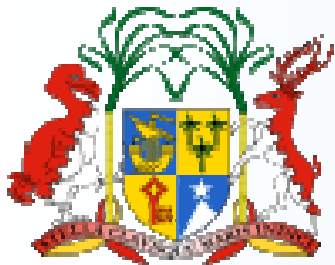


*“Integrated Coastal Zone Management – A  
Framework and Tool for Planning and  
Supporting Sustainable Management of Coastal  
Resources”*



**The Mauritian Experience**

**By**

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**November 2009**



# Outline of Presentation

- **Profile (bird-view) of Mauritius**
- **Highlight on the imp. of Coastal Zone**
- **Issues/ threat/ pressures on CZ**
- **ICZM in Mauritius**
  - **Policies, Tools, Legal frameworks, Inst. Framework ,  
Monitoring and Evaluation, R&D**
  - **Highlight of relevant recent studies and projects**
- **Institutional Challenges**
- **Conclusion**

# General Baseline

<b>Republic of Mauritius</b>	<ul style="list-style-type: none"><li>➤ A main island of Mauritius and</li><li>➤ A group of small islands (Rodrigues, the Cargados Carajos, Agalega, Tromelin and the Chagos Archipelago).</li></ul>
Capital	Port Louis
Area	Total 2,040 km <sup>2</sup> ( Mainland Mauritius :1865 km <sup>2</sup> )
Population	1,288,000
Per Capita GDP (in US\$)	6, 871
Key Economic Pillars	Tourism, Textiles and EPZ, Agriculture, Financial and Business Services and other emerging sectors such as ICT, Seafood Hub, amongst
Climate	Sub tropical ( winter and summer )

# General statistics of the Coastal Zone

Length of the Coastline	322 kilometer (Km)
Marine Exclusive Economic Zone	Approx 1.9 million square Km
Lagoon areas	243 square km
Length of coral reefs	150 km
Area of coral reef	300 square km
Number of coastal wetlands	44
Area of Mangroves forests	14 square km (1994)
Species of mangrove trees	2 ( <i>Rhizophora mucronata</i> and <i>Bruguiera gymnorhiza</i> )
Number of islets around	49
Number of public beaches	88
Number of hotels ( end of September 2008)	99
Total Fish Catch (tons)	8,671
Marine Protected Areas (ha)	7216
<b>Length of coastline occupied by Hotels</b>	41.9 km
<b>Length of coastline occupied by Public Beaches:</b>	26.6 km

**WHAT IS HAPPENING TO  
OUR COASTAL ZONES?**

# Key Issues

## SEA BASED / LAND BASED Activities

- ***Tourism development & recreational activities ( Target of 2.5 m by 2015 ).***
- ***Past sand mining***
- ***Past uncontrolled development.***
- ***Illegal backfilling of wetlands***
- ***Unsustainable fishing practices ( Rodrigues lagoon).***
- ***Certain unsustainable land practices and soil erosion.***
- ***Wastewater discharge from non-point sources/agricultural run-off (eutrophication)***
- ***Natural calamities (cyclones, tidal surges)***
- ***Climate Change and sea level rise.***

# NEGATIVE ENVIRONMENTAL IMPACTS

- Erosion of shores due to construction within dynamic beach zone
- Deterioration of the coastal water quality - fouling of the seas with solid waste (also Marine Litter), effluent discharges, sewage and agricultural run-off leading to eutrophication /algal blooms
- Sedimentation of the lagoon
- Destruction of coral reefs
- Potential loss of biodiversity and decrease in fish catch
- Potential Contamination of beaches and seafood
- Flooding of low lying areas
- Loss in amenities

## Tourist arrivals, nights and receipts, 2006 - 2009

Year	Tourist arrivals (Number)	Tourist nights (000)	Tourism receipts <sup>1</sup> (Rs million)
2006	788,276	7,761	31,942
2007	906,971	8,987	40,687
2008	930,456	9,218	41,213
<b>2009<sup>2</sup></b>			
1st Qr.	232,908	2,275	10,265
2nd Qr.	180,596	1,625	7,984
<b>1st Semester</b>	<b>413,504</b>	<b>3,900</b>	<b>18,249</b>
3rd Qr.	195,381	1,950	7,436

<sup>2</sup>  
/

<sup>1</sup> Source: Bank of Mauritius

<sup>2</sup> Provisional

# Coastline Changes

	1990		1996		2004		
	Length of occupied coastline	% occupied on coast	Length of occupied coastline	% occupied on coast	Length of occupied coastline	% occupied on coast	
Under vegetation	103.7	32.2	76.2	23.7	74.0	23.0	↓
Agriculture	23.7	7.4	17.0	5.3	16.0	5.0	↑
Hotel sites	29.0	9.0	41.9	13.0	48.6	15.1	↑
Public beaches	18.9	5.9	26.6	8.3	28.9	9.0	

Source : Ministry of Housing and Lands

# Fisheries Production statistics

	2004	2005	2006	2007
<b>High seas</b>	<b>7,000</b>	<b>6,711</b>	<b>6,259</b>	<b>4,310</b>
Local vessels	7,000	6,711	6,259	4,310
Foreign vessels	-	(650)	-	-
<b>Coastal fishing</b>	<b>1,993</b>	<b>1,897</b>	<b>2,114</b>	<b>1,754</b>
Lagoon and off lagoon	1,043	947	1,164	804
Sport Fishing	650	650	650	650
Amateur Fishing	300	300	300	300
<b>Ponds and barachois</b>	<b>437</b>	<b>374</b>	<b>472</b>	<b>180</b>
<b>Total Production</b>	<b>9,430</b>	<b>8,982</b>	<b>8,845</b>	<b>6,244</b>



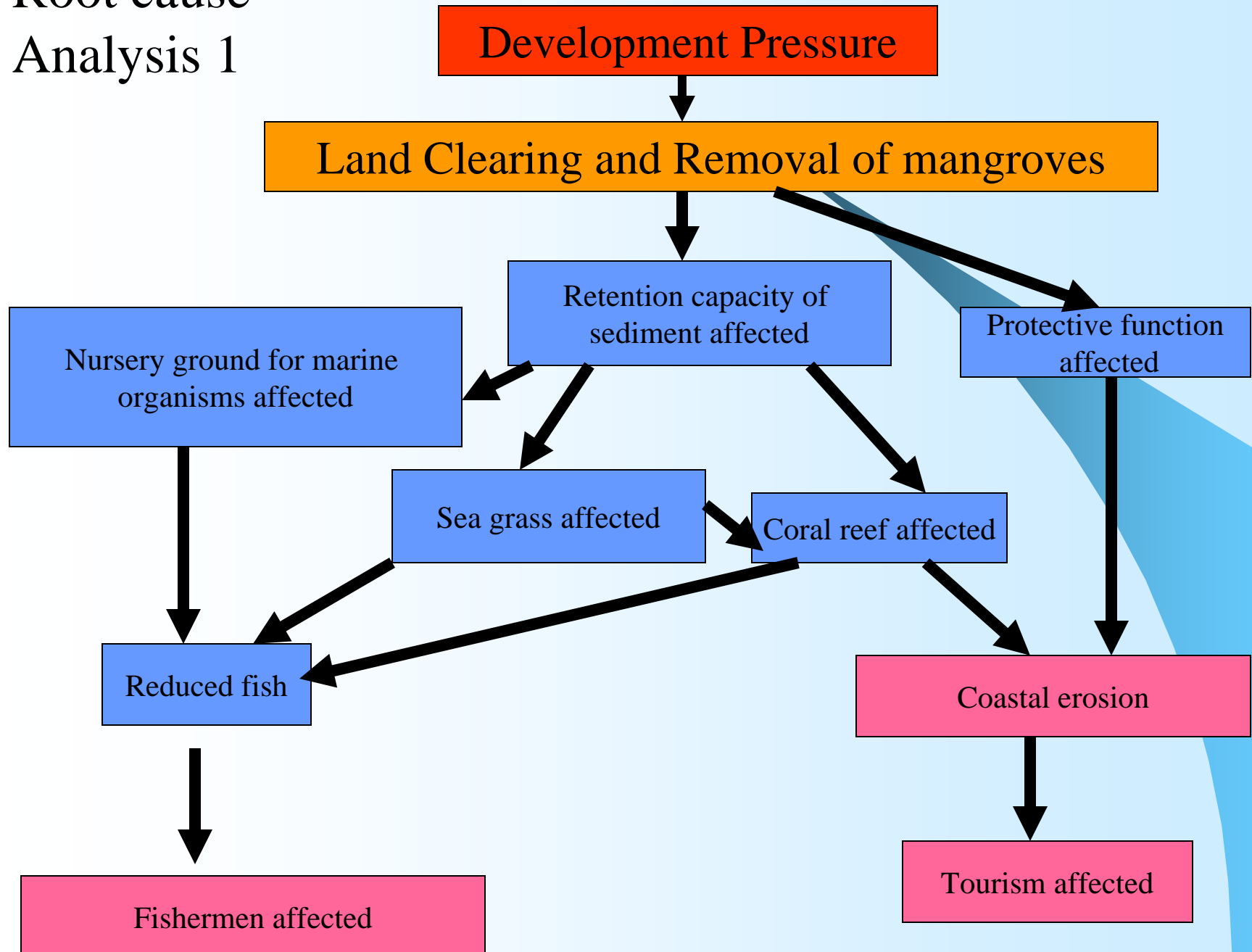
Source : Central Statistics Office 2009

# ICZM IN MAURITIUS

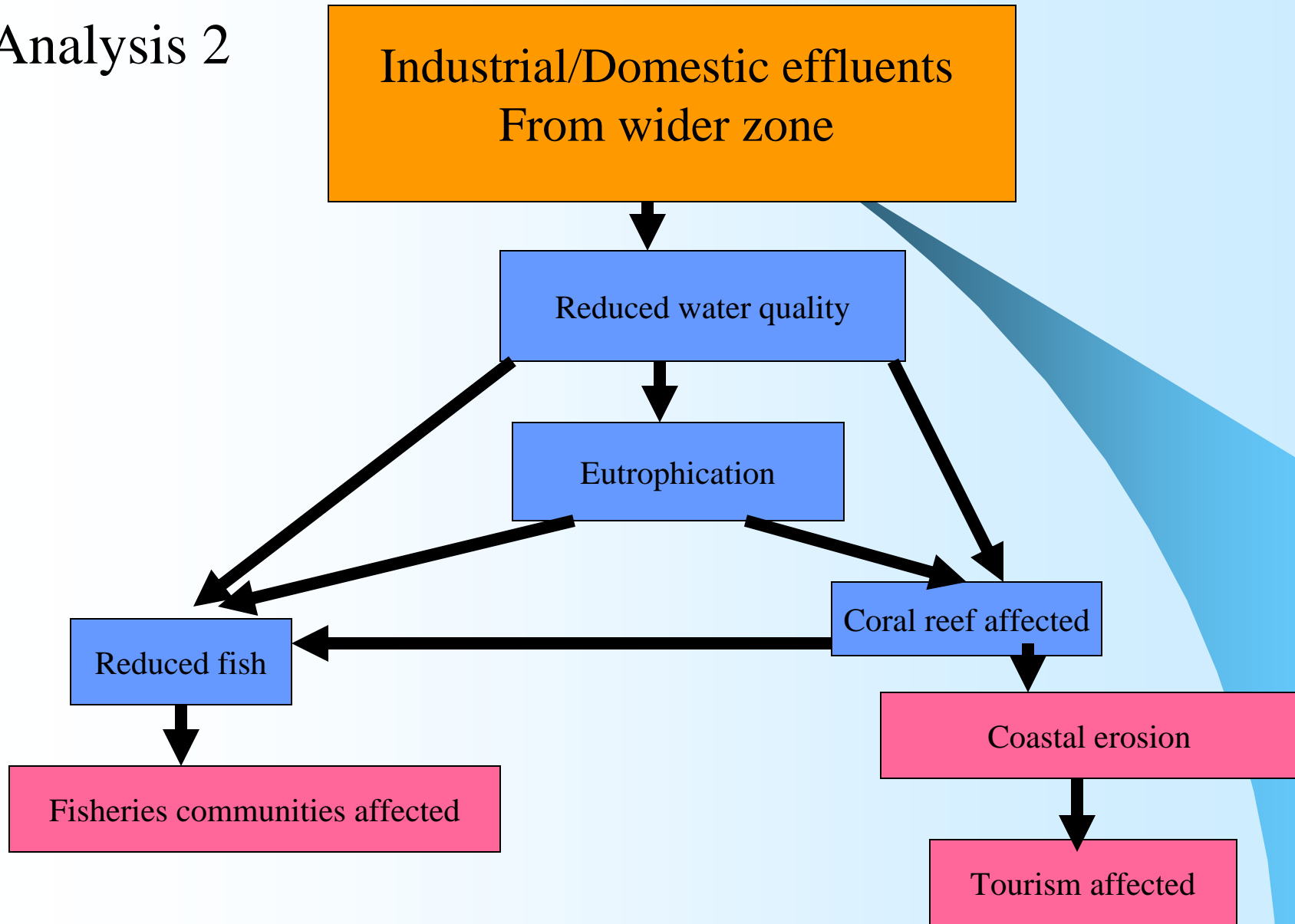
# Systems in Coastal Zone Management

- **Coastal areas are the meeting place of many systems:**
  - **Physical (natural and man-made features)**
  - **Biological**
  - **Social/Cultural**
  - **Economic**
  - **Political**
- **Understanding “system” is a key to management of coastal areas**
- **Stress, or change, in one system can have significant impact on other linked systems.**
- **ICM is “System Management” meant to achieve sustainability**
  - **Requires knowledge and understanding of several different sub-systems, their interlinkages and how they interact.**

# Root cause Analysis 1



# Root cause Analysis 2



## **Common Goals of ICZM (Cicin – Sain and Knecht, 1998)**

- **To achieve system cohesion, comprehension;**
- **To improve system efficiency and improve quality of life of coastal communities ;**
- **To reduce conflicts;**
- **To reduce waste in resource utilisation;**
- **To reduce vulnerability to coastal resources and inhabitants;**
- **To achieve balanced dynamism and sustainable well being of coastal ecosystems.**

**On the overall : To achieve sustainability through improved governance**

## Typical functions performed under ICZM

- *Area Planning*, to provide long term vision, plan for present and future uses)
- *Promotion of Economic Development*, to ensure sustainable uses
- *Stewardship of Resources*, through protection of ecological base, conservation, management, and education, public outreach
- *Institutional Policy Harmonisation* to avoid sub optimal, externalities and potential conflict among coastal users
- *Protection of Public Safety* against natural and manmade hazards
- *Proprietorship of public submerged lands and waters-* to manage resources wisely and with good economic return to the public

## **Pre-requisite for an ICZM?**

- (i) Political Will
- (ii) Policies and Planning tools.
- (iii) Regulatory Framework (Polluter-pays-principle / stewardship).
- (iv) Institutional Framework & efficient coordination
- (v) Qualified/trained Human Resource
- (vi) Public outreach programme (promotion of best practices/stewardship).
- (vii) Monitoring and Evaluation
- (viii) Feasible measures & Actions
- (ix) Financial Resources

# Key ICZM Policies

- Set back Policy (30 m)
- Architectural and building guidelines ( eg building on steep slopes)
- Waste water treatment plant for hotels (>30 rooms)
- No Removal of mangroves.
- Ban on coral sand extraction from the lagoon.
- Ban on collection of corals
- Building to comply with Planning Guideline.

# Key ICZM Policies (contd...)

- No development on environmentally sensitive areas
- Promote integrated development
- Composting of green wastes
- Reuse of treated wastewater
- Control of industrial/domestic pollution.
- Use of ecosystem approach at concept stage
- Provision of Drainage systems
- Provision of Solid waste disposal
- Heritage sites and conservation guidelines
- Use of Economic Instruments (EPF, Tax etc)

## Key Policy Documents (Principles of ICZM are enshrined)

1. National Development Strategies (2003) (30 m setback)
2. Development Policy Planning Guidelines for the coastal zone
3. Policy Guidelines at the level of Local Authorities.(Outline Schemes)
4. Ten year Fisheries Management Plan
5. National Environment Strategies for the Next Decade (2007)
6. Management Plans for the Protection and Conservation of Islets ( 2004)
7. Technology Needs Assessments and Maintenance and Enhancement of Capacities for Climate Change (2004) .

## Key Policy Documents (contd...)

8. National Biodiversity Strategy and Action Plan (2006)
9. Report on Legal, Regulatory and Institutional Frameworks + Report on the ratification and implementation of international environmental conventions relevant to land based activities and sources of pollution of the coastal and marine environment of Mauritius (under Nairobi Convention (2006))
10. National Environment Policy
11. National Sewerage Master Plan
12. National Solid Waste Management Plan
13. Oil Spill Contingency & Response Plans.
14. Islets Management Plans

# Key Tools

- Use of EIA mechanism to control development of activities potentially harmful to the coastal environment
- Land Planning ( Outline scheme, delimitation of Environmentally sensitive areas through use of GIS)
- Use of GIS for Management of Hotspots/Pressure zone/Zoning of lagoon ( 6 pressure zones identified)
- Use of GIS to do Biotope Mapping
- Lagoonal Water Quality Index

# Coastal Resource Inventory

<i>Habitat</i>	<i>Area (Ha)</i>	<i>% of marine area</i>
Unclassified	0.07	0.0
Beach sand	4.12	1.2
Coral Rubble	20.80	5.9
Coral Rubble Patches	13.39	3.8
Dead Coral Reef	69.25	19.7
Dead Coral Reef Patches	5.42	1.5
Macroalgae	10.92	3.1
Over 30% live reef	1.98	0.6
Rocks	11.76	3.3
Sand (underwater and visible)	204.05	57.9
Seagrass	0.68	0.2
Seagrass patches	5.96	1.7
Turf Algae	3.99	1.1
<b>Total Area</b>	<b>352.39</b>	<b>100.0</b>

## Coastline structures

	<b>km's of coastline</b>	<b>% of coastline by length</b>
Loose Boulders	0.11	1.5
Domestic Defensive Structures	0.64	8.8
Gabions	0.30	4.2
Other walls (away from immediate HWM)	0.18	2.5
Roadside walls	0.14	1.9
Retaining walls	2.87	39.5

Statistics

# LEGAL FRAMEWORK

## MAIN ACTS

- Wildlife and National Parks Act 1993
- Waste Water Management Authority Act 2000
- Environment Protection Act 2002
- Beach Authority Act 2002
- Tourism Act 2002
- Planning and development Act 2004
- Local Government Act 2005
- Maritime Zone Act 2005
- Fisheries & Marine Resources Act 2007

# ICZM COMMITTEE

Section 50 of the Environment Protection Act 2002 (Act No. 19 of 2002) makes provision for the establishment of an Integrated Coastal Zone Management (ICZM) Committee.

# **FUNCTIONS OF ICZM COMMITTEE**

- Develop an Integrated Management Plan
- Coordinate regional and international projects
- Monitor coastal water quality and coastal resources, including wetlands
- Conduct and recommend studies on Beach Erosion and propose measures for its control
- Make recommendations for the upgrading of recreational facilities

# **FUNCTIONS OF ICZM COMMITTEE**

(contd...)

- Coordinate the management of Islets and Outer Islands
- Make recommendations on guidelines for coastal constructions
- Propose Oil Spill Contingency Planning and Sensitivity Mapping
- Generally, make recommendations to the Minister on the management and protection of the Coastal Zone

# KEY INSTITUTIONAL ORGs WITH RESPONSIBILITIES RELATED TO COASTAL RESOURCES

**Department of Environment**

**EIA, ICZM , PPC**

**Ministry of Local Government (Beach Authority)**

**Management of public beaches**

**Ministry of Agro-Industry, FP&S**

**conservation of marine resources and fisheries management**

**Ministry of Home Affairs**

**Coast guard/police**

**Ministry of Housing and Lands**

**Physical planning**

**Ministry of Shipping**

**Marine pollution from vessels**

**Mauritius Port Authority**

**Port functions**

**Ministry of Tourism**

**Coastal hotels and recreation**

**Prime Minister's Office**

**Meteorological services**

# Monitoring and Evaluation

- Normally inbuilt in projects.
- Lagoonal water quality monitoring (Hotspots).
- Wastewater Audit (monitoring waste water discharge)
- Monitoring of Ex-sand mining sites.
- Annual survey on coastal/beach erosion

# Research and Development

Undertaken by the Mauritius Oceanography Institute (MOI)/Mauritius Research Council/University of Mauritius/Albion Fisheries Research Centre.

- Study on algae and seaweed
- Identification of offshore sand deposits
- Physical oceanography projects
- Control of IAS and others
- Ballast water monitoring , etc

## **Other Relevant/ Major Initiatives**

1. Implementation of the Sewerage Master Plan
2. Implementation of a Solid waste management plan
3. Implementation of 28 projects under the National Environmental Strategies
4. Implementation of a National Programme on Sustainable Consumption and Production
5. Coastal Protection and Rehabilitation works
6. Review of the NOSCP and Oil Spill Drill Exercises
7. National Sensitisation programme (Factsheets, films, Talks, Clean up campaigns etc)

## Some of Key Regional Initiatives

1. IOC/EU RECOMAP Project – Capacity building of stakeholders on ICZM practices
2. Marine Protected Areas (IOC)
3. National Training programme on improving Municipal Wastewater Management + Preparation of NPA (UNEP/GPA)
4. UNEP/GEF WIOLaB Project: Demonstration Projects - ‘*Solid Waste Management in the Ports Area*’ and ‘*Restoration of Native forest*’
5. WB/GEF Maritime Highway Project.

**Highlights of relevant  
Projects & studies  
undertaken by MoE & NDU**

# **ICZM STUDIES by Ministry of Environment (2000 – 2009)**

- Study on Environmental Risks in the Grand Bay area ( 2002)
- Study on Coastal Erosion (2003)
- Preparation of Management Plans for the Protection and Conservation of Islets ( 2004)
- Preparation of a Strategic EIA for Identification of Sites For Marina, Ski Lanes and Bathing Areas (2005)
- Integrated Coastal Zone Management Framework for Mauritius (2009)
- Study on identification and mapping of Environmentally Sensitive Areas in Mauritius (2009)

# Integrated Coastal Zone Management Framework for Mauritius

## ● Objectives

- To prepare an ICZM Strategy for Mauritius in line with government policies and strategies.
- To review and develop an appropriate policy and a regulatory framework that promote ICZM
- To develop ICZM (area and action) plan(s) for pressure zones. The area plan(s) will guide future development .

# Integrated Coastal Zone Management Framework for Mauritius

- Key Outputs
  - a) Memoranda of Understanding for Data sharing
  - b) Guideline on Coastal Constructions
  - c) Database for Coastal Zone Management
  - d) Institutional Strengthening and Capacity Building
  - e) Financial Strategies
  - f) Environmental Monitoring Plan
  - g) ICZM Strategy
  - h) ICZM policy and legislative frameworks
  - i) ICZM Area and Action Plans

# Study on identification and mapping of Environmentally Sensitive Areas in Mauritius (2009)

## • Objectives

- Identify, classify and demarcate all environmentally sensitive areas (ESAs) in Mauritius and Rodrigues.
- Prioritise the ESAs for protection and create a database for all ESAs to support and enhance decision-making.
- Develop a comprehensive policy and legislations for the protection, conservation and sustainable development of ESAs in line with the NDS, and
- Prepare a comprehensive management plan for ESAs which will be financially and institutionally sustainable in Mauritius and Rodrigues

## Study on identification and mapping of Environmentally Sensitive Areas in Mauritius (2009)

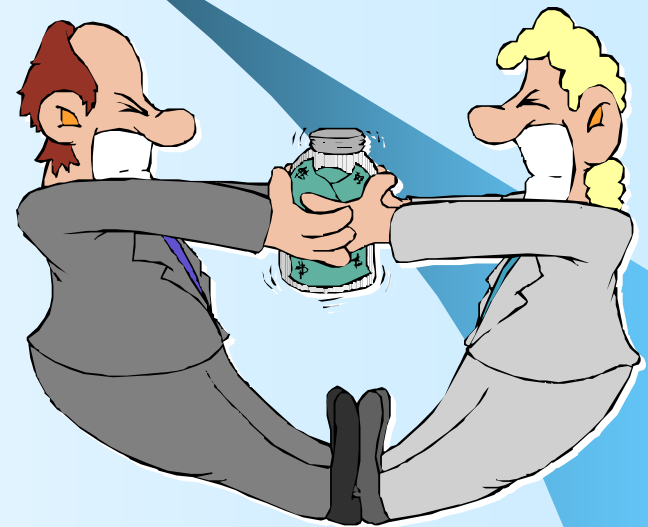
- **Outputs**

- Survey Report on Gran Baie Wetlands.
- Final National Report on Wetlands.
- ESA Database
- ESA Policy Paper
- ESA Classification Report
- ESA Management Plan

# **Institutional Challenges**

**Recap :**  
**Coastal zone is also a place where conflicts occur because of scarce resources**

- **Within sectors (e.g. artisanal vs commercial fisheries)**
- **Between sectors (e.g. tourist industry vs artisanal fisheries, for hotel development, mangrove clearing, etc...)**



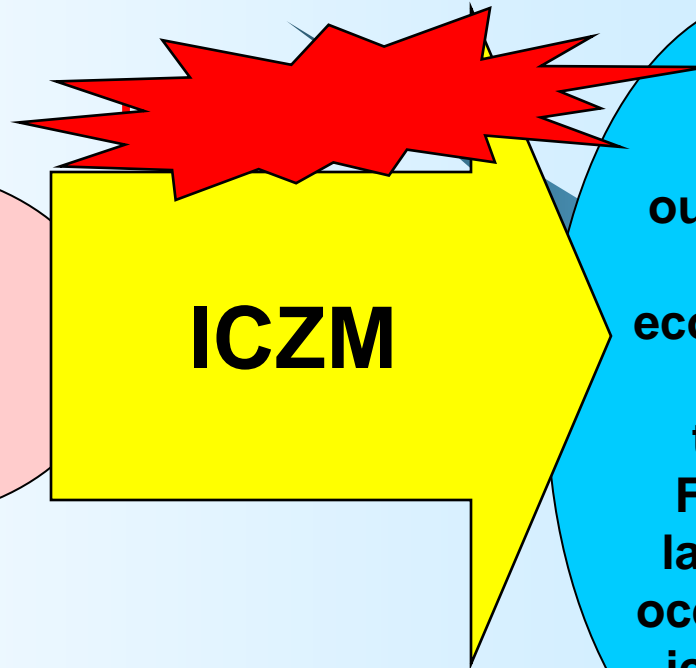
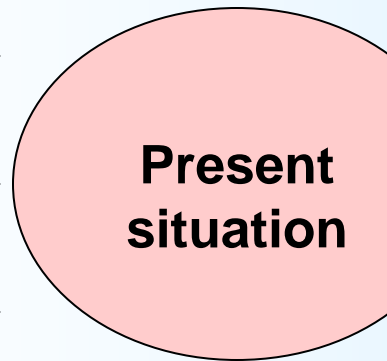
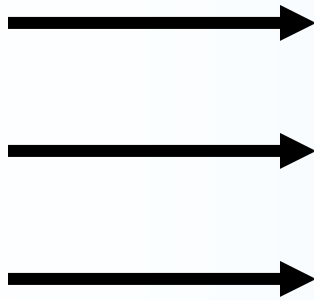
# Some of the Key Institutional Challenges

- The level of priority and attention accorded to the issues can vary at the level of the organisations
- The executing agencies often have **inadequate technical and financial resources and trained human resources**
- Overlapping Legislations.
- Limitation in knowhow that suit local context (capacity building and technology transfer needed)
- Data sharing
- Achieving synergies in the implementation of measures
- Joint Research Programme

# Conclusion

Threats/ Issues  
/ Challenges

Land Based Pressures



Desired outcome : A healthy ecosystem to Sustain tourism, Fisheries, land based oceanographic industry

Sea Based Pressures

# For Additional Information

- Website: <http://environment.gov.mu>
- E-mail: [menv@mail.gov.mu](mailto:menv@mail.gov.mu)  
[dirdoe@mail.gov.mu](mailto:dirdoe@mail.gov.mu)  
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*Photo Courtesy: MTPA*