)

Human losses

Economic losses
(million dollars)



Floodings
US



Hurricane Rita
Central America



Hurricane Katrina
US



Hurricane Stan
Central America



Hurricane Wilma
Mexico, US, Caribbean

July/August

August

September

October

October

Global losses due to the five major hydro-meteorological events in 2005.

Source: Cepal, 2009

Hurricane

Cancun, Before



Coastal & beach erosion

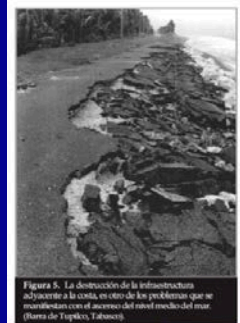


Figura 5. La destrucción de la infraestructura adyacente a la costa, es uno de los problemas que se manifiestan como resultado del avance del nivel medio del mar (fuerza de Tlapala, Tabasco).



Grijalva Este, Tabasco



Mecoacán, Tabasco



Barra de Machona



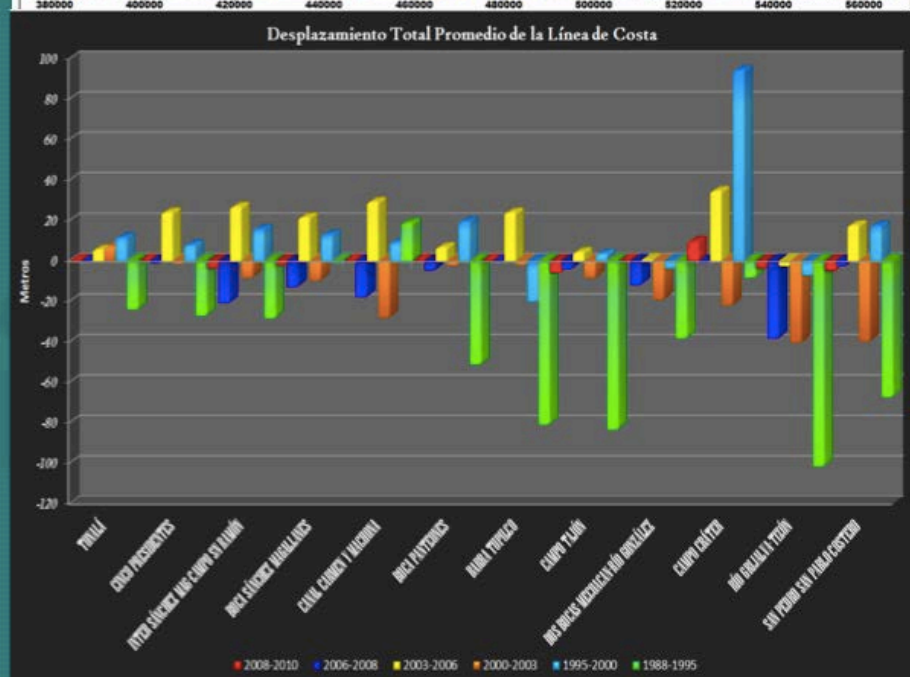
Possible effects of climate change on coastal zones

Natural Ecosystems :

- Flooding
- Accelerated beach erosion
- Sea water intrusion
- Loss of wetlands and mangroves
- Changes in fish abundance and population dynamics
- Impacts on reefs and islands
- Bleaching of coral reefs

Communities:

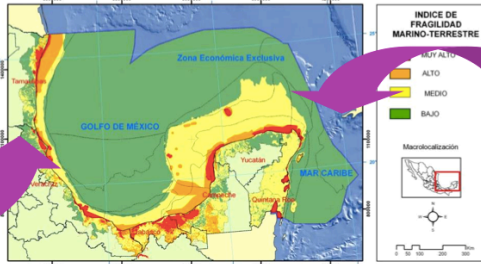
- Risks to life and property
- Displacement of millions of people in low-lying coastal areas
- Impacts on fish-dependent human societies
- Erosion and loss of beaches
- Damage to tourism infrastructure
- Impacts on agriculture



LAND AND SEA USE PLANNING PROCESS

Fragility Index

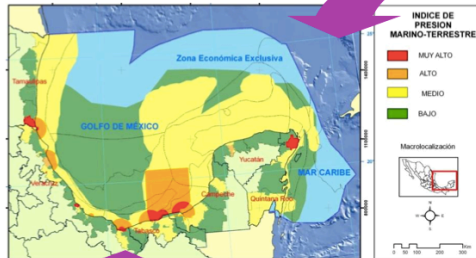
- Geomorphology
- Vegetation
- Climate
- Precipitation
- Slope



- 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 Runo
- Fisheries overexploitation
- Degradation processes
- Ports and Oil act

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



Floods

MANUEL – INGRID 2013



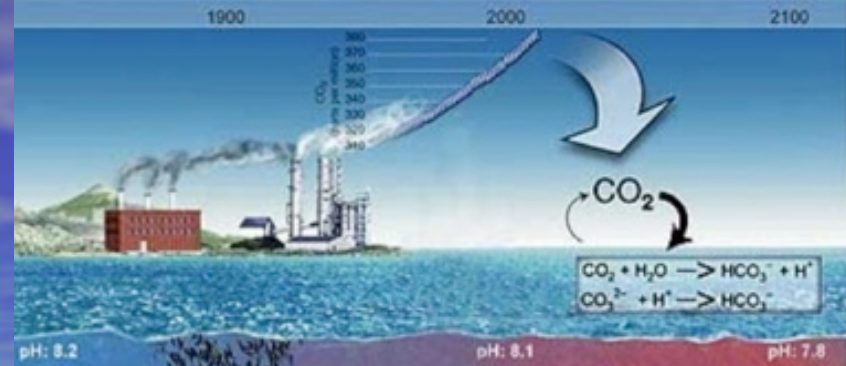
LAND AND OCEAN LINKAGES



IASNFS Real-Time Prediction

Sea Surface Salinity for NOAA/AOML

OCEAN ACIDIFICATION ASSESSMENT



NRL IASNFS

POLLUTION IN COASTAL AREAS

Benefits towards year 2020

Improve air quality in coastal areas

HEALTH

Preventing 5,500-14,000 premature deaths, 3,800 emergency visits, 4,900,000 acute respiratory symptom cases

POST 2020

Renew fleet with more state of the art technology and reduce NO_x

ECONOMIC HEALTH BENEFITS

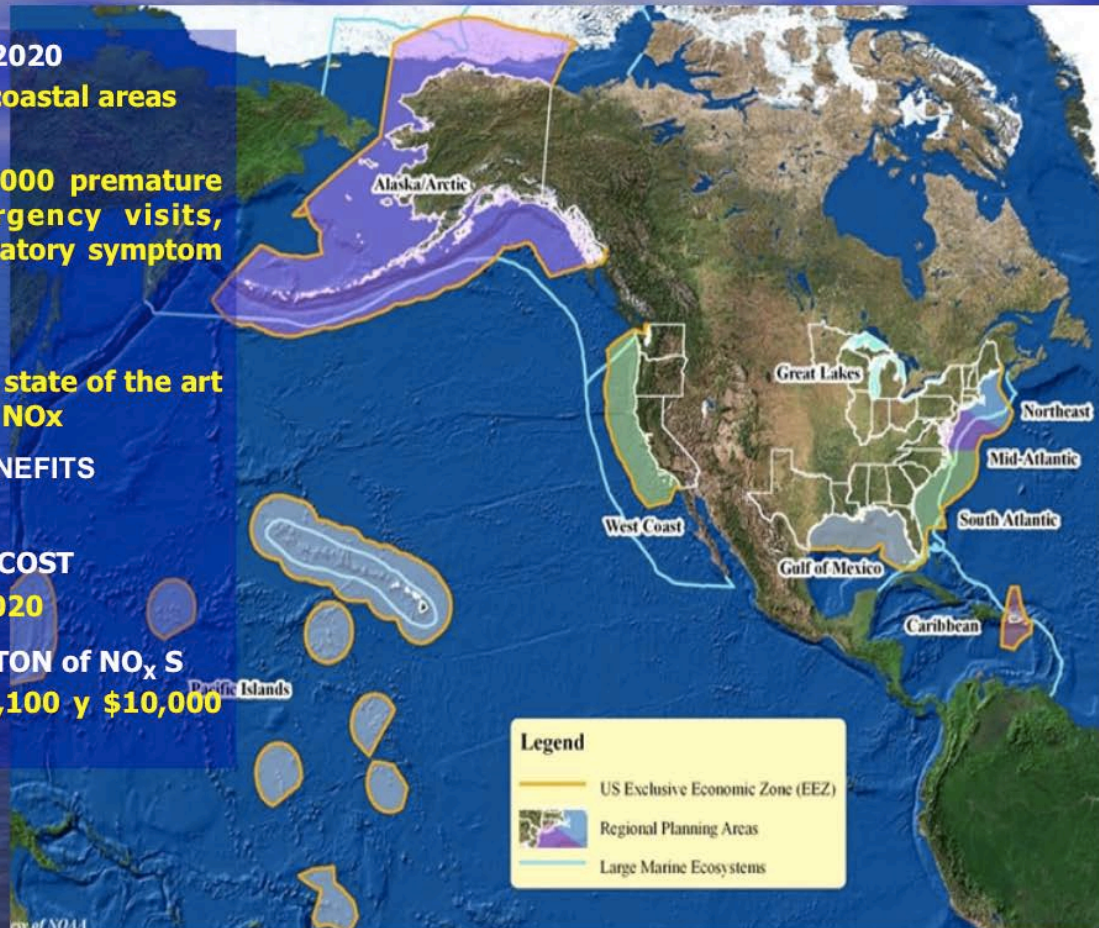
\$47-110 Billions USD

TOTAL IMPROVEMENT COST

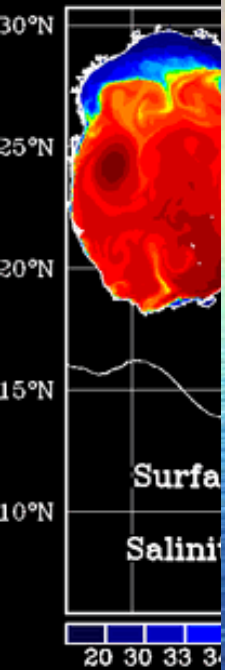
3.2 Billion USD up to 2020

REDUCTION COST per TON of NO_x S

O_x y PM es \$2,400 \$1,100 y \$10,000 USD respectivamente.



env. of NOAA



Most needed... OCEAN OBSERVING SYSTEMS, Near Real Time QA/QC DATA

Instituto Politécnico Nacional
"La Técnica al Servicio de la Patria"

SEP
SECRETARÍA DE
EDUCACIÓN PÚBLICA

SEMAR
SECRETARÍA DE ECONOMÍA

AEM
AGENCIA ESPECIAL
MEXICANA

CIIMAR
GOMC
Consejo de Instituciones de Investigación Marina
del Golfo de México y del Caribe

CONABIO

TECHNOPÔLE
BREST-IROISE

MexICOOS

*An international cooperation project to
set up the*

Mexican Integrated Coastal and Ocean Observing System

CIIMAR
GOMC

*The future of the ocean and
coastal observing system*

ENFOQUE y USUARIOS

PRODUCTOS

OBSERVACIONES

MODELOS

A model of
coastal and
ocean
observing
system that
provides
continuous
information



Natural hazards (met-ocean monitoring) / alerts



Oil spill drift forecast



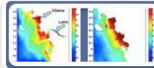
Environment monitoring & evolutions forecast & management



Renewable marine energies



Turbidity / sedimentology



Eutrophication, Harmful algal blooms, ..



Hydrodynamics and biogeochemistry around islands (Indian and Pacific Oceans)

What needs to be done?

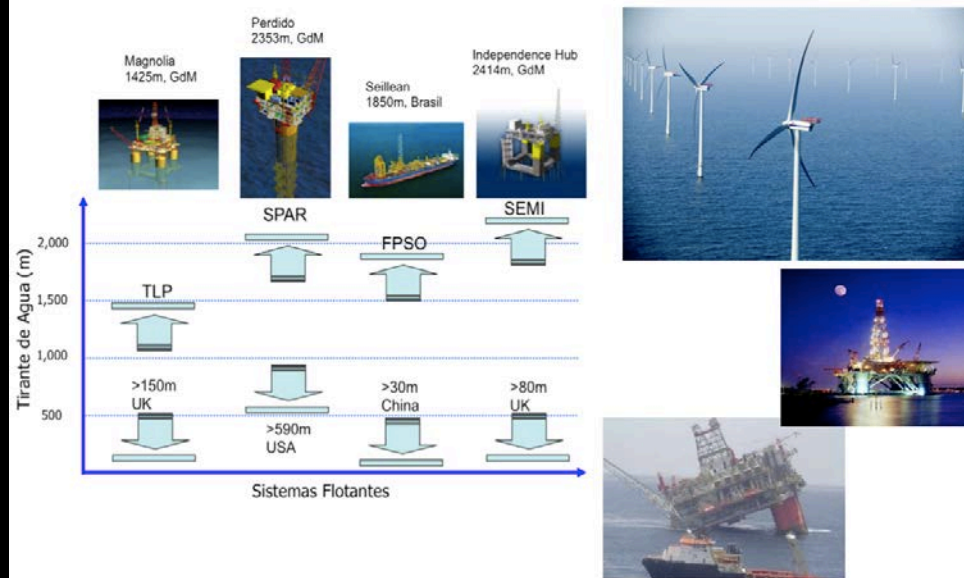
Adaptation Policy Framework

- Framework:
 - Institutions
 - Legislation
 - Strategies and plans
- Mechanism that identifies
 - Key players
 - Key information
 - Clear responsibilities and linkages
 - Right timing
- National Ocean Policy Implementation
- Regional Development watersheds & coastal areas integration

More research and operational systems are needed

- Variability of regional precipitation
- Regional sea-level rise
- Prediction of extreme weather events
- Mapping of vulnerability of coastal zones
- Costs of adaptation measures
- Implement the Integrated Coastal and Ocean Observing System

Move towards the use of renewable sources of energy

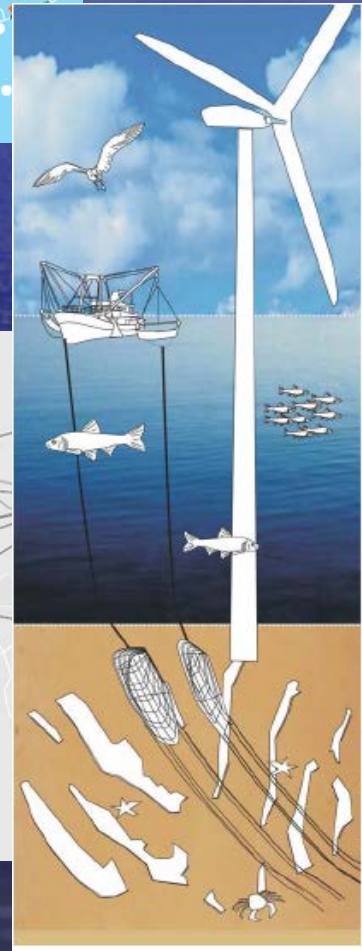


Clear communication of scientific data to policymakers and stakeholders

- Bridge the gap between science and decision-making
- Continuity of federal ocean and coastal policies
- Focus on regional and local forecasts that are relevant for policymakers
- Invest in the Ocean Observing System

ICZM, Inter-sectoral coordination & planning BENEFITS

- Identify compatible USES for development
- Reduces conflict among users
- Enhances certainty and investment
- Promotes efficient use of space and resources and reduces impact towards the environment
- Establishes hotspot areas or environmental sensitive areas reducing risk of conflict towards development
- Allows to achieve planning goals and integrated ecosystem based management (EBM)
- Ensures space for conservation of biodiversity and nature
- Allows to strengthen networking for social groups including environmental

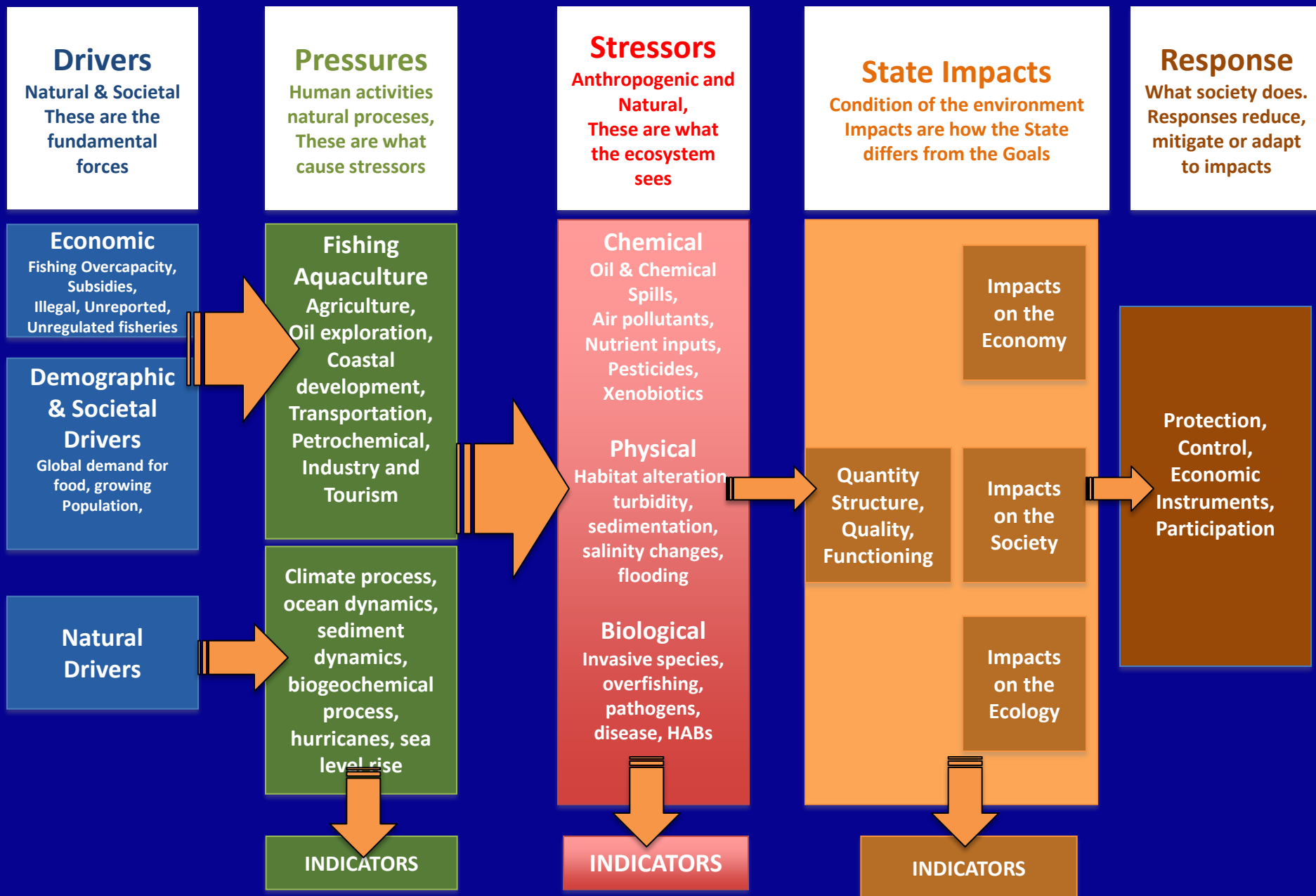


Bilateral Forum on Higher Education, Innovation and Research (FOBESII)

- Its creation was announced by the Presidents of Mexico and the U.S. in May 2013.
- Example of a **strong partnership** between governments, higher education institutes, civil society and private sector in México and U.S.
- Its objective is to expand economic opportunities for both nations' societies, and to develop a 21st Century work force.
- Conformed by high-level government representatives, supported by civil society and academic and private sectors.



Ocean and Coastal degradation



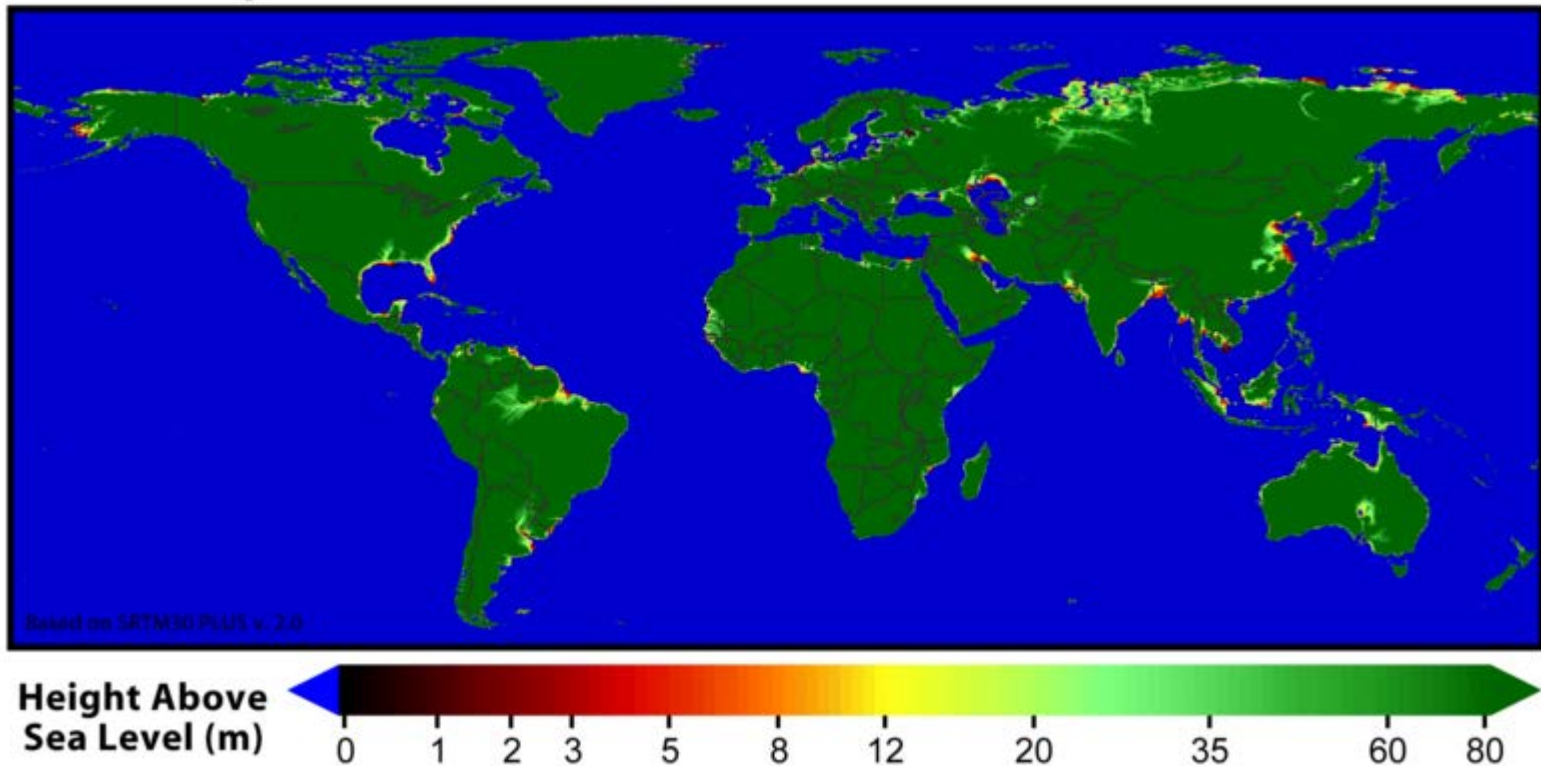
Final remarks and Actions

- Identify Hotspots, and develop Sister Sanctuaries in Marine Protected Areas
- Foster Environmental Education
- Support FOBESSi (BILATERAL FORUM on HIGHER EDUCATION and SCIENTIFIC RESEARCH)
- Develop joint scientific research programs and use existing programs in the three countries
- Strengthen financial support and establish synergies with existing organizations (i.e. CONACYT, NAS, NSF, others)
- Establish a joint cooperation group for Monitoring Coastal and Oceans in Canada US Mexico (IOOS in the US, and MexICOOS in Mexico)
- Develop a joint Coastal and Ocean INDEX for North America

Conclusions

- Joint monitoring and ocean observing system
 - Support the construction of the Mexican Integrated Coastal and Ocean Observing System
- Policy Integration
 - Integrating climate change science into policy process and decision-making across a range of sectors and scales will facilitate adaptation
 - Implement the ocean policy
 - Strengthen Research Consortia Cooperation
- Long term Education and Research
 - Encourage long term bilateral cooperation in the Gulf
 - Promote the Program FOBESII and
 - Proyecto 100,000 students exchange

Regions Vulnerable to Sea Level Rise



Thank you!