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Intergovernmental Oceanographic Commission

Sub-Commission for the Caribbean and Adjacent Regions

Subcomisión para el Caribe y Regiones Adyacentes

Impacts of Ocean Warming in Mexico and National Responses

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México: A Marine Nation

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Social

- 14.9% of the national population lives in coastal areas.
- Great diversity of productive activities in these regions.

Territorial

- 17 coastal states
- 263 coastal municipalities
- 62% of Mexican territory corresponds to the sea.

Environmental

- 137 coastal lagoons
- High biodiversity
- Great variety of landscapes and climates
- Highly productive ecosystems
- 37 MPA's

Economic

- More than 125,000 users in the ZOFEMAT (Federal Maritime-Terrestrial Zone)

Strategic Positioning

+ 11,000 km of coastline
+ 3 million km^2 of maritime surface
- 1,959,248 km^2 of maritime surface

Observed Impacts in Mexico

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- **Sea Surface Temperature**: persistent warming across all basins.
- **Ocean Acidification:** Threats to mollusks and reef systems.
- **Coral Bleaching**: Caribbean outbreaks (e.g., Banco Chinchorro, Cozumel)
- **Species Redistribution**: sardines, tuna, and other species shifting northward.
- **Extreme Events**: intensified hurricanes and coastal flooding, coastal erosion.
- **Tsunamis & Sea-level rise**: enhanced coastal risks.

Mexico: National Response

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Science and Monitoring

- **Coastal and ocean monitoring** (tide gauges, buoys, satellite, and in-situ data).
- **Integrated ocean observing systems**.
- **Early warning systems for extreme events** (e.g., hurricanes, tsunamis).

Policy Initiatives

- **ENACC** (National Adaptation Strategy), **LGCC**.
- **General Law of Seas and Coasts** (2023).
- **Updated National Policy** for sustainable ocean and coastal management.
- **National Environmental Restoration Program** (focus on mangroves, reefs, dunes, islands). **PAEM** – Ocean Decade Strategic Action Plan.

Marine Conservation

- **Expansion of Marine Protected Areas** (MPAs).
- Coral reef and mangrove **restoration projects.**
- **Sargassum Strategy** in the Mexican Caribbean (Circular Economy Center).

Cooperation and Community Engagement

- **PROCARIBE** – Regional coastal resilience initiative.
- **Mesoamerican Reef Restoration, IOCARIBE**
- **National Agreement on Beaches and Coasts** (multilevel participation).
- **Beach cleanups, coastal citizen science initiatives**.

National Response: ENACC

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General Law on Climate Change, Article 58

Assesment of coastal vulnerability to sea level rise

-Identification of risk areas
-Promotion of hybrid infrastructure

Conservation and restoration of ecosystems

-Ecosystem-based approach to conserve and restore mangroves, seagrasses, and coral reefs as natural barriers.
-Strengthening of Protected Natural Areas with a marine focus.

Integration of climate criteria in coastal planning

-Promotion of ecological land-use planning with climate considerations.
-Adaptation of tourism and fishing infrastructure to climate risk scenarios

Strengthening local capacities and monitoring systems

-Support for monitoring sea level, sea surface temperature, acidification, and loss of marine biodiversity.
-Use of downscaled climate scenarios for coastal planning

National Response: PAEM

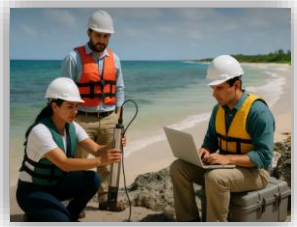
Mexico's Strategic Action Plan (PAEM)

7 Ocean Decade Outcomes:

1. **A clean ocean** – Sources of pollution are identified, reduced, or removed.
2. **A healthy and resilient ocean** – Marine ecosystems are understood, protected, restored, and managed.
3. **A productive ocean** – The ocean supports sustainable food supply and a sustainable ocean economy.
4. **A predicted ocean** – Society has the capacity to understand current and future ocean conditions.
5. **A safe ocean** – Human communities are protected from ocean hazards.
6. **An accessible ocean** – Data and technology are accessible to all.
7. **An inspiring and engaging ocean** – Society understands and values the ocean.

Gaps & Challenges

- Limited sustained **ocean observations** in some regions of the Country.
- Fragmented **data access** and integration.
- Need for more localized **science-policy** interfaces.
- Insufficient **technical capacity** in coastal communities.



How can UNESCO-IOC support Member States with Ocean Science to combat the effects of a Warming Ocean?

🎯 **Strengthen Regional Cooperation:** Foster capacity-building and knowledge exchange among IOC Member States by establishing regional platforms for collaboration and mutual support.

🛰️ **Enhance Data Sharing:** Promote open-access platforms to improve the availability and interoperability of oceanographic and climate data across national institutions.

🌱 **Support Ecosystem-Based Adaptation:** Advance nature-based solutions such as mangrove restoration, coral reef recovery, and the expansion of Marine Protected Areas (MPAs) to strengthen coastal resilience.

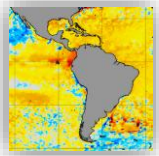
🧑‍🎓 **Invest in Science and Education:** Support long-term capacity building.

- Build regional networks of young ocean professionals
- Expand training (e.g., summer schools, fieldwork, exchange programs)
- Promote UNESCO Chairs, virtual learning, and mentorship programs

🛠️ **Coordinate Implementation Efforts:** Ensure that IOC-led programs are aligned with national adaptation strategies and local, community-based actions.

Conclusion

- 🌊 Ocean warming is a pressing issue with significant implications for Mexico
- 🧪 National science and policy responses are advancing
- 🔗 Greater coordination that integrate science, policy and action is critical
- 💰 Continued investment and international collaboration are key to building a resilient future.
- 🌐 IOC can catalyze science-based solutions at regional and local levels



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THANK YOU
MUCHAS GRACIAS
MERCI BEAUCOUP

CTORRES@UABC.EDU.MX

1.Publicación de la Ley General de Mares y Costas de México. Ningún comentario
2.Presentación de la actualización de la Política Nacional para el Manejo Sustentable de Mares y Costas de México. Ningún comentario
3.Implementación del Programa Nacional de Restauración Ambiental, con enfoque prioritario en la restauración de manglares, arrecifes de coral, dunas costeras y ecosistemas insulares. Me permito sugerir que el enfoque no solamente incluya la restauración, sino la protección de dichos ecosistemas con soluciones basadas en la ciencia y regulaciones en materia de desarrollo territorial, ya que una importante causal de la destrucción de estos ecosistemas es el desarrollo indiscriminado y no regulado de proyectos inmobiliarios, hoteleros, de infraestructura costera y portuaria (tanto privada como pública). También hay que considerar la contaminación fluvial, que aporta residuos sólidos y contaminantes desde la masa continental hacia las costas.
4.Lanzamiento del Acuerdo Nacional por las Playas y Costas de México, con la participación de los tres órdenes de gobierno y los sectores social, privado y académico, para garantizar el derecho a playas y costas seguras, limpias, ordenadas y biodiversas. Ningún comentario
5.Ejecución de una Campaña Nacional de Limpieza y Conservación de las Playas y las Costas de México, orientada a prevenir y revertir la contaminación marina desde una perspectiva integral, intersectorial y participativa. Recomiendo incluir en la campaña este punto sobre la concientización, y acciones sobre la limpieza y conservación de los sistemas fluviales como parte de la problemática de las costas y mares.
6.Atención a la problemática del sargazo en el Caribe mexicano, mediante la instalación de un Centro de Economía Circular en la región. Recomiendo considerar que el sargazo, mientras se encuentra vivo se puede considerar un recurso natural explotable, y una vez que inicia su descomposición en las arribazones, se convierte en un desecho con un potencial distinto del sargazo vivo. Ambos son útiles, pero con diferentes enfoques.