

Preparing to Adapt

Global change, Climate Change, Impacts, Integrated Responses

by

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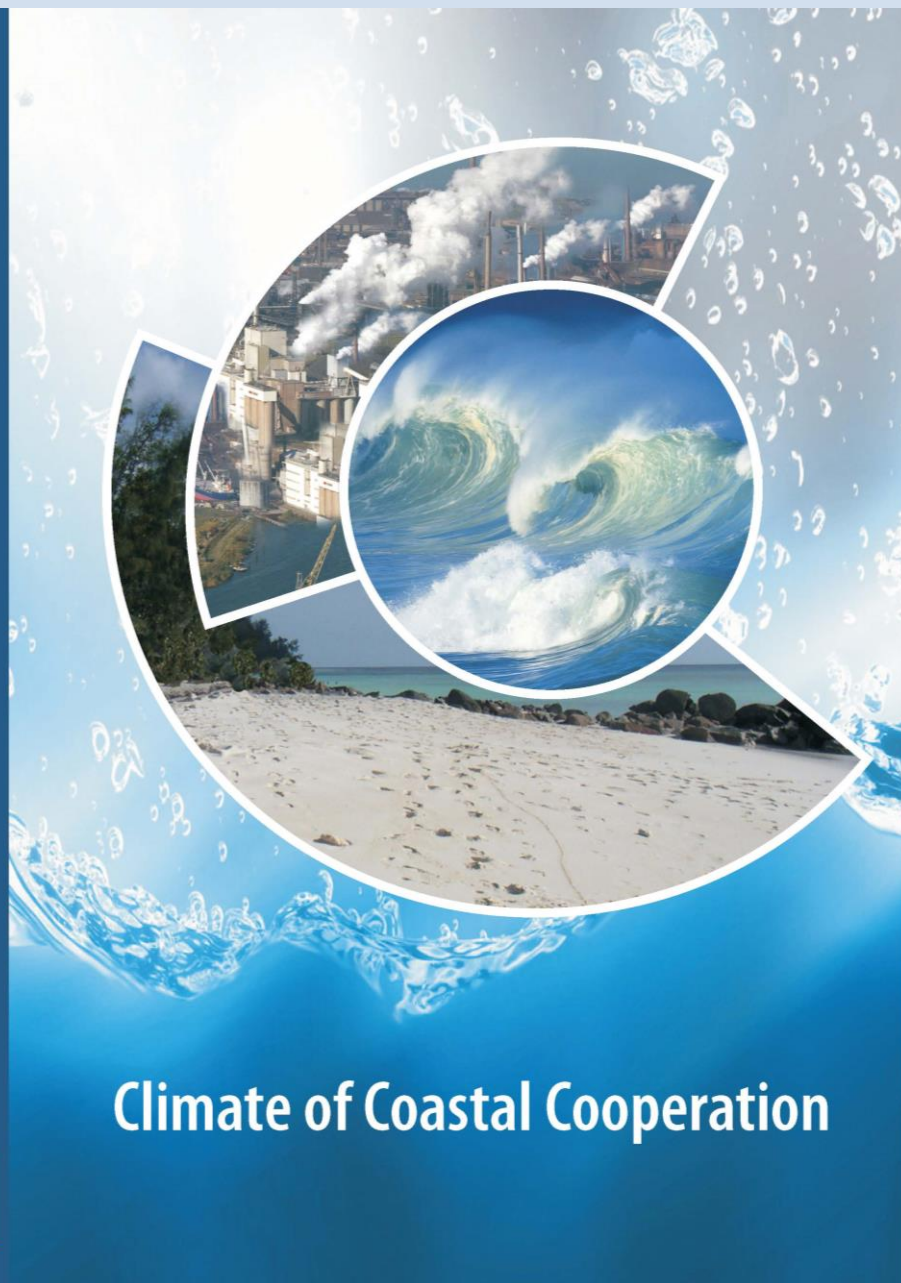
Peer-Reviewer UNEP and IPCC: 2001 & 2007;

Technical Secretary IPCC “Coastal Zones” :1989-1994;

Chief Engineer - Rijkswaterstaat/Min.V&W:1978-2004

UNESCO – expert, Nile Delta: 1972 – 1977





Climate of Coastal Cooperation

CCC Production:

Book (208 p)

+

Internet Publication (> 900pages)

Intro's by high level executives;

33 Cases from Europe and Asia;

7 Interactive GIS based
Training Tools & Manuals;

8 Examples of innovative,
adaptive coastal measures;

101 International co-authors with their
e-mail Addresses.

The CCC Book:

2000 copies distributed around the world



First Copy handed to Vice President Al Gore, October 2011

The CCC Website:

Visitors: 2500/month

Downloads: 7 GBytes/month

www.coastalcooperation.net



ICZM – Integrated Coastal Zone Management

The adaptive response for vulnerable coasts

1. Why ICZM
2. Structure of an ICZM programme
3. Ecological and Economic Benefits



WHY - an holistic approach?

Triggers for a long term ICZM programme:

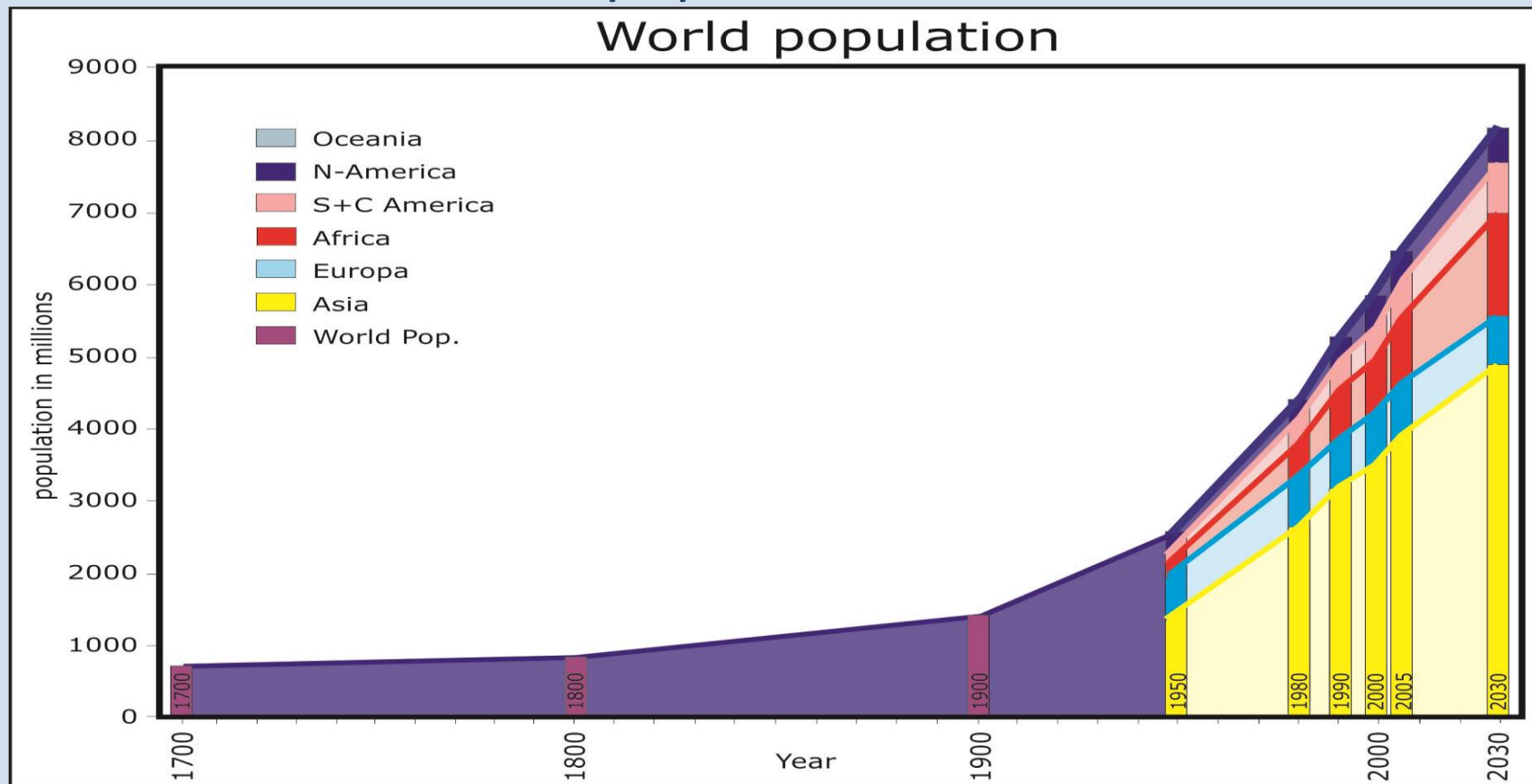
- Exponentially growing population: density, spatial footprint
- Exponentially growing world economy:

capital investment & overexploitation;
- Strongly increasing Green House Gases and impacts of CC;
- Complexity of coastal processes.



Strong growth of Population

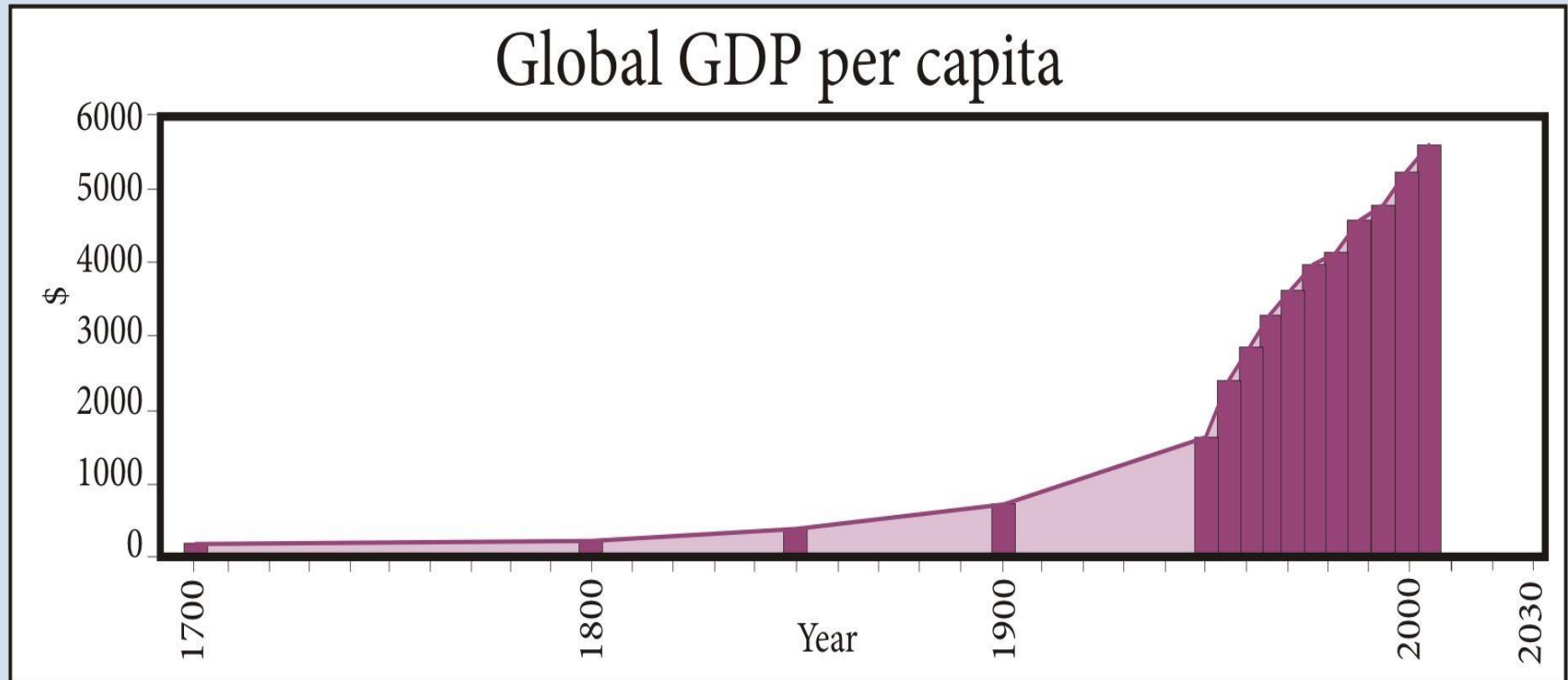
Half of the world population lives in Coastal Zone



Impacts:

Strong increase in population density in coastal areas,
coastal urbanisation -> increasing coastal vulnerability

Strong Economic development



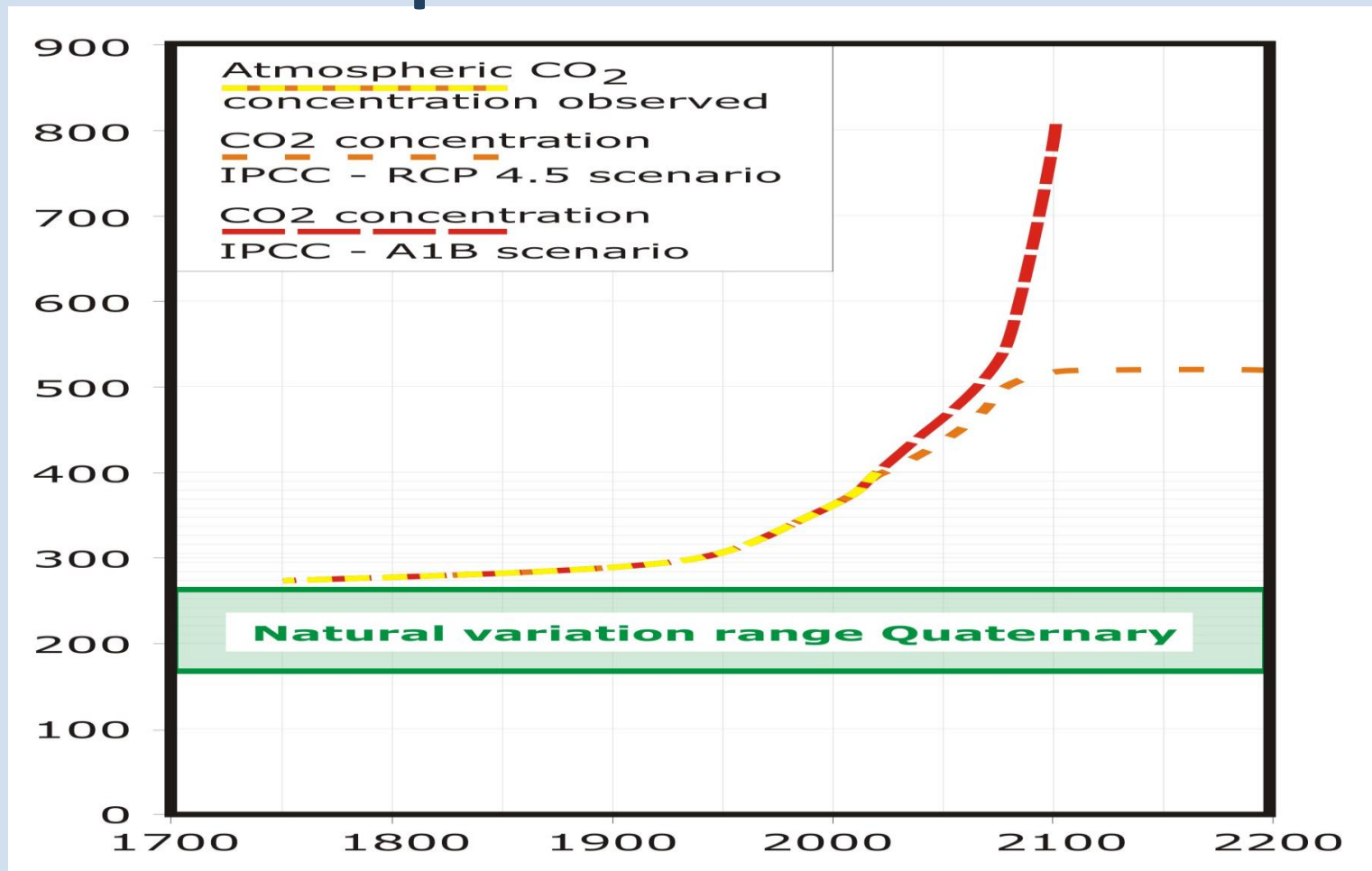
Impacts:

Strong increase of urban settlements, built-up areas, number houses -> spatial footprints and capital investment

Increase of damage of the service supplying ecosystems & habitats.



Strong increase of CO₂ atmospheric concentration



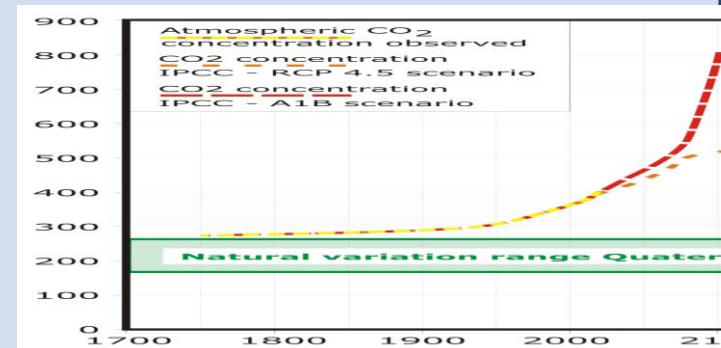
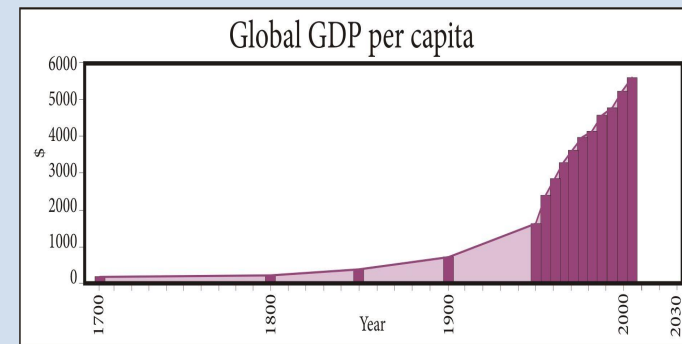
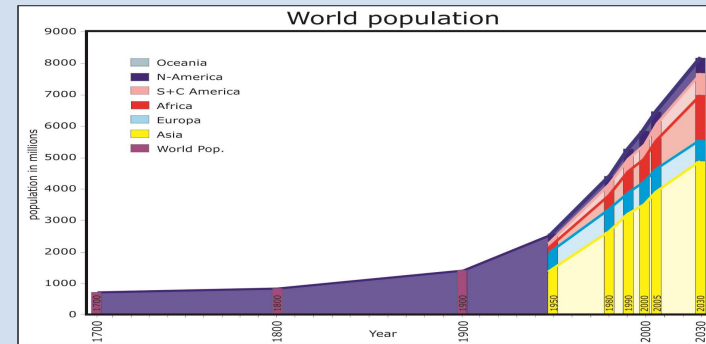
Impacts of increase of global temperature:

Acceleration of sea level rise, increase of storminess -> increased risk of flooding, coastal erosion, and salt water intrusion,



Three exponential increasing triggers

Will these trends continue,
at what costs?
Should give a sense of **high urgency** to come into
integrated action:
mitigation & adaptation



Pressures on the coastal zone

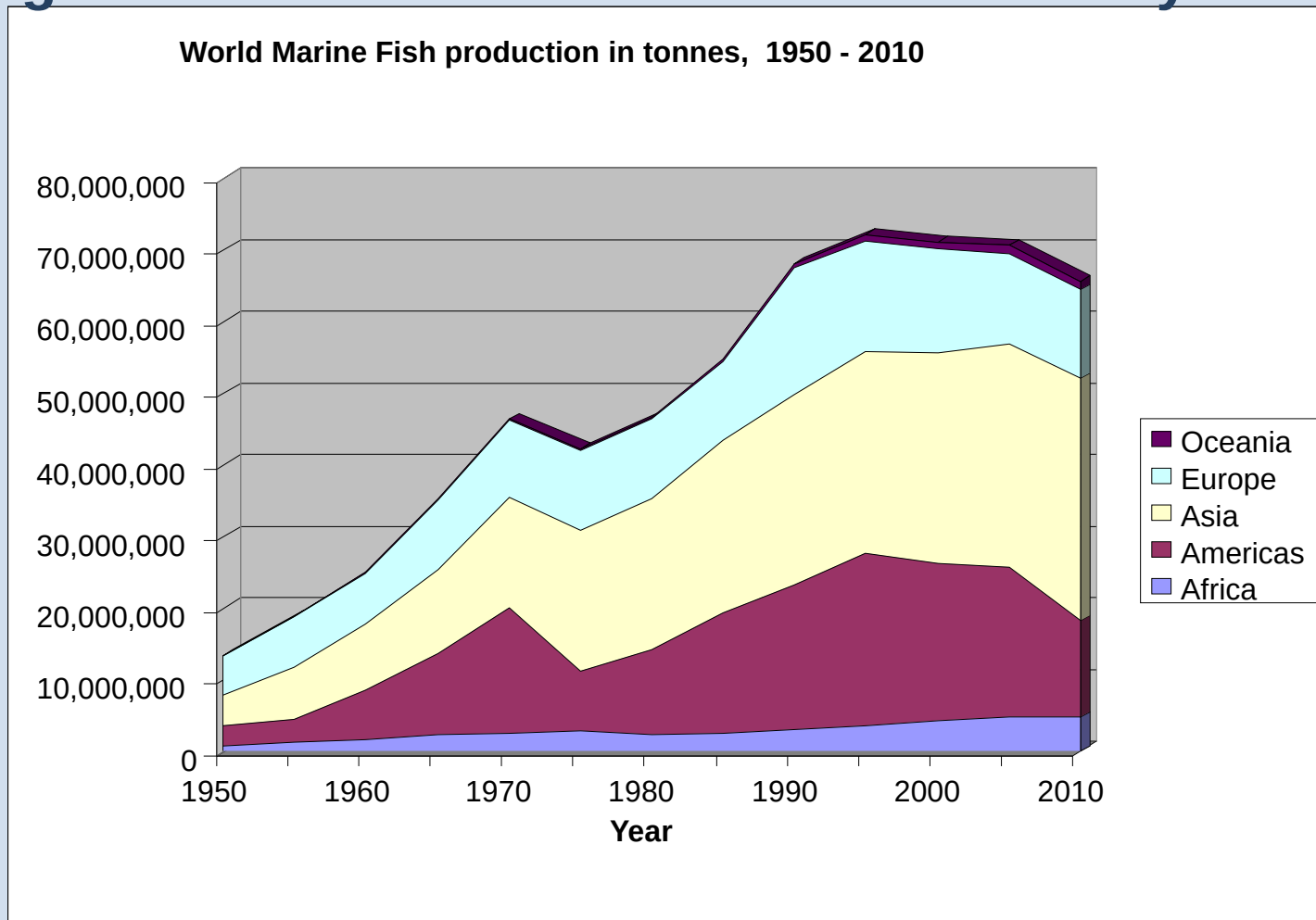
Illustrated by

- Overfishing & excessive marine littering
- Increasing damages by hazards
- The complexity of the coastal water system

demand an integrated response



Strong increase world fish catches followed by decrease:



Marine fishing productivity

		1995	2000	2005	2010
Global m.capture / # vessels	tonnes/vessel	18.03	17.37	16.91	15.05
Global m.capture / # fishers	tonnes/fisher	2.54	2.17	1.92	1.71

Data: FAO-faostat, FAO 2012

RM-IHD080416

Sterke toename jaarlijkse schade vnl stormen & overstromingen

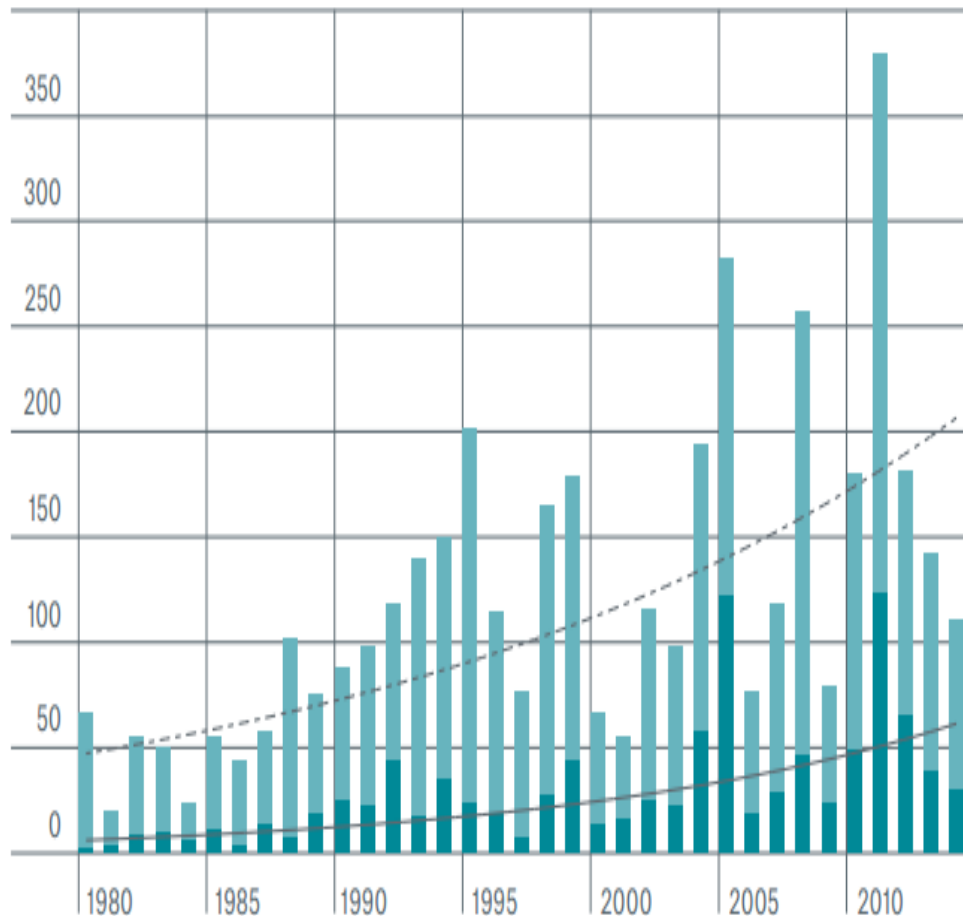
Munich Re: Global Great Natural Catastrophes

Annual Report 2015:

1980 – 2014

Overall losses and
insured losses in US\$bn

2015: > 200 US\$billion damage



The coastal system: complex interactive processes

Policy & Decision making process

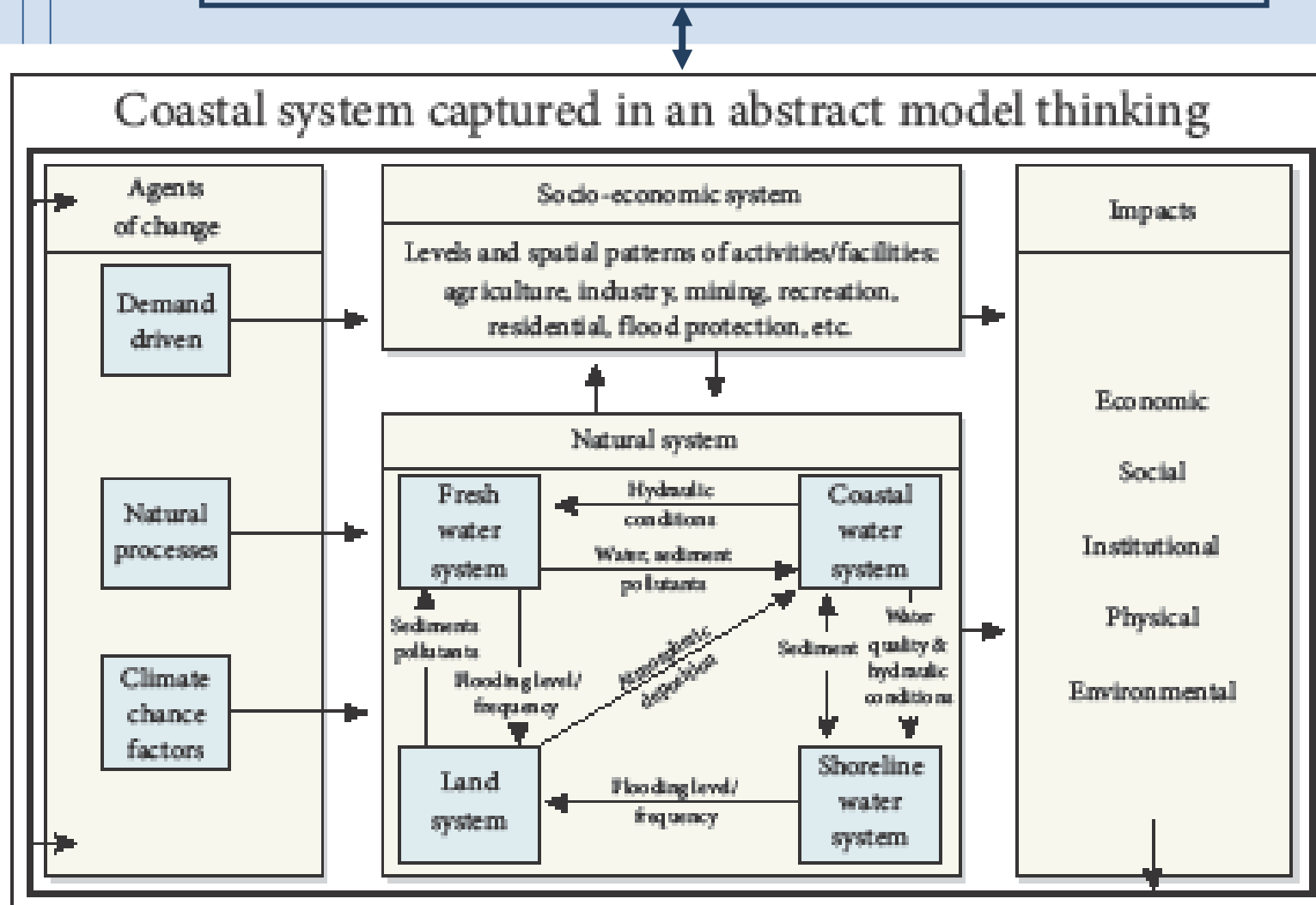
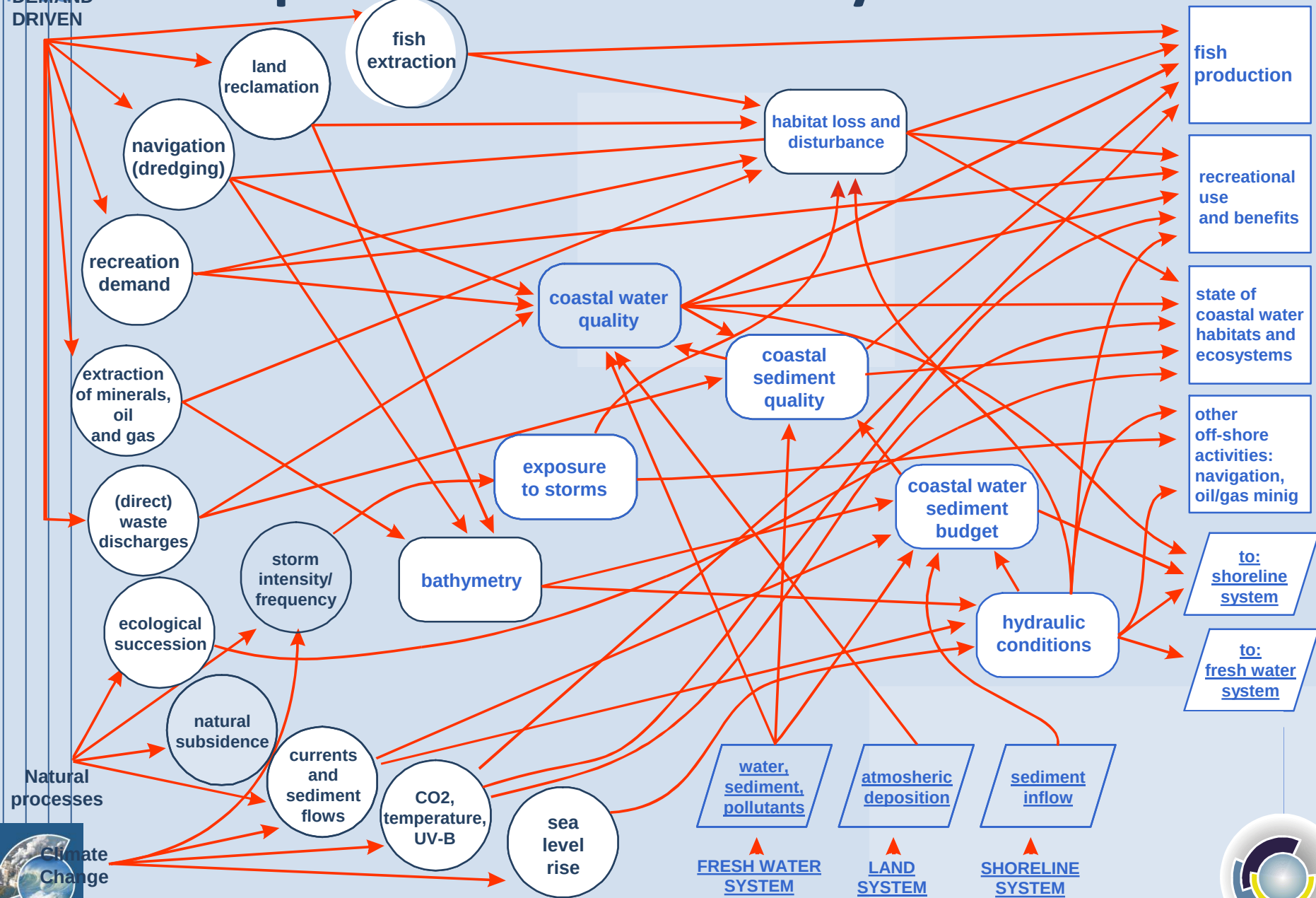


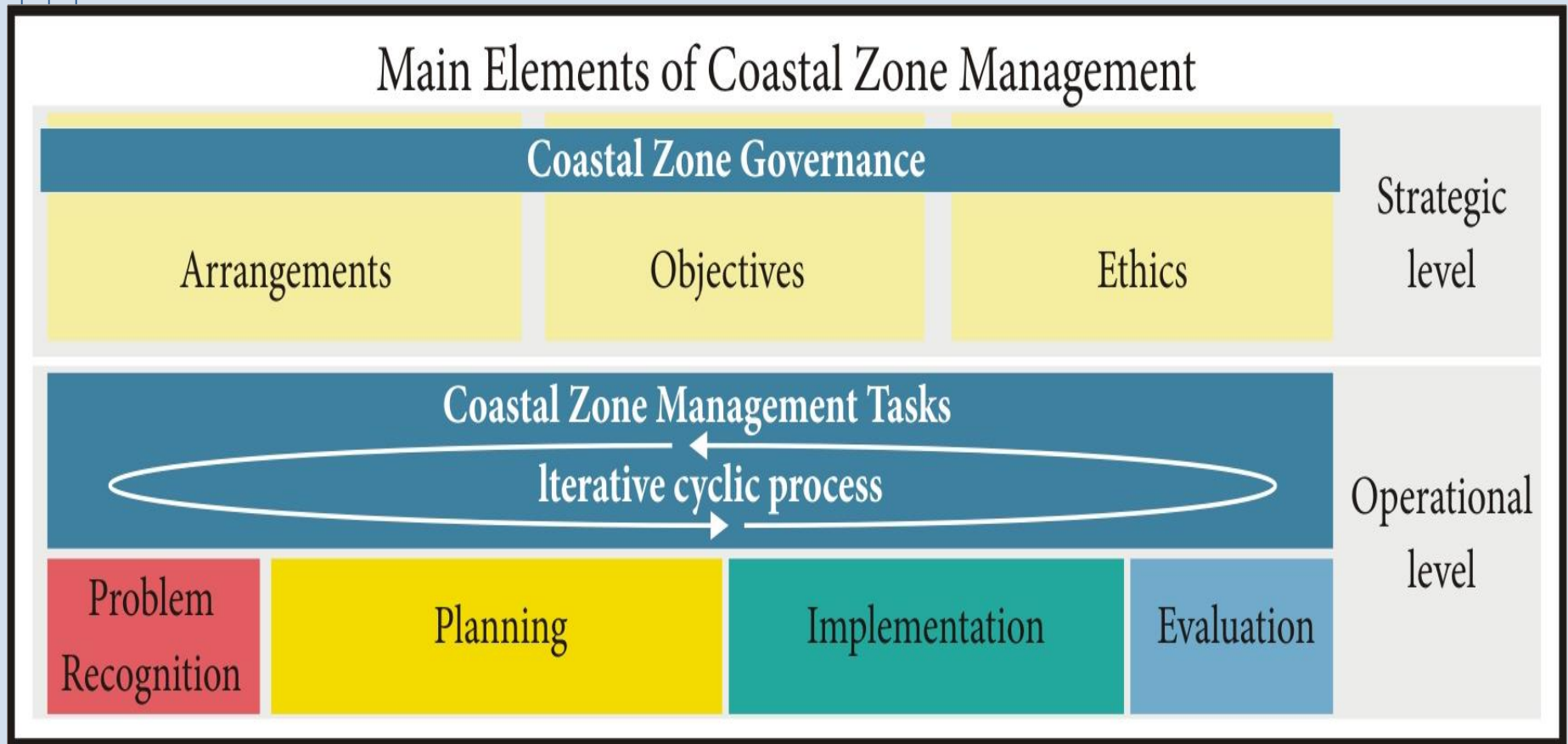
Figure 2: A coastal system representation with interacting (main) components. (source: WCC'93)

Complex Coastal Water System

DEMAND
DRIVEN

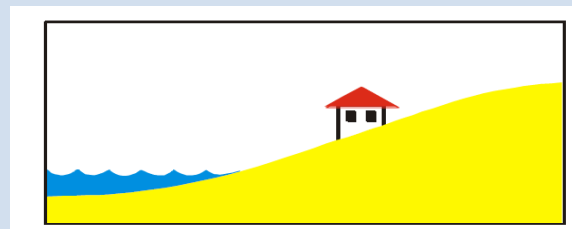


Structure of an ICZM programme



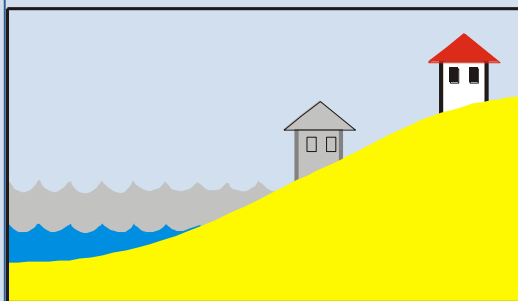
Ref.: CCC III-2 Chapter: <http://www.coastalcooperation.net/part-III/III-2.pdf>

ICZM - Coastal Adaptive Strategies



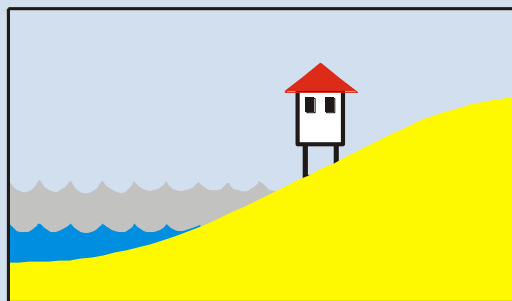
Current situation and sea level

RETREAT



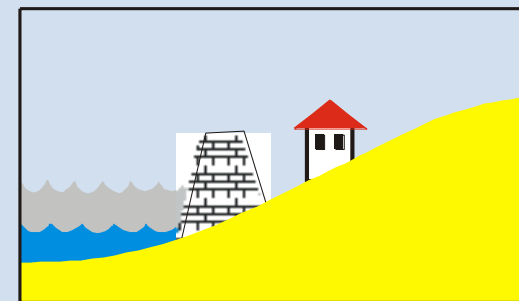
Establish building setback codes

ACCOMMODATE



Regulate building development

PROTECT



Protect coastal development

Future adaptive responses with sea level rise (IPCC, 1992)

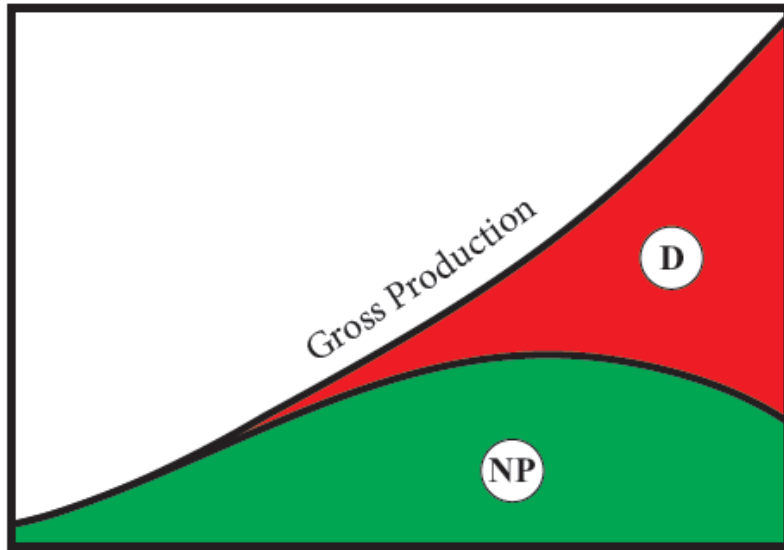


Integrated approach delivers

(Eco & Eco) benefits

Net Production: non-sustainable and sustainable economic development

Non-sustainable economic development

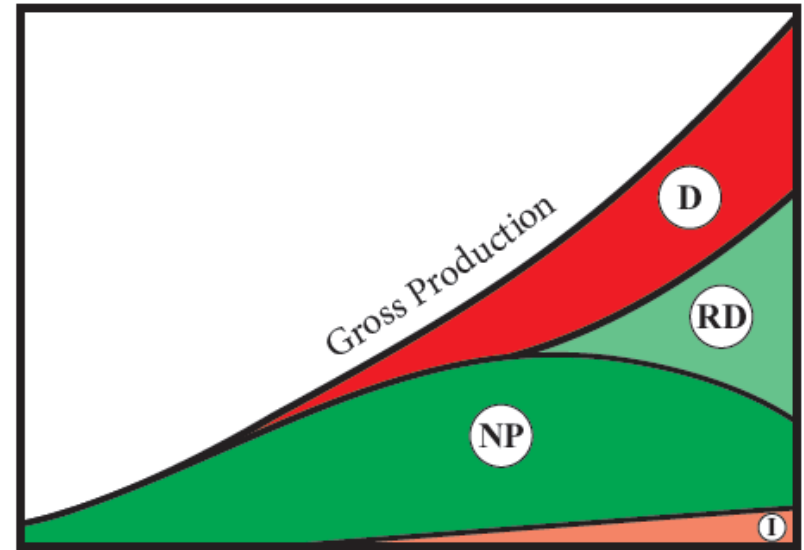


time

D = Damage due to pollution, congestion, over-exploitation of resources

I = Investment in ICZM for sustainable development

ICZM and sustainable economic development



time

NP = total Net Production

RD = Reduction of Damage

Concept presented: A small Investment in ICZM delivers a large reduction of Damage and increased Net Production - 1993 World Coast Conference



Examples of win-win, integrated solutions,

Providing Economic and Environmental benefits:

- 1) Sustainable development of the Port of Rotterdam;
- 2) Replanting mangroves in Vietnam;
- 3) Conservation of coastal vegetation belt, Seychelles.

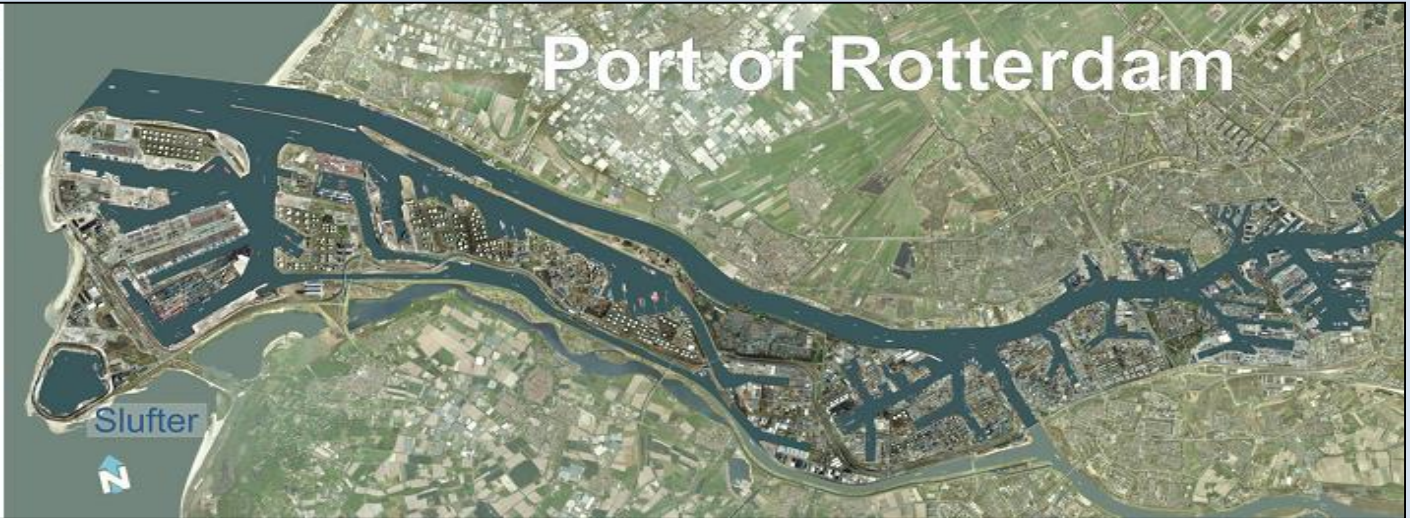


Win-Win: Rotterdam sustainable harbour development -

Economic and Environmental benefits simultaneously delivered



July 1, 2009



Through a structured, integrated approach:
Initial leadership, long term vision, commitment by all partners, a signed covenant for **7 billion €** programme executed 28 projects, including 2000 ha land reclamation - new harbour area MV2.

Win-Win achievements of the 1993 – 2010 ROM programme:
and strong economic growth with a direct added value of **25 billion €** (1996-2010)
and strong improved air & water & sediment quality,
and 750 ha terrestrial Greenery/Nature & 25,000 ha Marine Reserve compensating MV2
and improved housing & recreational conditions and human health.



Ref: CCC Chapter I-2-2: 'Rotterdam Sustainable Harbour Development',
<http://www.coastalcooperation.net/part-I/I-2-2-f.pdf>

RM-IHD080416

Win-Win: Mangrove Planting in Vietnam by Red Cross



Since 1994: 22,000 ha mangrove planting – at about 1 million \$ costs:

- Increasing safety against cyclones and flooding **and**
- Reducing coastal defence costs: some million \$/year **and**
- Increasing fish breeding habitat & fisheries **and**
- Enlarging the coastal bio-diversity **and**
- Providing employment & income.

Ref: CCC Chapter III-3-3-7: Mangrove replanting:
<http://www.coastalcooperation.net/part-III/III-3-3-7.pdf>

Seychelles: nature conservation pays-off



Republic of the Seychelles:

- Island state in the Indian Ocean,
- 1.4 million km², mostly water and 155 islands
- 80,000 inhabitants on the main granitic island Mahe.



The 2004 Tsunami : 4m breaking waves, hit the coastal zone:



Relatively little damage/casualties:

- Two persons killed,
- Infrastructure: only two bridges were “up-lifted”
- Only some Palm trees up-rooted,
- About 1.5 m back beach “cliff” erosion,
- Limited damage to the important coral reefs, sea grass fields and coastal vegetation

The uninterrupted coastal vegetation belt provides:

- Protection against flooding;
- Large bio-diversity;
- 60 % of GNP by international tourism.

Summarising

ICZM= the mechanism for coastal adaptation

- A holistic approach for the main Global Change issues;
- Monitoring & disseminating knowledge of coastal processes;
- Integrated spatial planning – GIS simulations = strong tool
implementing sustainable coastal measures;
- Flexible, resilient, no-regret adaptive measures are
Eco & Eco beneficial.





Three main triggers for Integrated Coastal Zone Management

Strong coastal population growth:

Strong increase of economic development:

Impacts of Climate Change:

