Integrated Coastal and Ocean Management

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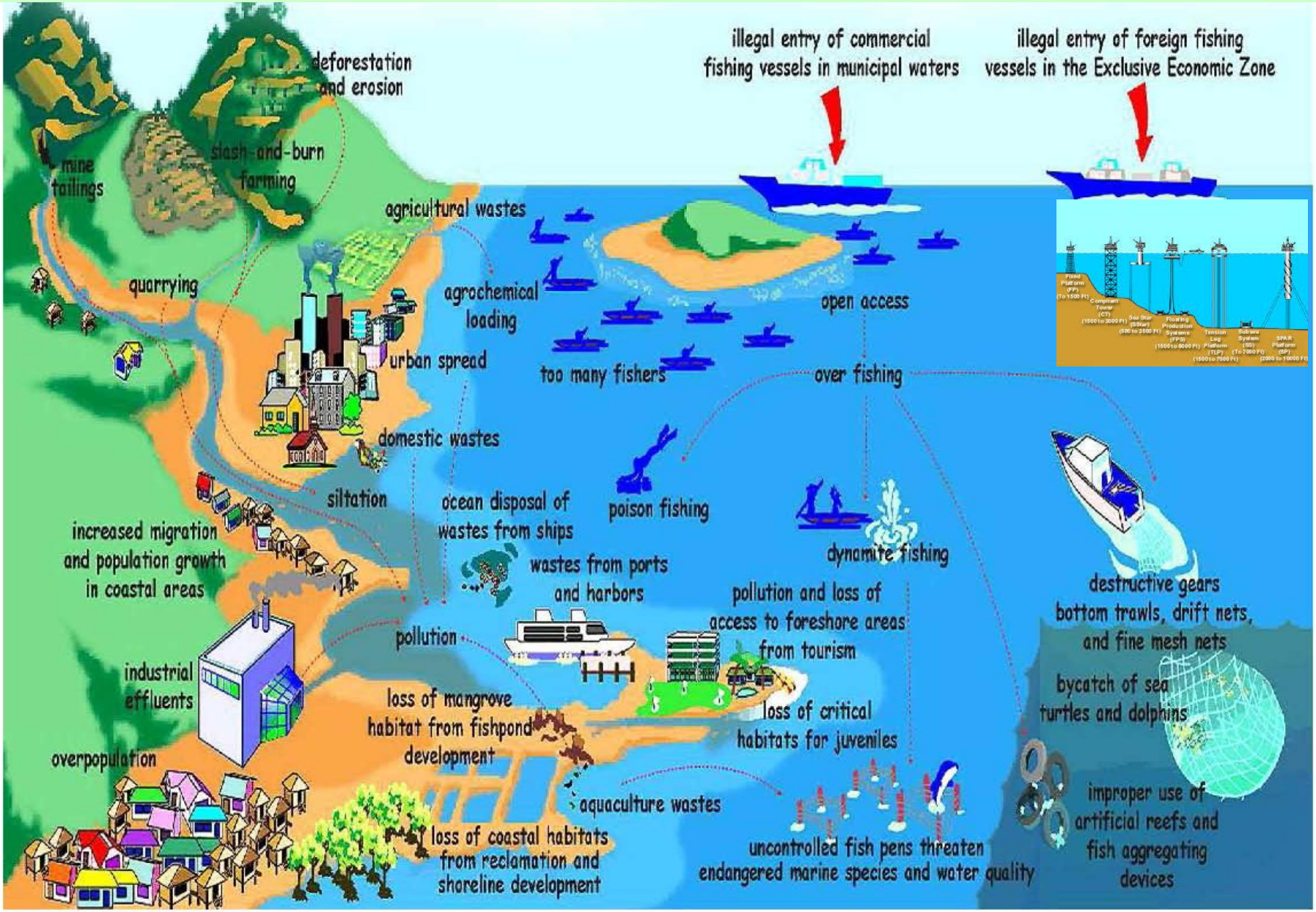
Session Objectives

- Expanding and deepening participants' exposure of the **theoretical and practical** aspects of integrated coastal and ocean management (ICOM; ICM; ICZM; ICAM)
- Recognize and fully appreciate the breadth and depth of **uses** of the ocean and the **benefits** that the ocean provide
- Understand that **trade offs** will have to be made for effective management, given that human"**demands exceeds supply**"
- Emphasizing practical management **skills and tools** for use in the practice of ICOM;
- Focusing on **problem/case-based** learning.

Format

1. Challenges and context of ICOM
2. ICOM objectives
3. Terminology
4. Drivers, pressures and major issues
5. ICOM process and practical exercise

1. Challenges to managing activities in the coastal zone? environmentally, socially, economically, legally, institutionally?



Ecosystem Context

The benefits people obtain from ecosystems

Provisioning

Goods produced or provided by ecosystems

- food
- fresh water
- fuel wood
- fiber
- biochemicals
- genetic resources

Regulating

Benefits obtained from regulation of ecosystem processes

- climate regulation
- disease regulation
- flood regulation
- detoxification

Cultural

Non-material benefits obtained from ecosystems

- spiritual
- recreational
- aesthetic
- inspirational
- educational
- communal
- symbolic

Supporting

Services necessary for production of other ecosystem services.

- Soil formation
- Nutrient cycling
- Primary production

MEA, 2003

Benefits from Marine and Coastal Ecosystems and Activities

Coastal tourism

The volume of global tourist arrivals increased more than 20 times between 1950 and 1995, making tourism the world's fastest-growing industry. The present number of tourists is expected to double by 2010 – particularly in the Caribbean and Asia-Pacific regions, where much of the industry is concentrated in coastal areas.

$ 161 billion

Trade and shipping

Since the 1950s, the annual volume of shipping and seaborne trade has risen sixfold, to more than 5 billion tonnes of oil, dry bulk goods and other cargo. In 1995, there were 27,000 freighters over 1,000 tonnes in operation. Industrial countries account for 50% of the cargo loaded – and 75% of that unloaded.

$ 155 billion

Offshore oil and gas

Since gasoline was first used in California a century ago, the oil and natural gas industry has skyrocketed to meet soaring energy demands. Today, about 20% of the world's oil and natural gas comes from offshore drilling installations in the Middle East, the United States, Latin America, and the North Sea.

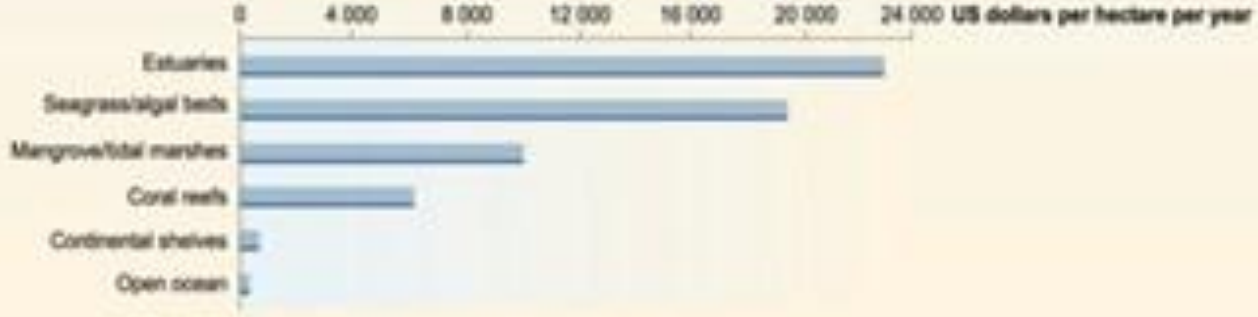
$ 132 billion

Fisheries

Between 1950 and 1997, global fish production from capture and culture fisheries grew from 20 million tonnes to 122 million tonnes, with the per capita supply doubling from 8 kg to 15 kg. Over 200 million people rely on fishing for their livelihoods, with more than 80% of all fish (by value) sold in industrial countries.

$ 80 billion

Estimated Mean Value of Marine Biomes



Source: Anne Platt McGinn, *The Health of Oceans*, Worldwatch paper 145, Worldwatch Institute, 1999, Washington DC (www.worldwatch.org) ; Costanza, R., et al.

ICOM COMPONENTS

Coastal environment

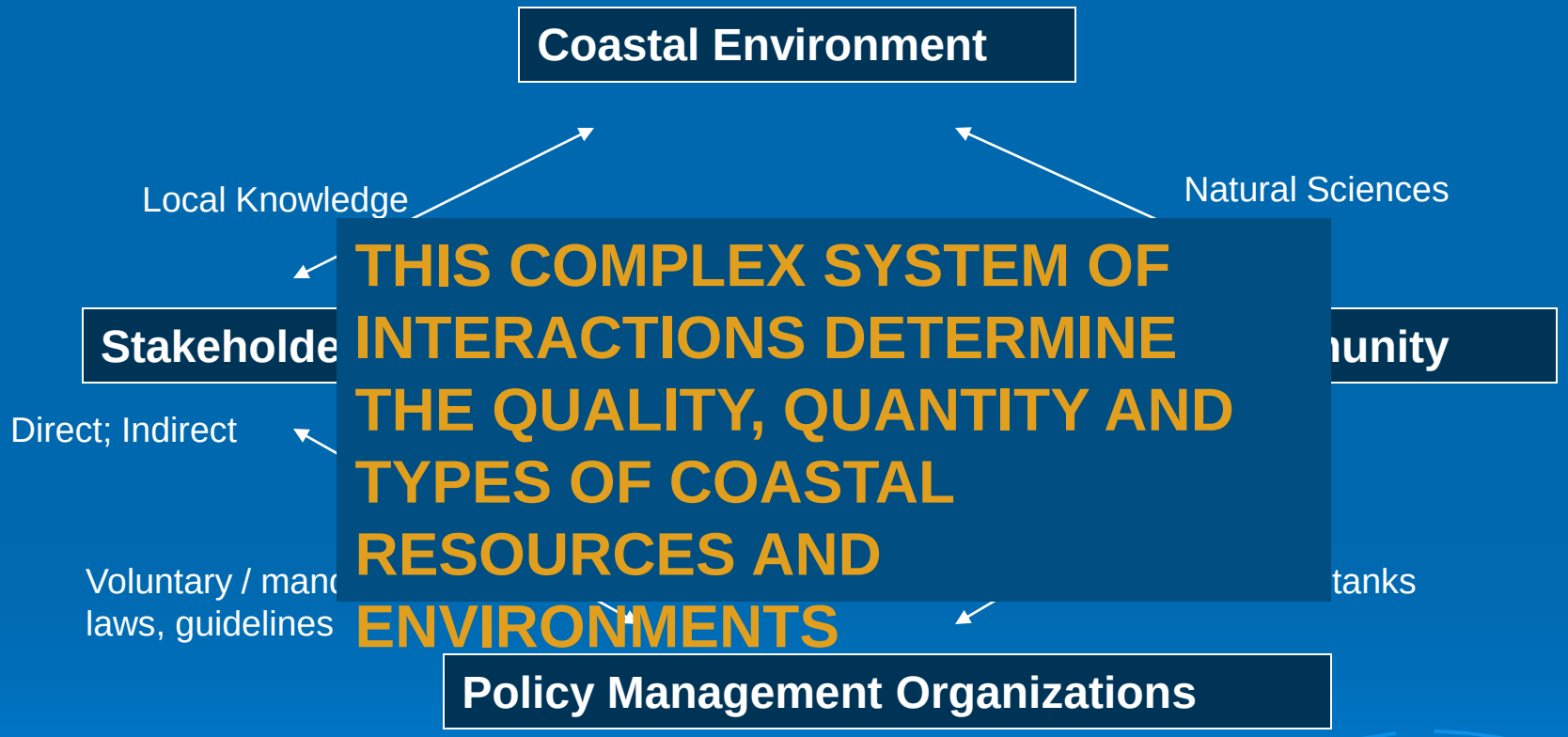
Stakeholders

Decision-makers, policy makers, managers

Advisors and Scientists

The Coastal Management System:

Cultural-Ecology of Coastal Public Policy Making



Adapted from Orbach, 1995

Challenges to be addressed

When perceptions of a problem vary broadly,

When there is uncertainty in the scientific assumptions and outcomes that underlie the process,

consensus on trade-offs is difficult to achieve.

Weinstein et al., 2007

Identifying and Addressing Ongoing Challenges in the coastal zone

- Many jurisdictions
- Secondary responsibility of most; primary responsibility of none
- Traditional “silo” focus
- Pursuit of economic goals divorce from environmental and social goals & vice versa
- Lack of agreed priorities
- Failure to appreciate interconnections within coastal systems (natural and social)
- Inadequate legislation and/or lack of enforcement
- Lack of trained personnel, relevant technologies, equipment, etc.
- Little decentralization of power to lower levels of governance
- Many nations’ governance capacity severely constrained by deep divisions among their populations (e.g., race, religion, ethnic or linguistic group, socio-economic class)

In a nutshell

- Humans depend on the world's coasts for living space, extractable commodities, and economic growth.
  - Managing how people and other coastal biota share space and resources becomes the great challenge of the 21st century
- Conflict mitigation, consensus building, trade-offs, sacrifice, and compromise will become the norm for sustainable coastal management
- A sustainable future will also depend on balancing both ecology and commerce management of coastal resources, proportional to human dominance in the landscape

2. What can be done?

PLAN and MANAGE USING ICOM!

An integrated systems approach, taking into account conflicting goals and inter linkages among environmental issues and humans as well as the geographic scales of both the issues and political jurisdictions.

CZ - Most contentious piece of real-estate on the planet!

Space that resources occupy can be more important in institutional design than the functional sectors in which the activities belong!

- **Multi-resource system**
  - Provides space, resources and performs regulatory functions
  - Mismatch between coastal and oceanic systems and administrative authorities
- **Multi-user system**
  - Involves many stakeholders with differing interests and capabilities
  - Involves many agencies at the sub-national and/or national level of government
- **Transition zone**
  - coastal productive and defence functions linked to physical and socio-economic conditions far beyond its physical boundary
  - different coastal processes/systems interact in CZ
  - government authority can change abruptly

The #1 problem of the coastal manager is the problem of the 'dual' mandate

"The need to reconcile society's desire to preserve, restore, and rehabilitate natural ecosystems …

while at the same time …

ensuring the provision of reliable, predictable, and stable supplies of goods and services at a time of escalating demand"

(Roe and van Eeten 2001)

So, how do we address this dilemma?

Through ICOM!

ICOM is a continuous and dynamic process by which decisions are made for the sustainable use, development, and protection of coastal marine areas and resources.

(Cicin-Sain and Knecht, (1998)

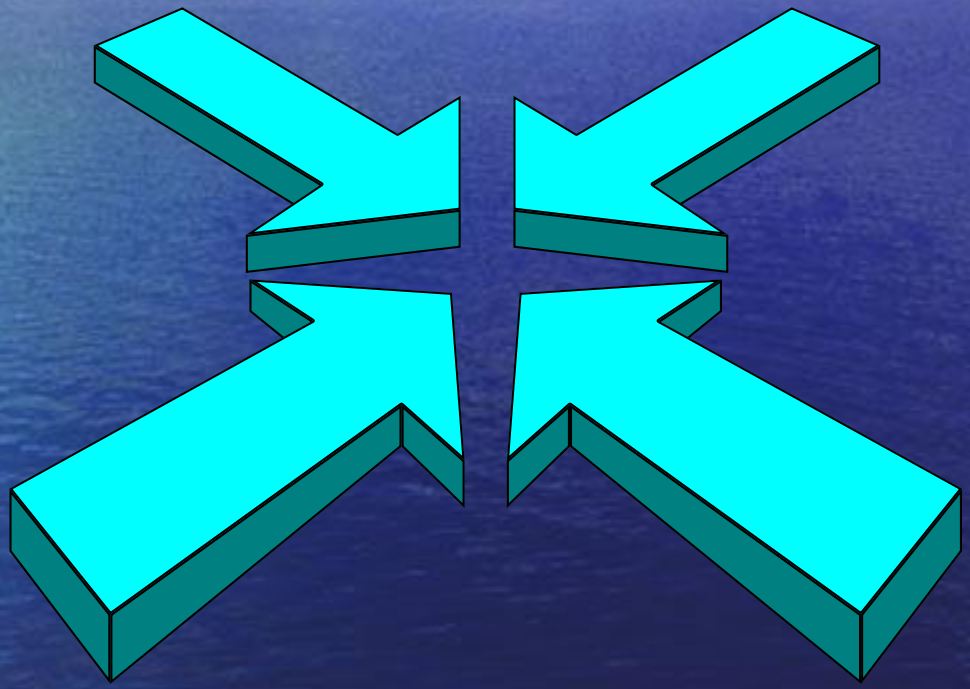
Aim is to maximize benefits while minimizing conflicts while being guided by principles of sustainable development

(World Bank, 1993)

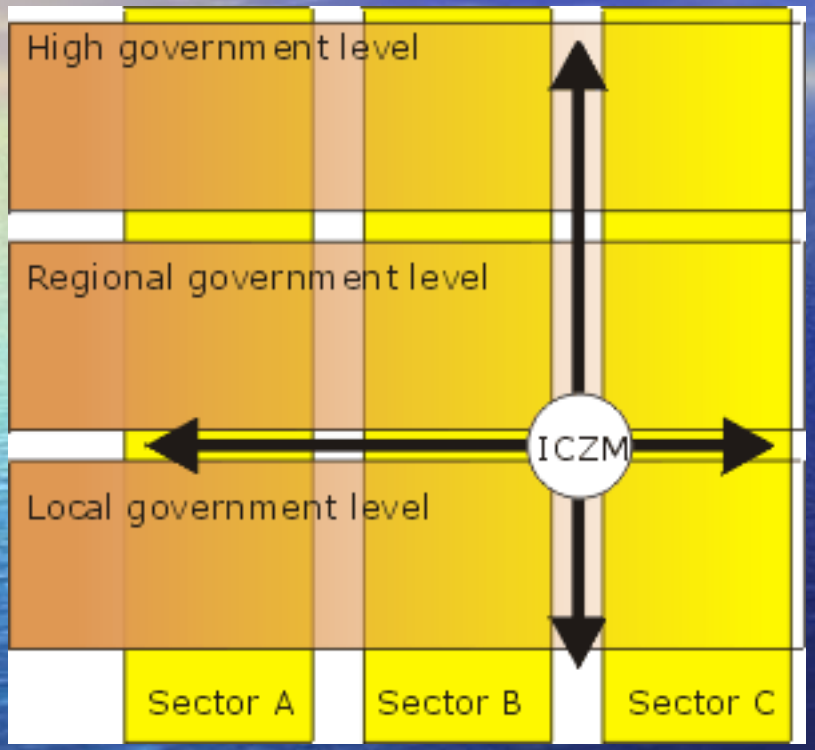
Frameworks and international ICOM-related guidelines

Year	Organization	Framework and Guidelines
1992	UN	Agenda 21, Chapter 17
1993	OECD	Coastal Zone Management: Integrated Policies
	World Bank	Guidelines for Integrated Coastal Zone Management
	IUCN	Cross-Sectoral, Integrated Coastal Area Planning: Guidelines and Principles for Coastal Area Development
1995	UNEP	Guidelines for Integrated Management of Coastal and Marine Areas: With Special Reference to the Mediterranean Basin
1996	UNEP	Guidelines for Integrated Planning and Management of Coastal and Marine Areas in the Wider Caribbean Region
1997-2001	IOC	Methodological guide to integrated coastal management Steps and tools towards integrated coastal area management
1998	FAO	Integrated Coastal Management and Agriculture, Forestry and Fisheries
1999	UNEP	Conceptual Framework and Planning Guidelines for Integrated Coastal Area and River Basin Management
	EC	Towards a European Integrated Coastal Zone Management (ICZM) Strategy: General Principles and Policy Options
	Council of Europe	European Code of Conduct for Coastal Zones
2000	CBD Baseline 2000	Review of Existing Instruments Relevant to Integrated Marine and Coastal Area Management and their Implementation for the Implementation of the CBD
2004	CBD	Integrated Marine & Coastal Area Management Approaches for Implementing the CBD
2006	IOC	Measuring the process and outcomes of integrated coastal and ocean management
2009	IOC	Hazard assessment and risk mitigation in integrated coastal and ocean management
2002/12	UN	**Rio+10 (Cape Town) and Rio+20 (Rio de Janiero)**

What needs to be integrated?



Integration in ICOM - Vertical and Horizontal

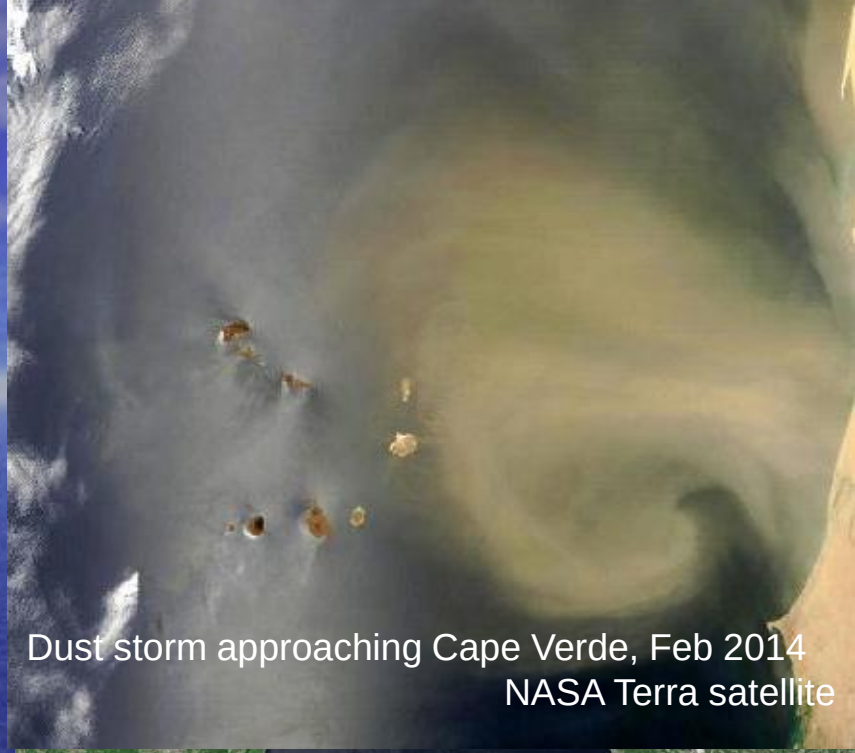


Sectoral approaches undervalues importance of other sectors in their analysis

- **Inter-sectoral (horizontal)**
  - Among different coastal and marine sectors
  - Between coastal and marine sectors and land-based sectors
  - Among government agencies in different sectors
  - Between government agencies and other stakeholders in different sectors
- **Intergovernmental (vertical)**
  - Among different levels of government, all of whom play different roles, address different public needs and have different perspectives

Other Types of Integration

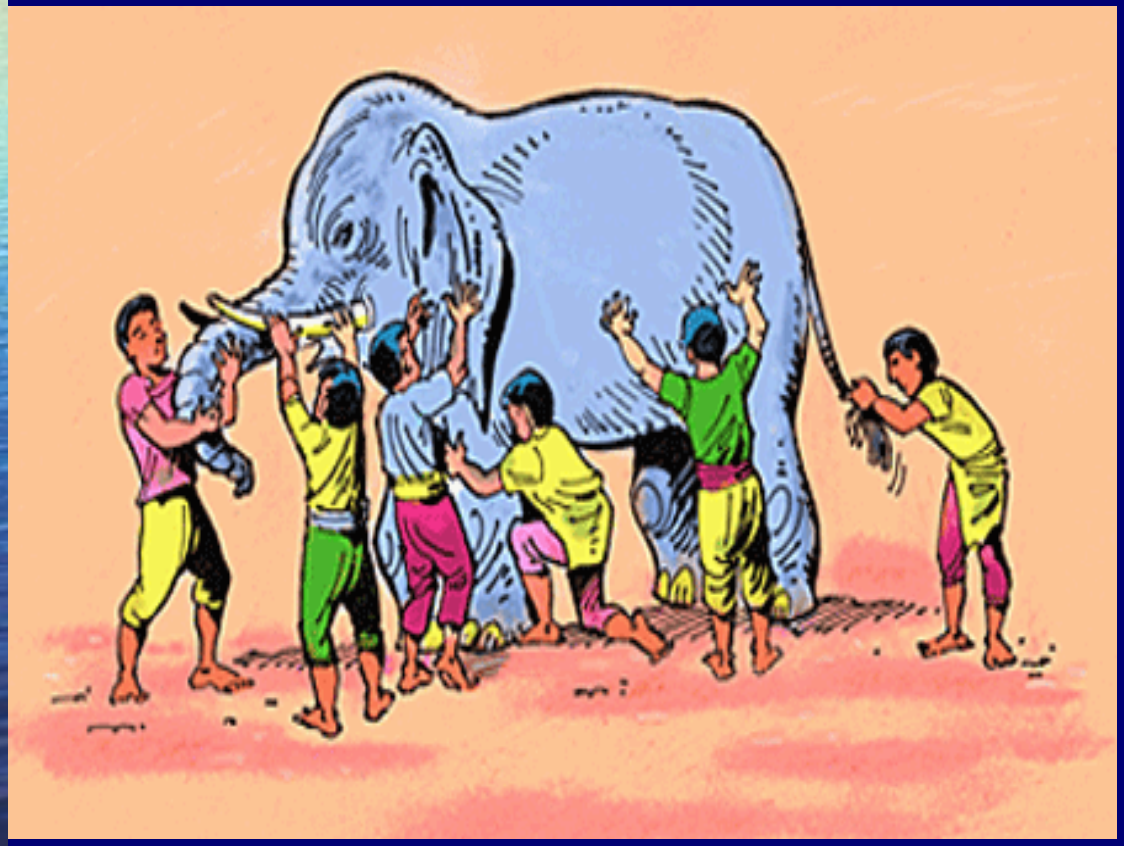
- Spatial integration
  - between inland areas, coastal lands, coastal waters, offshore waters and high seas
- Science-Management integration
  - among different scientific disciplines and management
- International integration
  - to address transboundary issues, etc.



Dust storm approaching Cape Verde, Feb 2014
NASA Terra satellite

3. The many "pieces" playing a role in ICOM

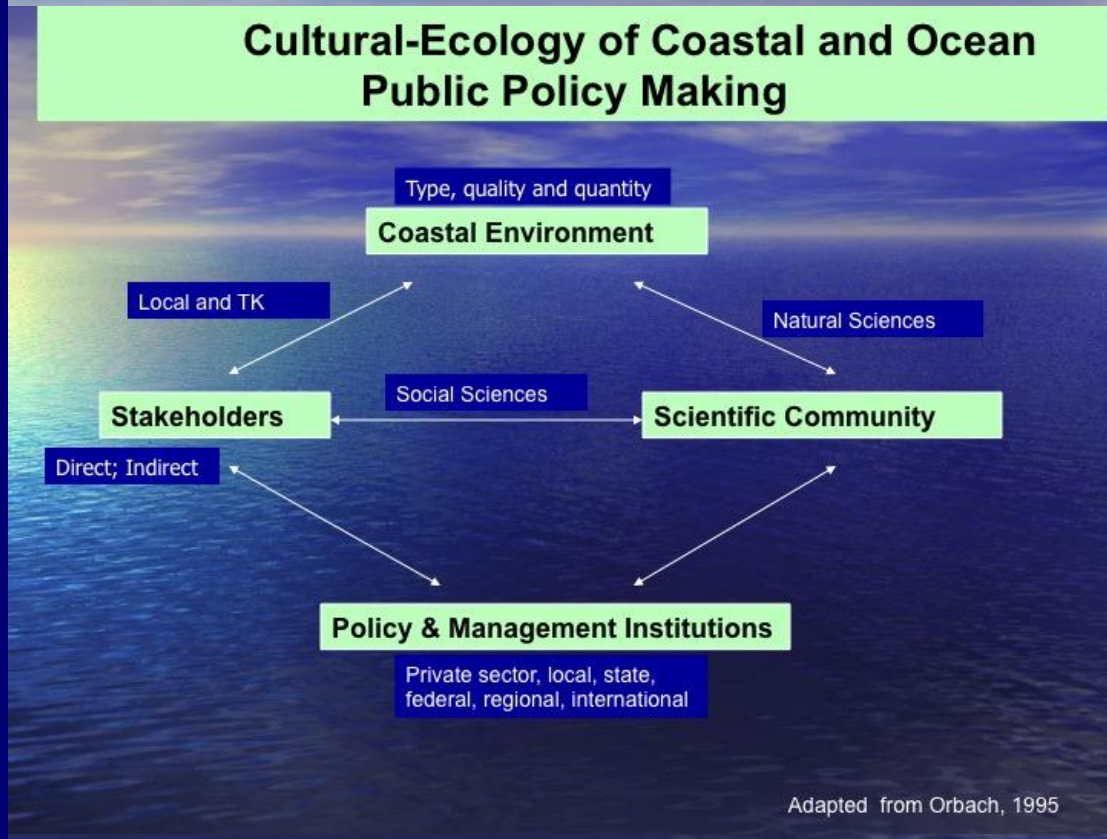
- Terminology changes with knowledge and fashion.



Parable of the 6 blind men:
One's subjective experience can be true but fails to account for other truths or a totality of truth

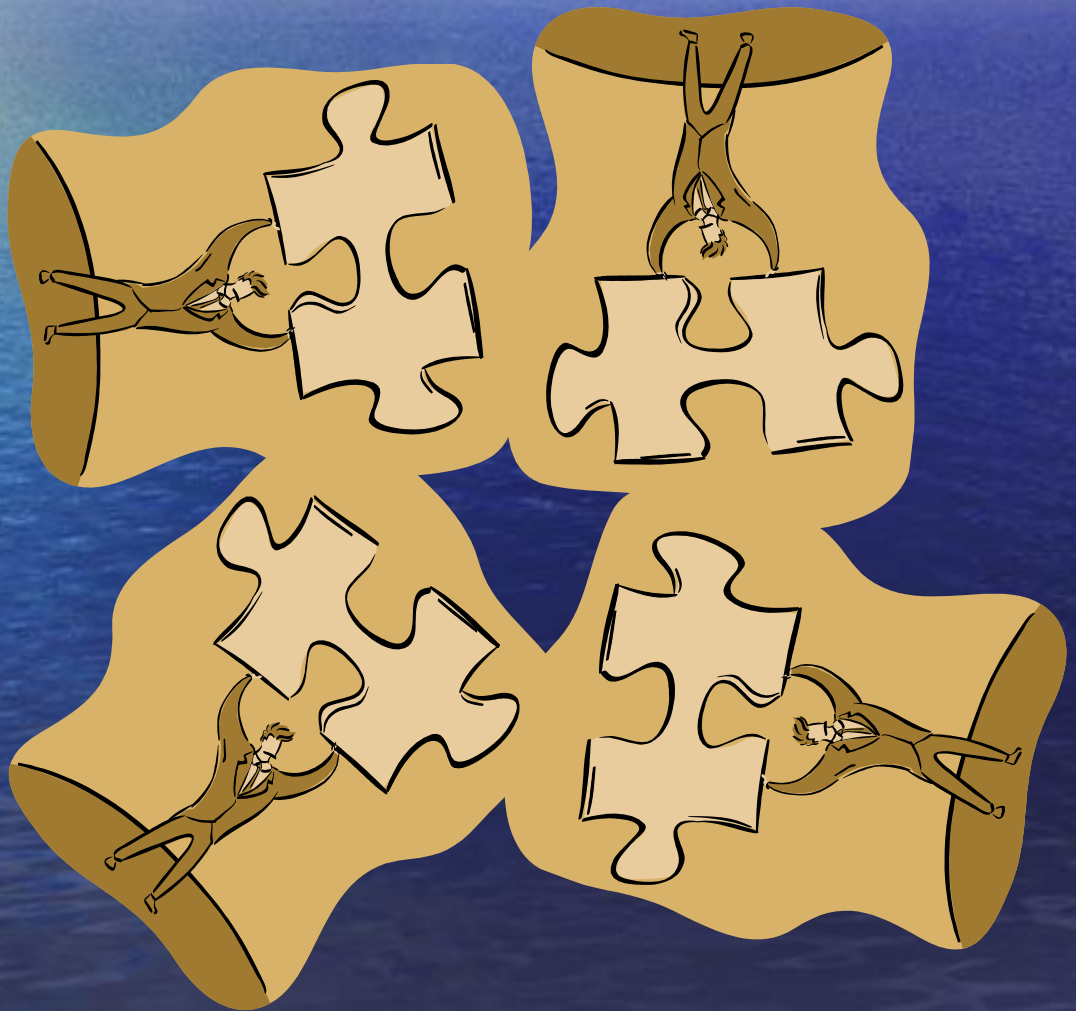
Understanding Terminology

- In ICOM planning, 3 major areas need to be commonly understood
  - The environment
    - Natural system, functions, time scale, how changing
  - The interactions of man with the environment
    - Activities, impacts
  - Management objectives
    - Our attempt to control activities and impacts



Terminology

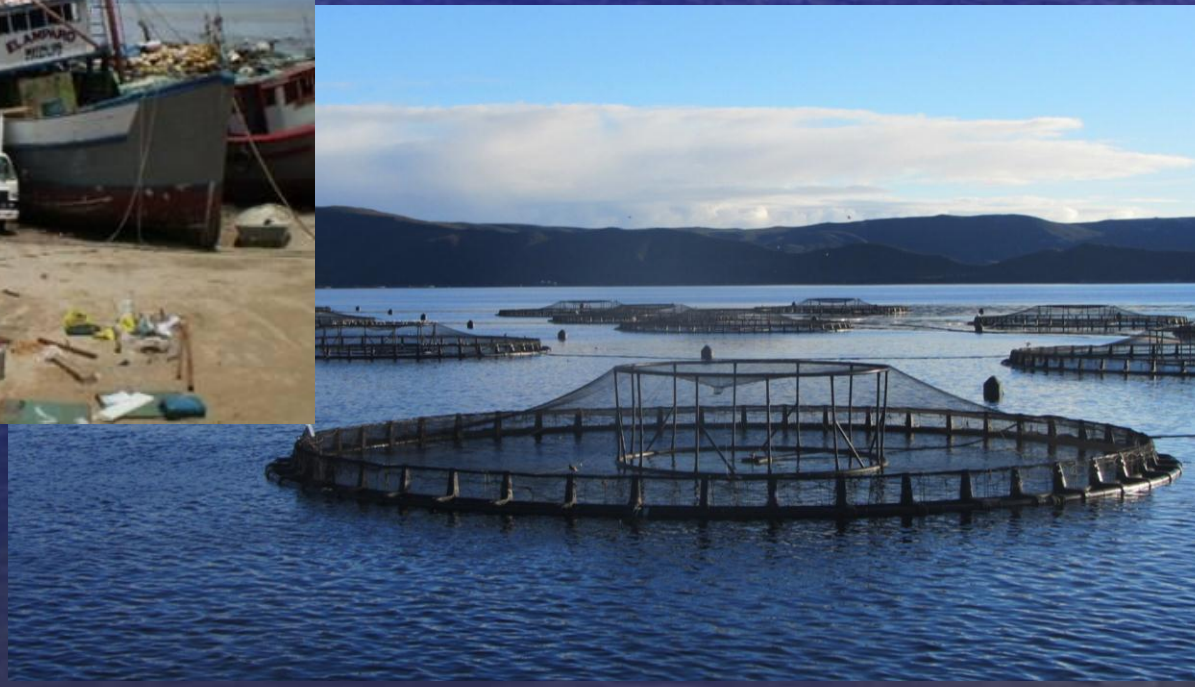
The ICM Jigsaw



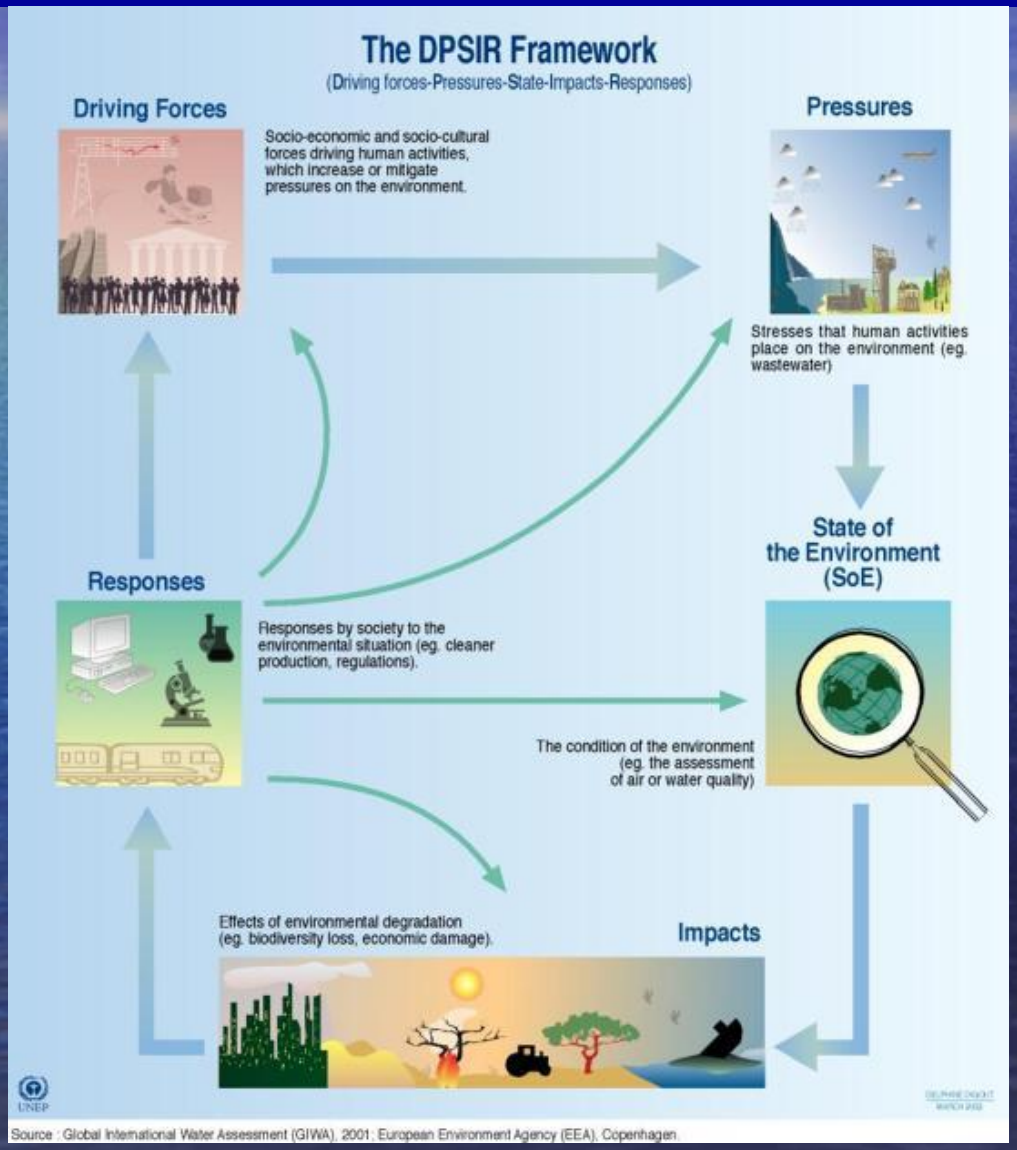
Let's discuss what the following words mean and decide collectively which one or more of the following categories it describes

Term	Environment	Interaction with Environment	Management Objectives
Pollution control			
Set back			
Aquaculture			
Storm surge			
Maritime boundary			
Sustainable use			
Coastal communities			
Climate change			
Red tide			
Beach seining			

4. Drivers, Pressures and Major Management Issues

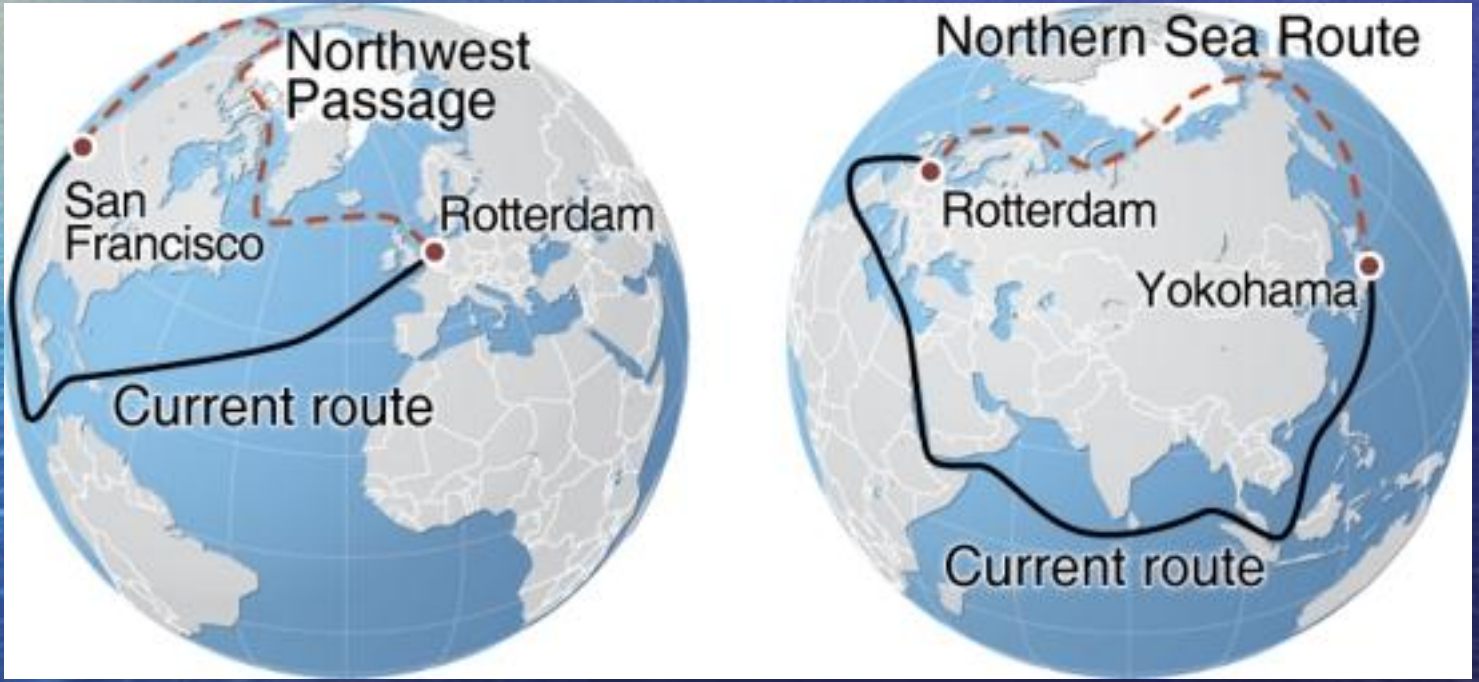


DPSIR Framework



Coastal Drivers

- Population growth
  - 20X increase in consumption by 2100
  - Coastal pop 4X US national avg.
- Global climate change
  - Green House Gases
  - Changes in distribution and species composition
  - Changes in water chemistry
  - Changes in ocean circulation



From 9000miles to 7000 miles

(Borgerson, 2008)

From 11,200 miles to 6500 miles
From $17.5M per trip to $14M

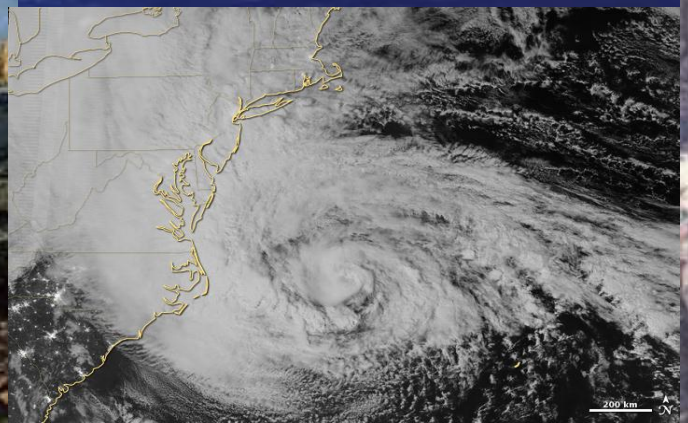
Coastal Pressures

- Land use patterns and CZ alterations -LBSP
- Resources Uses
  - Fisheries, aquaculture, forestry, O&G, mining, tourism
- Patterns of ownership and control

What are the major impacts of uses in the coastal and marine environment?

- **Pollution**
- **Loss of biodiversity**
- **Increase coastal hazards - who pays?**

What issues need to be managed?



Problems	Causes and Source of the Problem?
Marine Pollution	Indonesia?
Decreasing coastal/marine resources	Malaysia?
Deforestation and soil erosion	The Philippines?
Ground water contamination	Brunei?
Urban growth/ industrialization	Singapore?
Raw sewage discharge	Cambodia?
Haz/solid waste disposal	Laos?
Beach erosion	Myanmar?
Coral reef degradation	Thailand?
Sea-level rise	Vietnam?
Illegal hunting/fishing	China?
Civil war	Malaysia?
Rapid population growth	Cambodia?
Air pollution	The Philippines?
Desertification	China?

Critical Management Issues

- Protection of coastal wetlands/habitats, biodiversity
  - large scale filling and draining
  - legacy type impacts
- Protection of coastal waters
  - BMPs (agriculture, urban areas, forestry, fishing)
  - environmental level "playing field"
  - challenge of non-point sources of pollution
- Coastal storm mitigation
  - evacuation times vs warning times
  - structural reinforcement
  - hazard zone avoidance
  - building code and elevation






Critical Management Issues

- Shoreline erosion and SLR
  - 40% of coastlines have significant erosion
  - perverse incentives
  - resist or battle coastal forces(protect), accommodate or engage in strategic retreat?
- Protection of public access
  - conflicts between developers, private property owners and public
- Coastal Planning
  - private property vs public interest
  - social equity - "gentrification of CZ"
  - urban design and community character
- Safety and security/customs/illegal activities/terrorism, etc.


TIME FOR A BREAK!!!!
WHEN YOU COME BACK,
SIT IN YOUR 5 GROUPS
Sunrise on Fraser Lake,
Timberlea, Nova Scotia,

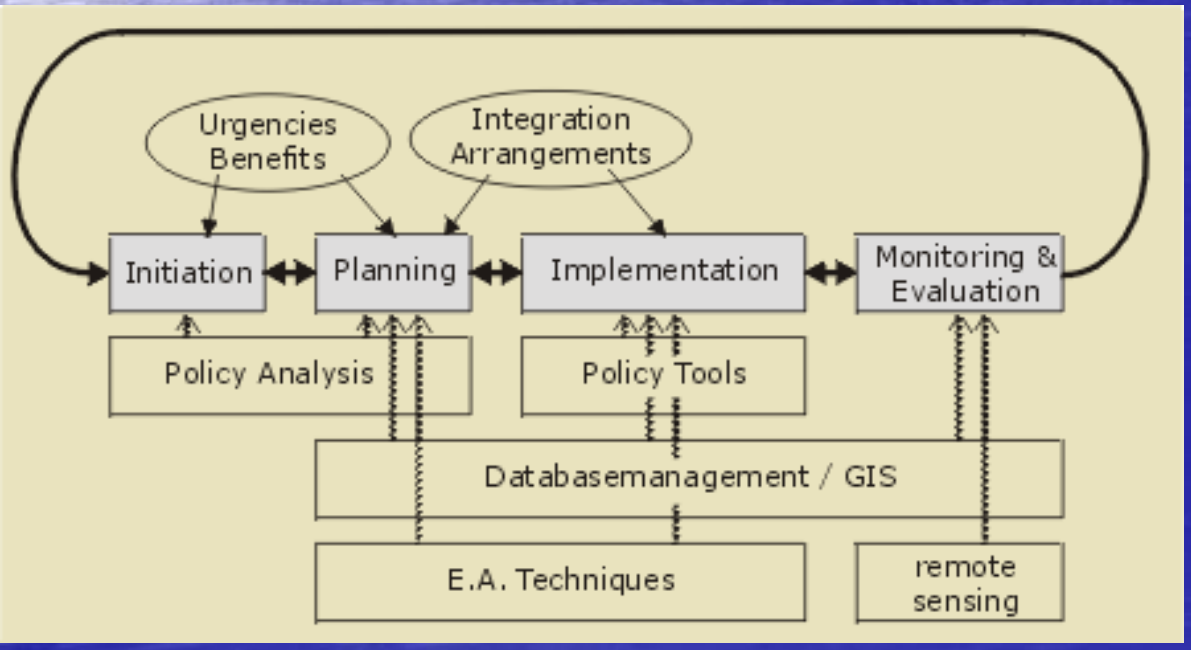
5. How can a manager make sense of current uses and issues and better plan for emerging uses?

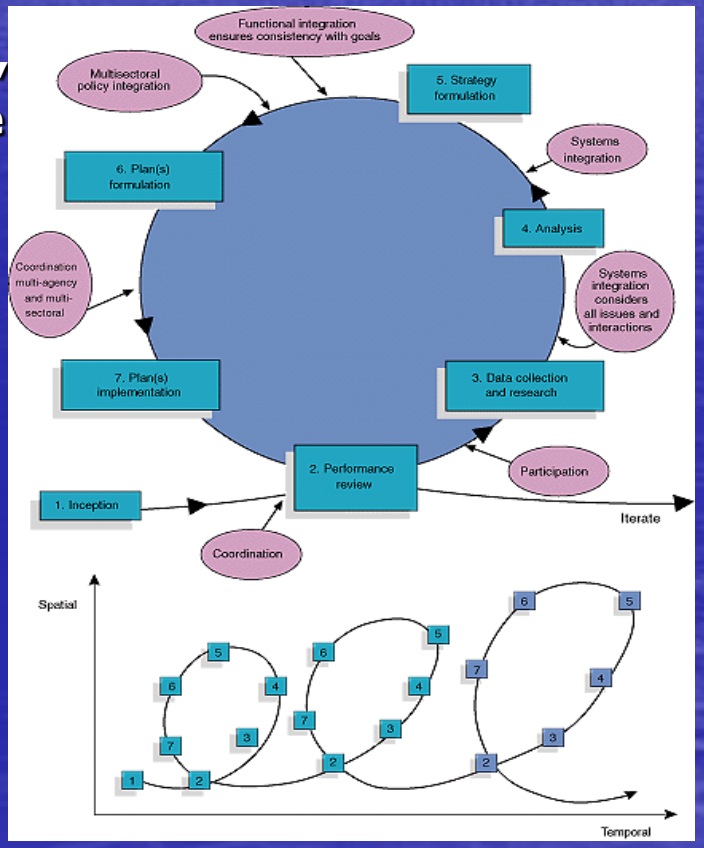
ICOM Process

Stages of the ICOM Process

- **Initiation** – evidence of a problem with existing approaches
- **Planning** – what is it, why do we need it, what would it do, who supports it, etc.
- **Implementation and Operation** – formal adoption, funding, legislation, communication, coordination, etc.
- **Monitoring & Evaluation** – hypothesis testing,

How has context changed: priorities, state, governance



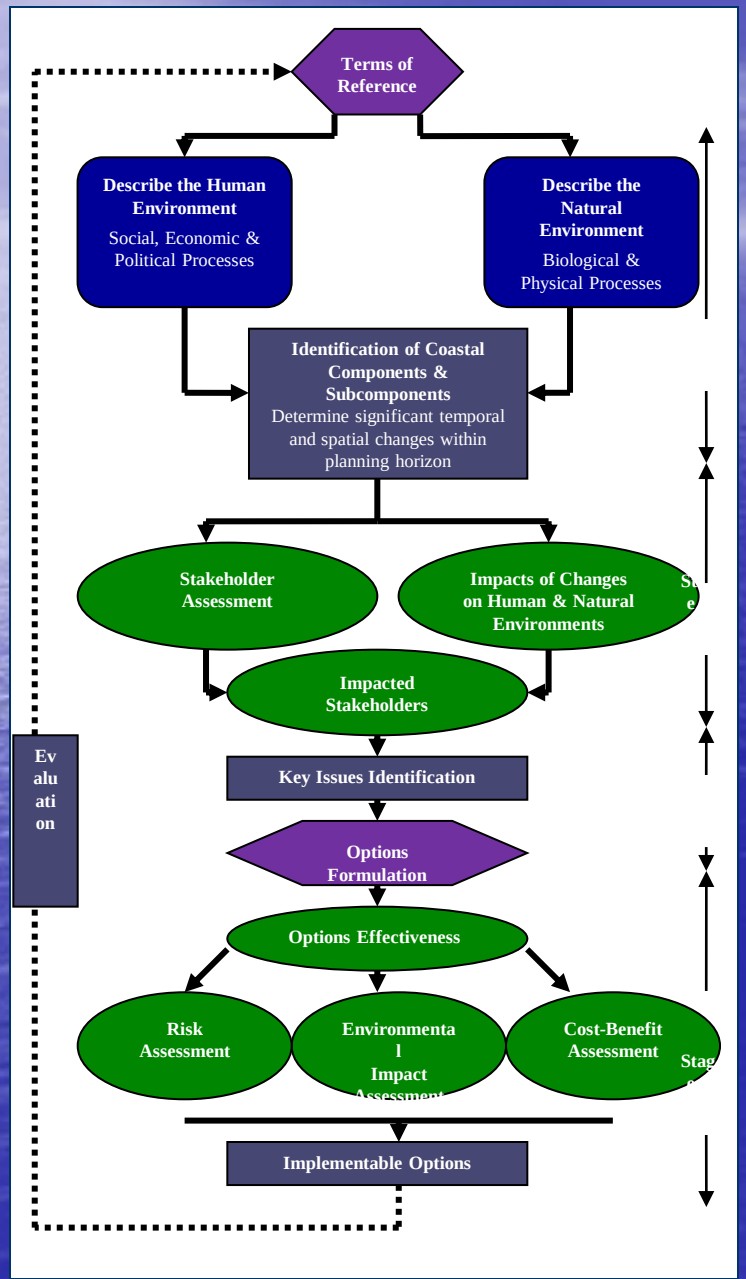


ICOM Management Plan Components

An ICOM Plan should include:

- description of area to be managed
- description of problems/opportunities, goals, objectives and targets
- statement of principles and policies to guide the program
- timeframe
- statement of management actions to be taken
- description of required institutional arrangements, laws and policies, responsibilities, support needed
- funding and staffing requirements
- actions needed to adopted plan and timetables for action

ICOM Planning Critical Path Analytical Framework



Each step represents a distinct event that must be adequately completed before it is logical to proceed to the next stage

Le Tissier et. al., 2010

ICZM Planning Framework

- **Terms of reference** defining spatial and temporal boundaries, principles for decision making and goals, objectives and targets of the plan
- **Stage 1** - gather information on natural and human components and anticipated change in the plan area
- **Stage 2** - assimilate and integrate the information in a non-sectorial manner and determine impact of change
- **Stage 3** - identify key issues and management options
- **Stage 4** - evaluate and assess options against goals, objectives and targets in the ToR

What might be the Terms of Reference for Yayati?

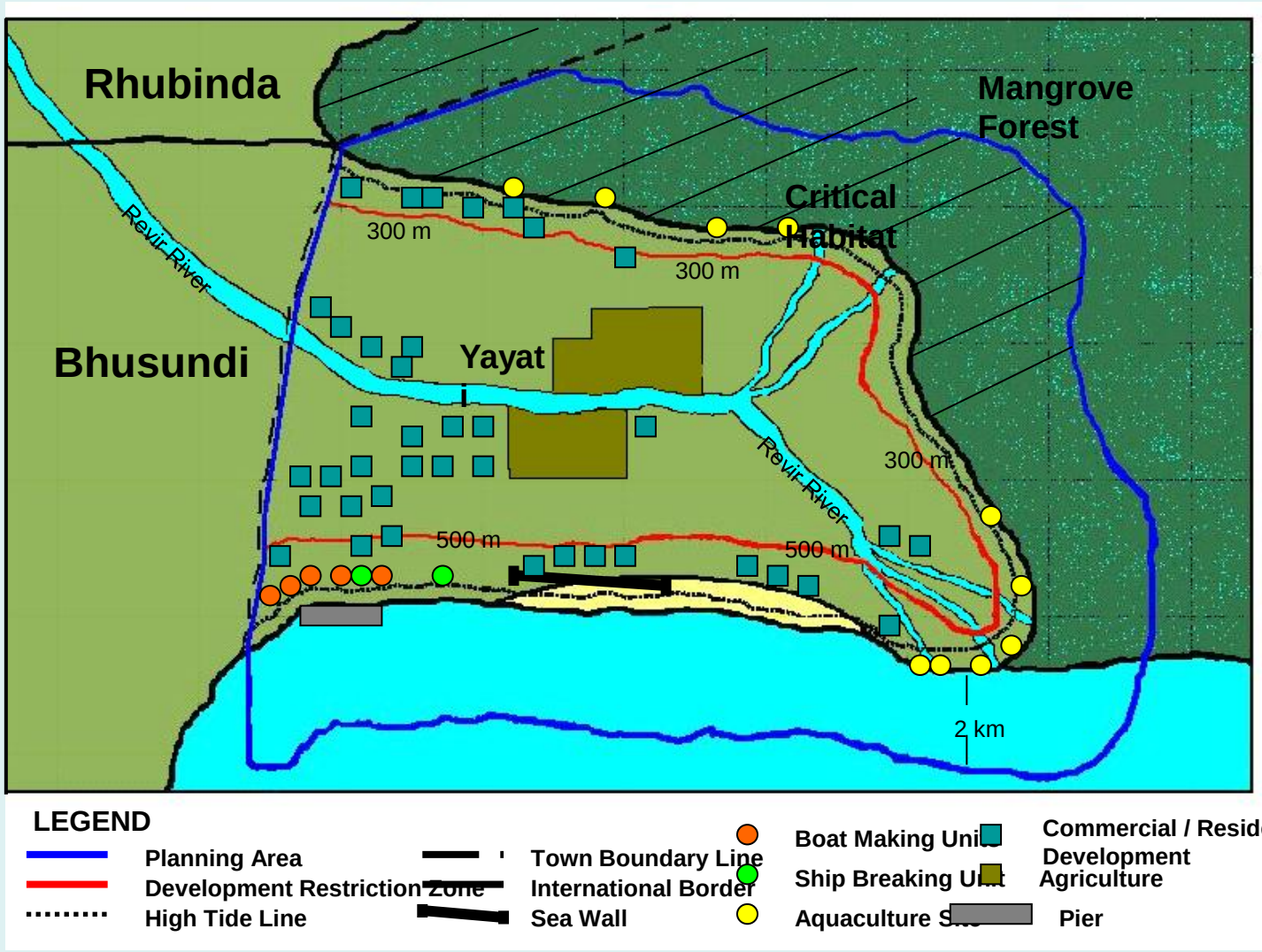
Geographic boundaries
- Administrative?
- Functional?
- Issues-driven?

Time scale
- Short term?
- Long-term

Specific issues to address

Goals and objectives

Specific targets to achieve



Stage 1 - Information gathering on human and natural components and change in the plan area

- **Describe natural and man-made physical components of the plan area that are important features of the coastline**

- **Describe the significant current and predicted changes taking place in the plan area which impact people or coastal resources and the causes of change**

Natural or human-made physical component categories and significant temporal and spatial changes

Components	Sub-components	Changes
Coastal environment	Beaches and dunes, estuary and creeks, mangroves, ground water, etc.	
Land use	Agriculture, forestry, seawall and breakwater, etc.	
Ports & Harbours	Jetty, storage, etc.	
Industry	Fishing, tourism, ice plants, aquaculture	
Housing & Infrastructure	Hotels, residential, govt offices, etc.	

Consequences and Magnitude of Change

Consequences:

- Impact on human and natural environment, in time and space
- Impact on current and future environmental functions
- Consequences to users and uses on the coast

e.g. aquaculture pond abandonment or planted dunes

e.g. increased rural migration into Yayati from the neighbouring inland and poorer country of Rhubinda

e.g. expected increased tourist arrivals into Yayati

Magnitude:

- Present conditions and probable future conditions
  - Natural environmental conditions e.g. probability of extreme events
  - Built environment e.g. life span of infrastructure
  - Political decisions e.g. establishment of tourism development goals

Natural or human-made physical component categories and significant temporal and spatial changes

Components	Sub-components	Changes
Coastal environment	Beaches and dunes, estuary and creeks, mangroves, ground water, etc.	Erosion, cyclone, sea-level, species depletion/introduction
Land use	Agriculture, forestry, seawall and breakwater, etc.	Conversion to aquaculture, seawall construction, etc.
Ports & Harbours	Jetty, storage, etc.	Dredging, expansion jetty construction, etc
Industry	Fishing, tourism, ice plants, aquaculture	Increase in pollution, increase in fishing effort, modernization
Housing & Infrastructure	Hotels, residential, govt offices, etc.	Tourist inflow, increase population, cities

Yayati ICOM plan – TOR and Stage 1

Task 1: Refine TOR to allow management team to proceed

- Identify:
  - geographical boundaries of what the plan will cover
  - time scale over which plan is to be designed
  - Specific issues to be addressed
  - specific goals and objectives
  - targets to be achieved

Task 2: Determine information required to develop knowledge base for the plan area

- Identify the important natural or human-made physical sub-components which are important features of the plan area

Task 3: Identify significant existing and predicted changes within the planning horizon which impact significantly on people or coastal resources, in the absence of any form of ICOM intervention

Natural or Human-made Physical Features

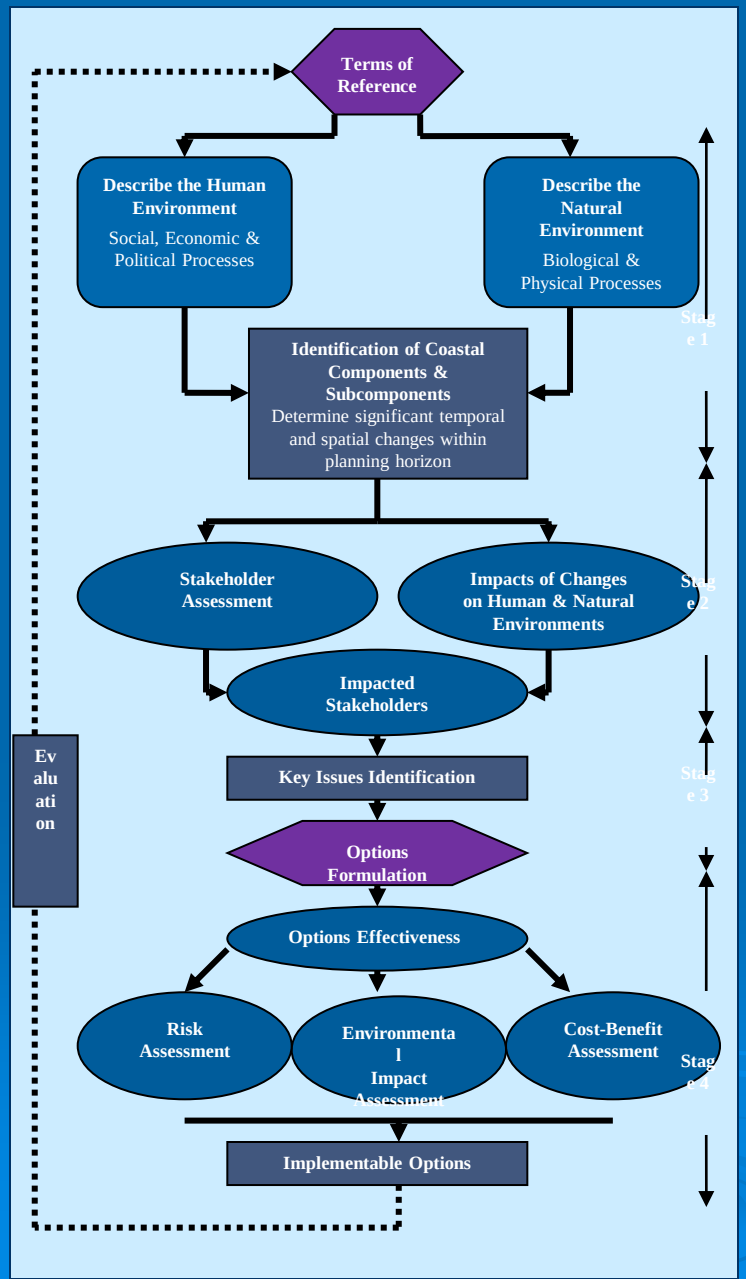
Components	Sub-Components	Changes
1. Coastal environment Formed by natural processes	Delta, beaches and dunes, estuaries, mangrove forest, groundwater and surface water	• Erosion, sea level rise; • decrease in species composition/biodiversity; • destruction of ecosystems/ habitats by storms, cyclones, tsunamis, etc.; • flooding and salt water intrusion. [1]
2. Land Use Natural or man-made	Agriculture, mangrove forest, seawall, beaches and roads.	• Conversion of natural ecosystems for agricultural use; • pollution of water, soils, and biota by agrochemicals; • increase in nutrients from fertilizer use; • erosion and soil loss from deforestation; • alteration of hydrology, increased salinization of soils from irrigation and canal development; • increase in water consumption; • chemical contamination of freshwater and coastal waters; • mangrove degradation, pollution, and depletion; • accelerated erosion; • decrease in coastal protection against storms, tsunamis; • loss of fish and wildlife habitats; • increase in pollution resulting from paved surface runoff; • increase in resource use conflicts or competition for space use/ access to resources; • changes in erosion patterns from seawall construction; • changes in hydrology, use of soils, and ecosystem disturbance from road construction. [2]
3. Ports and marine transportation / Navigation structures	Wharves; shipping, ship building, ship breaking, storage and maintenance sheds; channel markers or coastal navigation beacons.	• Pollution of water, air, sediments, and biota from waste; • alteration of the sediments from dredging; • water consumption; contamination from dredge spoil disposal; • introduction of invasive species; • pollution of air, water, soils, biota from accidental spills of oil/ hydraulic fluids and chemical use/ discharge/ spills; • impacts of construction on marine habitats/ species; • increased ship strikes/ collisions with navigational aids. [2]
4. Industry and associated structures	Tourism, fishing, prawn collection, aquaculture, boat building, ship breaking, ice plants.	• Increase in potable water demand/reduction in water supply; • degradation of natural habitats (mangroves) from tourism pressures; • loss of fish from fishing due to by-catch practices; • alteration of sea and river beds from trawling; • overexploitation of fish and mangrove resources; • mangrove waters contamination from dredging for prawn; • loss of coastal protection from storms and habitat; • contamination of wild fish genetic strains; • spread of fish diseases; • increase in contamination of soils and water (heavy metals, oil, hazardous substances) from industrial activities. [2]
5. Housing and infrastructure for service provision	Resort hotels and associate amenities; government buildings.	• increase in population numbers; • alteration of hydrology from construction; • increase in water consumption; • increase in pressures on natural resources and wildlife; • conversion of vegetation, ecosystems and soils by construction; • loss of habitat; • increase in pollution of water, air, and soil pollution from wastes; • increase in public health risk from contaminated fish; • decrease in groundwater supply; • urban expansion. [2]

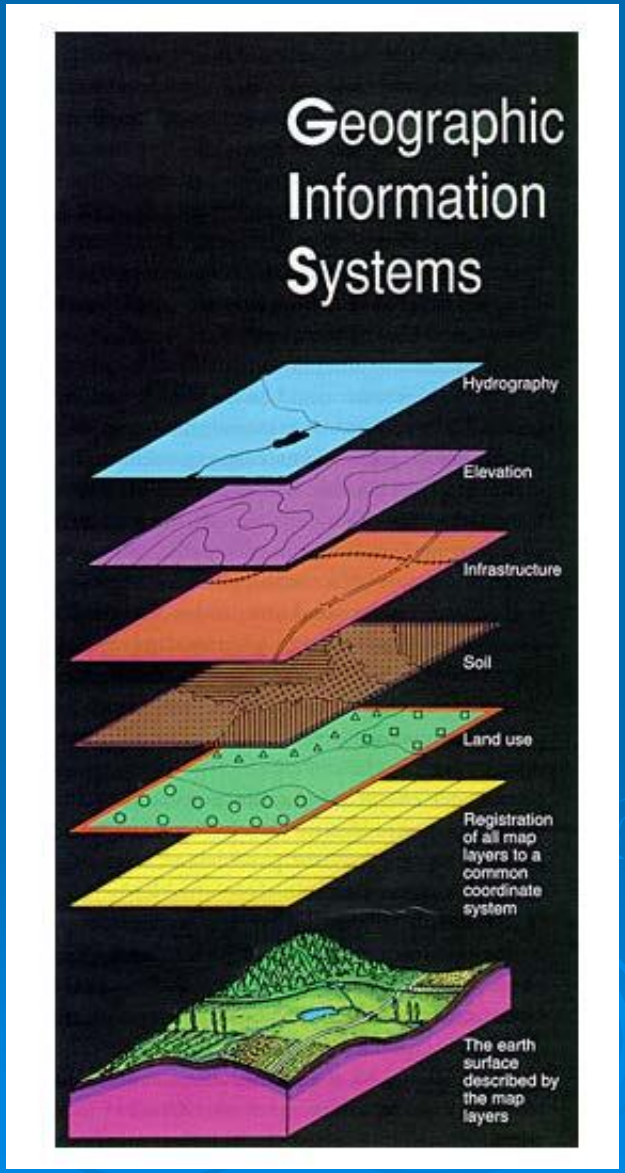
Stage 1 Outputs

Outputs

- Knowledge base of the natural and human dynamics taking place in the plan area
- Understanding of changes taking place in the plan area and the causes of change
- Foundations for understanding the interdependencies between natural system and the users and uses that are made of the resources and space available within the plan area

ICOM Planning Critical Path Analytical Framework





Stage 2 - ICZM Plan Framework Determining the impacts of change

- Interaction matrix
- Stakeholder assessment
- Stakeholder Matrix

Interaction Matrix - Moving decision-making away from "expert mystic" to consensus group outcome

			Components															
			Coastal Environment						Land use						Ports and Harbours		Industry	Housing & Infrastructure
			Dry flood plain (>2m)	Wet flood plain (<2m)	Shoreline	Creeks	Mangroves	Forestry	Agriculture	Aquaculture	Ponds	Kitchen gardening	Animal sheds	Wells	Fishing harbour	Jetty	Saw Mill	Houses
Changes	Coastal Environment	Sea level rise		√	√	√	√			√				√	√	√		
		Cyclones	√	√	√	√	√		√					√	√	√		√
		Erosion		√	√													
		Accretion		√	√		√		√									
		Siltation				√	√			√					√			
	Land use	More wells							√									
		More agriculture	√	√														
		More nat. resource exploitation		√			√	√							√			
	Ports and Harbours																	
	Industry																	
	Housing & Infrastructur	More Houses							√									√

Figure 2. Example of an Interaction Matrix from a low lying coastal area in area in Bangladesh.

Interaction matrix

Placement of interactions provide interpretation of dynamics in the area

- Interactions arising from changes in **the coastal environment** might **not be able to be modified by human intervention** --- but the consequences of this change must be reduced.

- Interactions arising from changes in **the human categories** suggests human activity is the prime driver of change and management could be more related to **changing the drivers through intervention** rather than coping with consequences

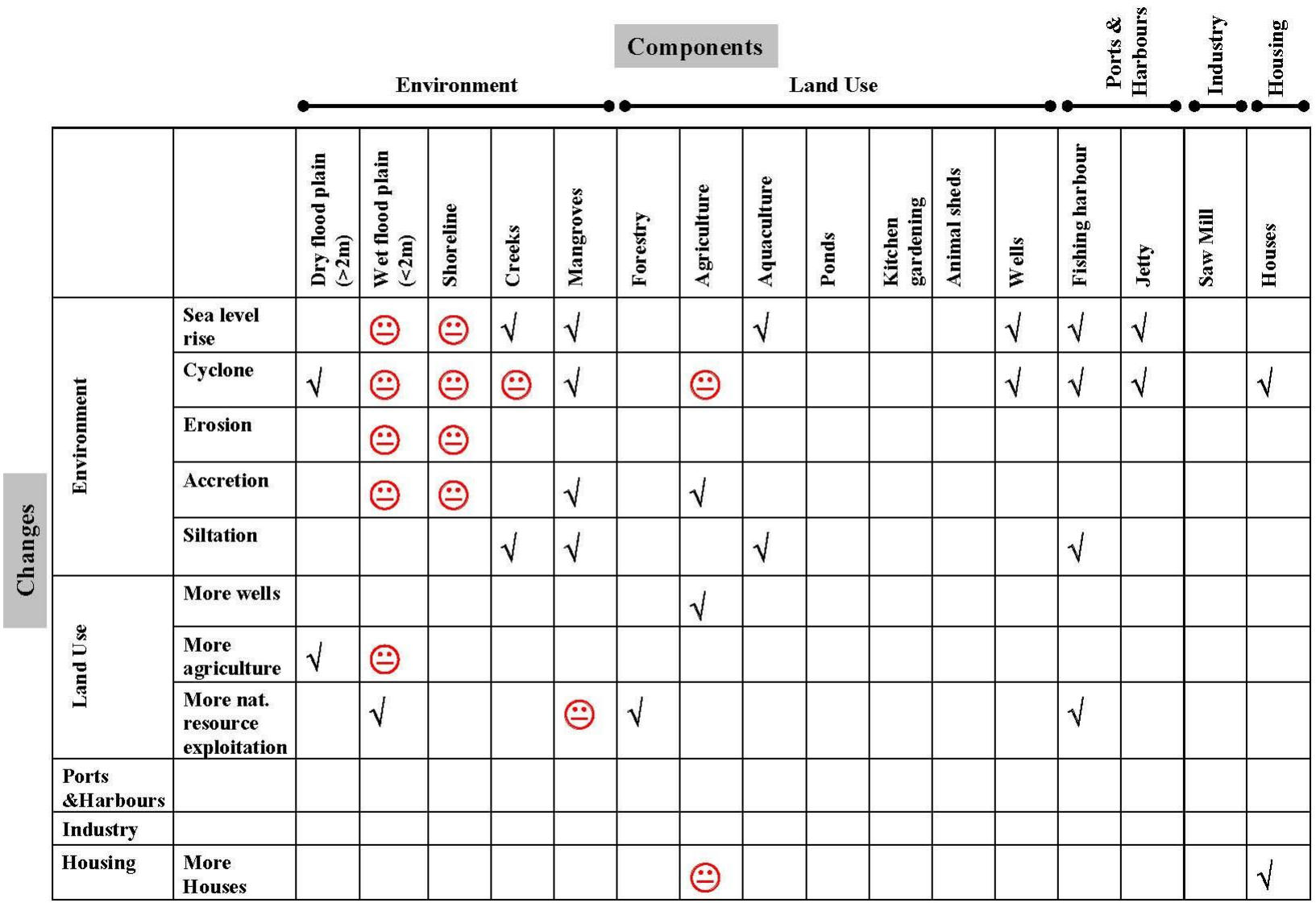
Why stakeholder analysis is useful

- Different groups have diverse economic, social and political interests associated with resource use in the coast.
- CZ managers need to understand who the “users” of the resource are and the dimensions of their interest in particular “uses” of the resources of a given locality
- Different stakeholders have different interests in relation to the exploitation of particular resources

Categorization of Stakeholders

- Primary
  - those ultimately affected by the plan, positively (beneficiaries) or negatively (e,g, those displaced by a recommended infrastructure project). e.g. fishers, farmers, poor members of the community, specific industry sectors
- Secondary
  - those involved with delivering the plan, those involved in decision-making and those excluded from it. e.g. municipal council, public health department
- Key
  - Those indirectly affected but who may exercise significant influence that might affect the implementation of options. e.g. Navy, academia

Stakeholder – Interaction Relationship Matrix
Impacted stakeholders



Changes		Components: Environment					Land Use							Ports & Harbours	Industry	Housing
		Dry flood plain (>2m)	Wet flood plain (<2m)	Shoreline	Creeks	Mangroves	Forestry	Agriculture	Aquaculture	Ponds	Kitchen gardening	Animal sheds	Wells	Fishing harbour	Jetty	Saw Mill	Houses
Environment	Sea level rise		😐	😐	√	√			√				√	√	√		
	Cyclone	√	😐	😐	😐	√		😐					√	√	√		√
	Erosion		😐	😐													
	Accretion		😐	😐		√		√									
	Siltation				√	√			√					√			
Land Use	More wells							√									
	More agriculture	√	😐														
	More nat. resource exploitation		√			😐	√							√			
Ports &Harbours																	
Industry																	
Housing	More Houses							😐									√

Figure 3a. Example of Stakeholder Matrix for in-migrating landless people (faces symbol) in a low-lying coastal area of Bangladesh.

Who are Stakeholders in Yayati?

- Primary?
- Secondary?
- Key?

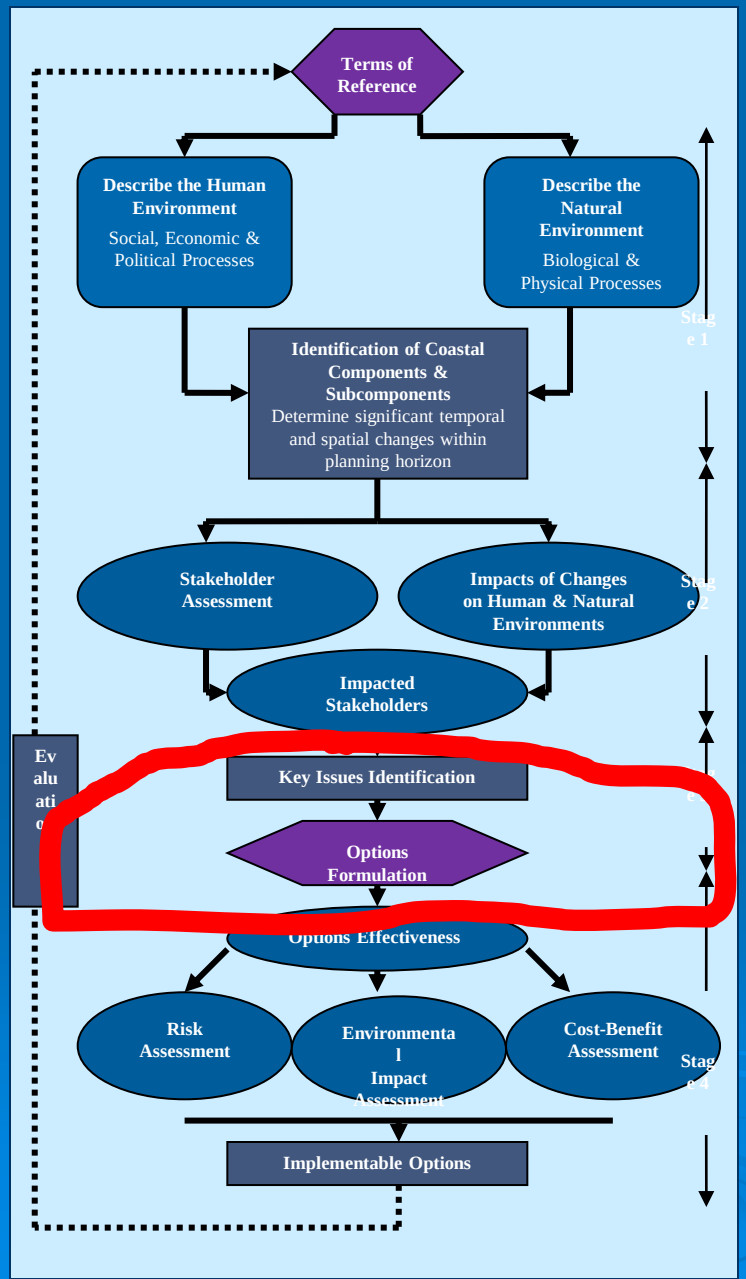
Complete a stakeholder matrix for 3 primary stakeholders in Yayati

- Examine results of interactions with stakeholders and focus on those that impact a number of different stakeholders

Outcome of stage 2

- Recognition that ICOM is a **negotiated process** focused on stakeholders rather than disciplinary or sectoral interests
- Understanding **different impacts on different stakeholders** for each change
- **Prioritization** of target activities for management action
- Greater understanding of dynamics of the plan area and their impacts on users and uses of the resources and space

ICOM Planning Critical Path Analytical Framework



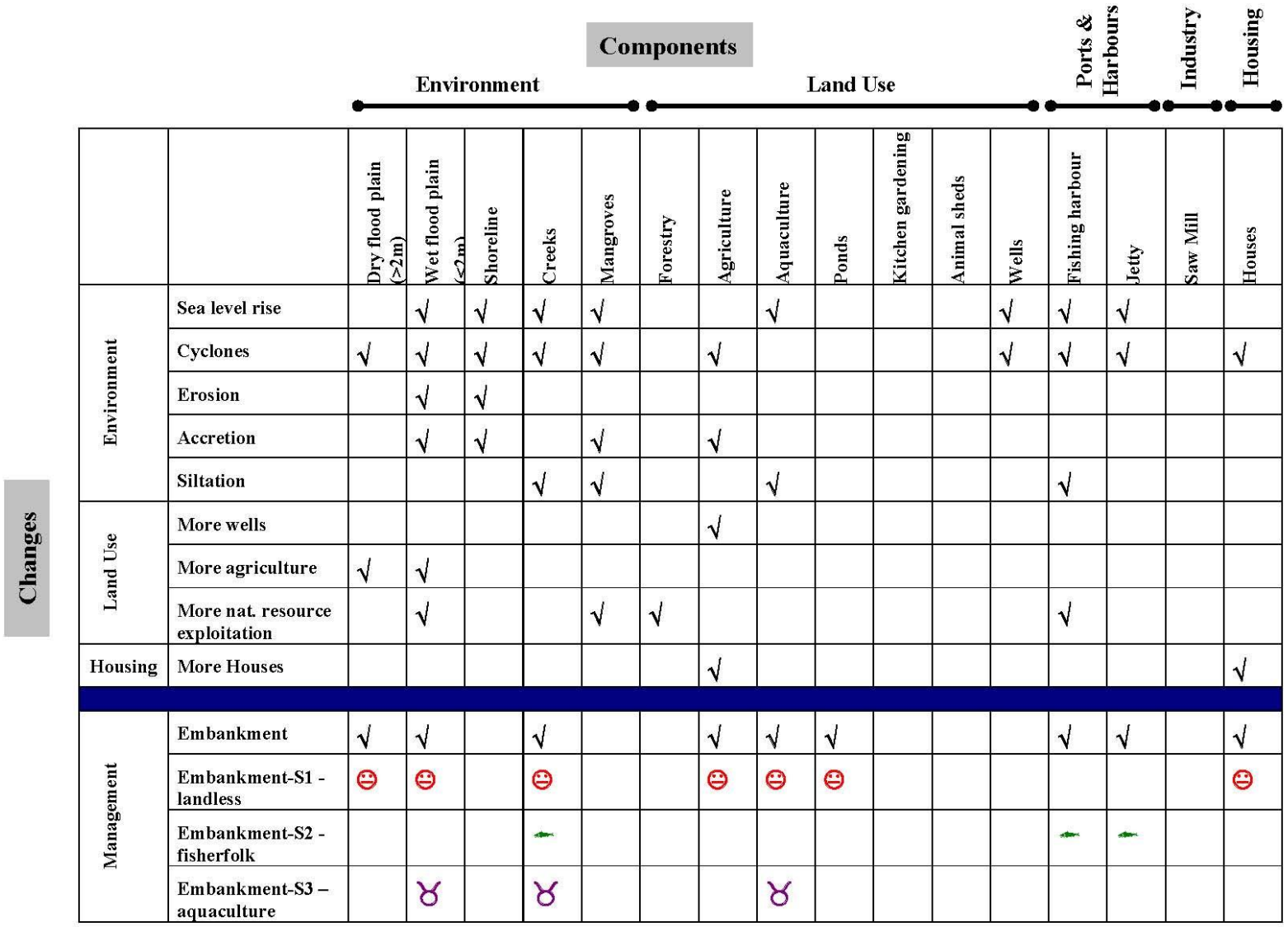
Each step represents a distinct event that must be adequately completed before it is logical to proceed to the next stage

The Options Matrix

- Each proposed option, if implemented will effectively impose a new “change” on the plan area
- Single management intervention
  - e.g. relocation of vulnerable communities away from hazard zones
- Suite of complementary management interventions
  - e.g. early warning system
  - e.g. construction of cyclone shelters
  - e.g. rehabilitation of buffer ecosystems such as mangroves
  - e.g. relief management response to storm hazards

Management options which impact on a wide range of components require careful consideration to determine if the change produces interactions that did not exist previously

Options/Interventions Matrix



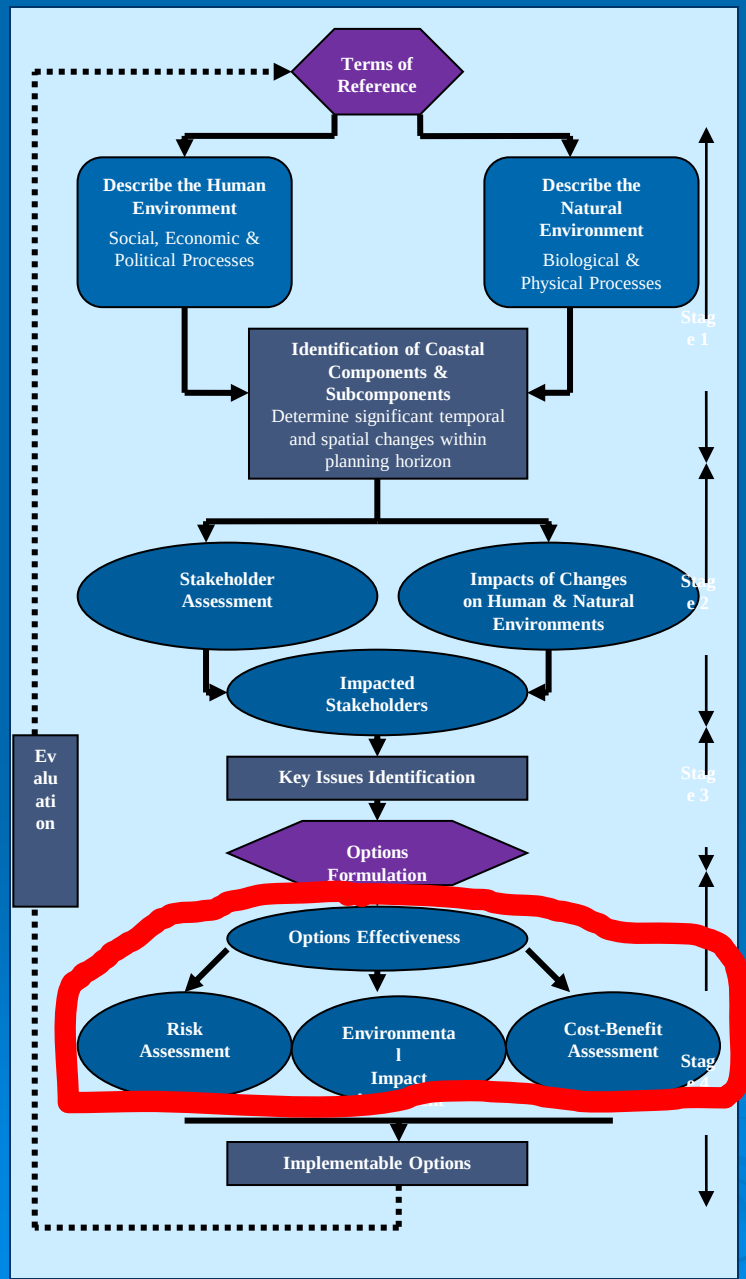
Changes		Components: Environment						Land Use								Ports & Harbours	Industry	Housing
		Dry flood plain (>2m)	Wet flood plain (<2m)	Shoreline	Creeks	Mangroves	Forestry	Agriculture	Aquaculture	Ponds	Kitchen gardening	Animal sheds	Wells	Fishing harbour	Jetty	Saw Mill	Houses
Environment	Sea level rise		√	√	√	√			√				√	√	√		
	Cyclones	√	√	√	√	√		√					√	√	√		√
	Erosion		√	√													
	Accretion		√	√		√		√									
	Siltation				√	√			√					√			
Land Use	More wells							√									
	More agriculture	√	√														
	More nat. resource exploitation		√			√	√							√			
Housing	More Houses							√									√
Management	Embankment	√	√		√			√	√	√				√	√		√
	Embankment-S1 - landless	☹	☹		☹			☹	☹	☹							☹
	Embankment-S2 - fisherfolk																
	Embankment-S3 – aquaculture		♉		♉				♉								

Figure 4. Example of an Options Matrix showing the impact of the construction on landless, fisherfolk and aquaculture stakeholder groups.

Options matrix

- What might be some options for intervening in Yayati?
  - Identify one option
- What is the interaction of the management option (a new change) with the subcomponents in the plan area? And
- On Yayati's 3 primary stakeholders?

ICOM Planning Critical Path Analytical Framework



Each step represents a distinct event that must be adequately completed before it is logical to proceed to the next stage

Evaluation of management options

This stage reinforces the principle that ICOM attempts to reduce the risks of hazards on people and resources at least cost.

3 tools used to judge each identified management option

- Risk Assessment and Evaluation
- Environmental Impact Assessment
- Benefit-Cost Analysis

Measuring risk

- 3 components for measurement
  - What is the **chance** of the event happening?
    - likelihood of occurrence or **probability**
  - What is most **threatened** if it happens?
    - **elements** at risk (e.g. people and infrastructure affected)
  - What is the **magnitude** of the impact?
    - vulnerability of the elements due to **exposure** time

Risk Evaluation Matrix

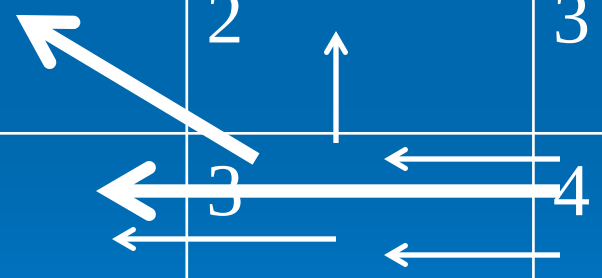
		Consequence or Magnitude of Impact ←		
Probability or Frequency of Occurrence ↑		Low	Medium	High
	Low	1	2	3
	Medium	2	3	4
	High	3	4	5

Examples

- Oil terminal protection - oil spill events during offloading due to pipe coupling failure resulted in 2 risk management measures
  - improved clean offloading technology
  - oil spill containment team on permanent standby
- Cyclone management after 1991 disaster which killed 135,000 & 1 M homes, $2.4-4B
  - cyclone warnings
  - shelter construction and evacuation shelters
  - disaster relief

Risk Evaluation Matrix

		Consequence or Magnitude of Impact		
Probability or Frequency of occurrence		Low	Medium	High
	Low	1	2	3
	Medium	2	3	4
	High	3	4	5



Good management is about GOOD decision making, even in data-poor environments

- Making decision which are :
  - Efficient (economical)
  - Appropriate
  - Effective

  ….within the context of **values, principles and norms** espoused for the sustainable management of coastal and ocean resources, including both use and space **and are consistent with the stated ToR.**

Understanding and Planning for Sustanable Uses – what managers need to know for ICOM

- Integrated coastal and ocean management is all about trade-offs!!!
- What, where, when, how, who and why must be answered to properly manage multiple uses and multiple users so as to ensure continuing benefits while minimizing conflicts
- An array of tools to inform decision making exist to help managers minimize conflicts while maximizing benefits and ensuring ecosystem gods and services are sustainably maintained.
- ICOM requires integration to ensure consistency in policy and management objectives across an array of activities and stakeholders but does not replace sectoral management!!!

謝謝

Thank you

ขอบคุณมาก

Terima kasih

អរគុណ

Salamat

cảm ơn bạn

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chei-zu tin-bar-te