



**LITTORAL 2016 Conference, Biarritz 25-29 October 2016**

"The changing littoral. Anticipation and adaptation to climate change"



# **Integrated Coastal Zone Management: State & Perspectives**

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- 1. ICZM: Background, definition & development in Europe**
- 2. Are coastal problems and challenges solved or addressed appropriately?**
- 3. 'Best practice' in Europe - are there still deficits in ICZM?**
- 4. The Systems Approach Framework (SAF) in ICZM - theory and practice**
- 5. Conclusion**



## What is Integrated Coastal Zone Management (ICZM) ?

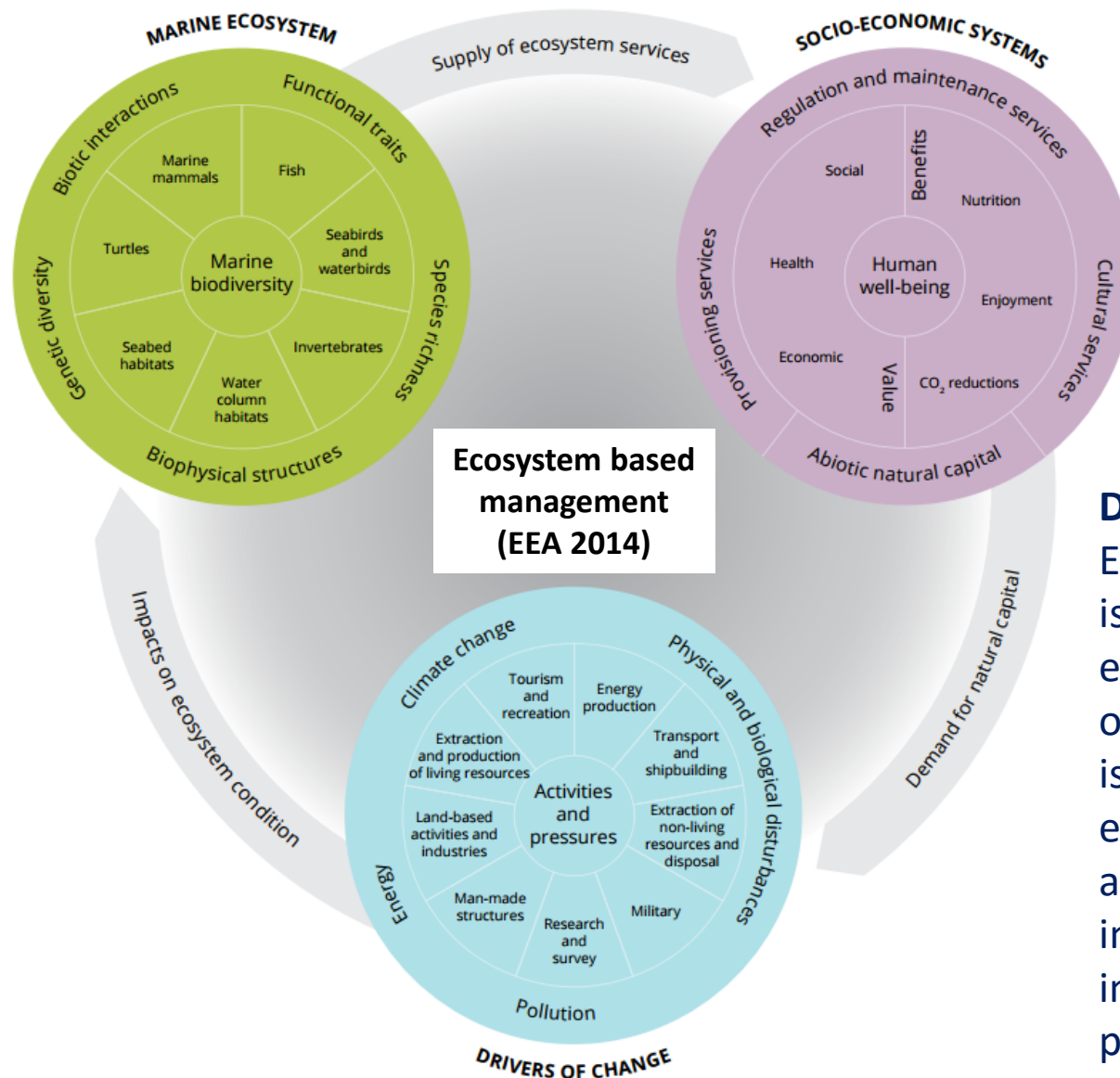
**ICZM is a dynamic, continuous and iterative process designed to promote sustainable management of coastal zones**

ICZM seeks to balance the benefits from

- economic development and human uses of the coastal zones,
  - protecting, preserving, and restoring coastal zones,
  - minimizing loss of human life and property and the
  - public access to and enjoyment of the coastal zone,
- all within the limits set by natural dynamics and carrying capacity.

- ➡ **ICZM is the sustainable development of coastal zones**
- ➡ **ICZM takes into account the ecosystem approach to management**

# What is an ecosystem-based management ?



UNEP (2011):  
Taking Steps toward  
Marine and Coastal  
Ecosystem-Based  
Management

## Definition:

Ecosystem-based management is an approach that goes beyond examining single issues, species, or ecosystem functions in isolation. Instead it recognizes ecological systems for what they are: a rich mix of elements that interact with each other in important ways. This is particularly important for oceans and coasts.

# Example of ICZM

(following an ecosystem-based approach)



*Unplanned development*



*Planning with an ecosystem perspective*



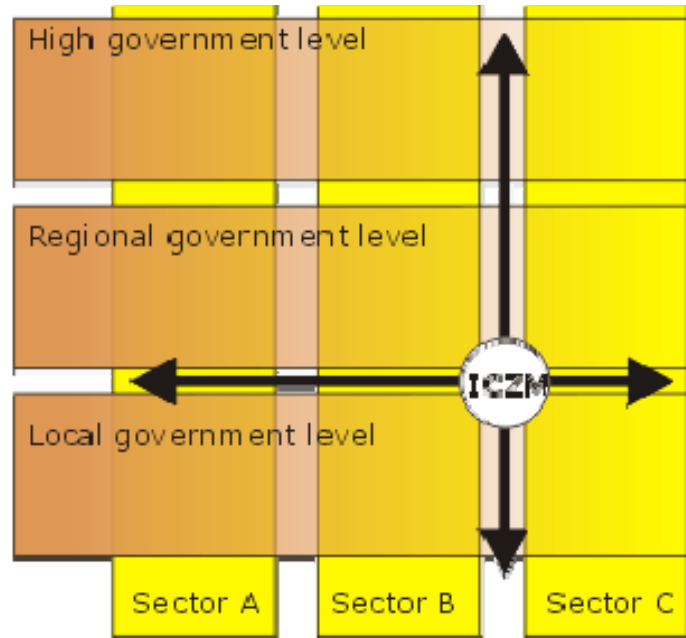
*Degraded and unproductive*



*Healthy and productive*



## What does it mean: 'Integrated'??



It refers to the integration of

- objectives,
- the multiple instruments and policies needed to meet these objectives
- all relevant policy areas, sectors and levels of administration,
- multiple disciplines and
- terrestrial and marine components

**➔ Integration of temporal and spatial as well as horizontal and vertical aspects**

# Example: Integration of multiple objectives

*Conflicting uses*



Shipping corridor passes through important feeding habitat for endangered whales, causing collisions.

Bottom fishing in the whale habitat leads to ocean floor disturbance and a decline in food sources for whales.

*Accommodating uses and reducing conflict*



Key whale feeding habitat is closed to shipping traffic and fishing, and whale mortality decreases. Ocean floor recovers from fishing activity, biodiversity increases, and ecosystem processes are restored.

Shipping corridor is re-routed and new zones are created to support sustainable fishing in less sensitive habitats.

UNEP (2011)



## Why Integrated Coastal Zone Management (ICZM)?

- Legislation and policy sectorial based and uncoordinated
- Inappropriate and isolated sectoral planning decisions
- Rigid bureaucratic systems and limited local creativity
- Lack of resources for local initiatives
- Lack of coastal development visions for management
- Limited understanding of coastal processes
- Scientific research and data isolated from end-users

**➔ Inadequate and non-sustainable coastal management in Europe**





## Principles

According to the EC-Recommendation on ICZM (30 May 2002)

- broad thematic and geographic perspective
- long-term perspective
- adaptive management
- local specificity (local to regional approaches)
- respecting carrying capacity of ecosystems
- involving all parties (public participation)
- involvement of all relevant administrative bodies
- coherence between sectoral policy as well as between planning and management

**➡ Regional approaches, which facilitate policy, planning and management and involve all stakeholders, are needed.**



## Where are we now?

- 1992** UN Earth Summit of Rio de Janeiro in 1992 **initiated the EU policy on integrated coastal zone management**. The conclusions of the summit call on coastal states to set up integrated coastal zone management strategies in Chapter 17 of the Agenda 21. Moreover, Chapter 10 of the Agenda 21 stresses the need for sustainable and integrated land management.
- 1994** the Council adopted a **resolution on integrated coastal zone management (94C 135/02)** . It acknowledges the integrated approach as very important for facing the challenges in regard to coastal management, and urges the Commission to come forward with proposals for action in Europe.
- 1996 to 1999**, the **Demonstration Programme** on integrated coastal zone management to provide technical information about sustainable coastal zone management, and to stimulate a broad debate among the various actors involved in the planning, management or use of European coastal zones.
- 2000** "**Integrated Coastal Zone Management: A Strategy for Europe**" (COM/2000/547 of 17 Sept. 2000), a Communication from the Commission
- 2002** **Recommendation concerning the implementation of Integrated Coastal Zone Management in Europe** adopted (2002/413/EC).
- 2003 - 2010 ICZM in Regional Sea Conventions:** Baltic Sea (2003, 2007, 2010), Black Sea (2009), Mediterranean (2010),
- 2011** **OurCoast database with > 350 ICZM best practice examples**
- 2013** **Proposal for a Directive establishing a framework for maritime spatial planning and integrated coastal management** adopted by the Commission





## **iCZM 2.0 - Brian Shipman (Littoral 2012)**

Protocol on Integrated Coastal Zone  
Management to the Barcelona Convention  
(Council Decision 2010/631/EU)



**DIRECTIVE 2014/89/EU OF THE EUROPEAN  
PARLIAMENT AND OF THE COUNCIL of 23 July 2014  
establishing a framework for maritime spatial  
planning and ~~integrated coastal management~~**



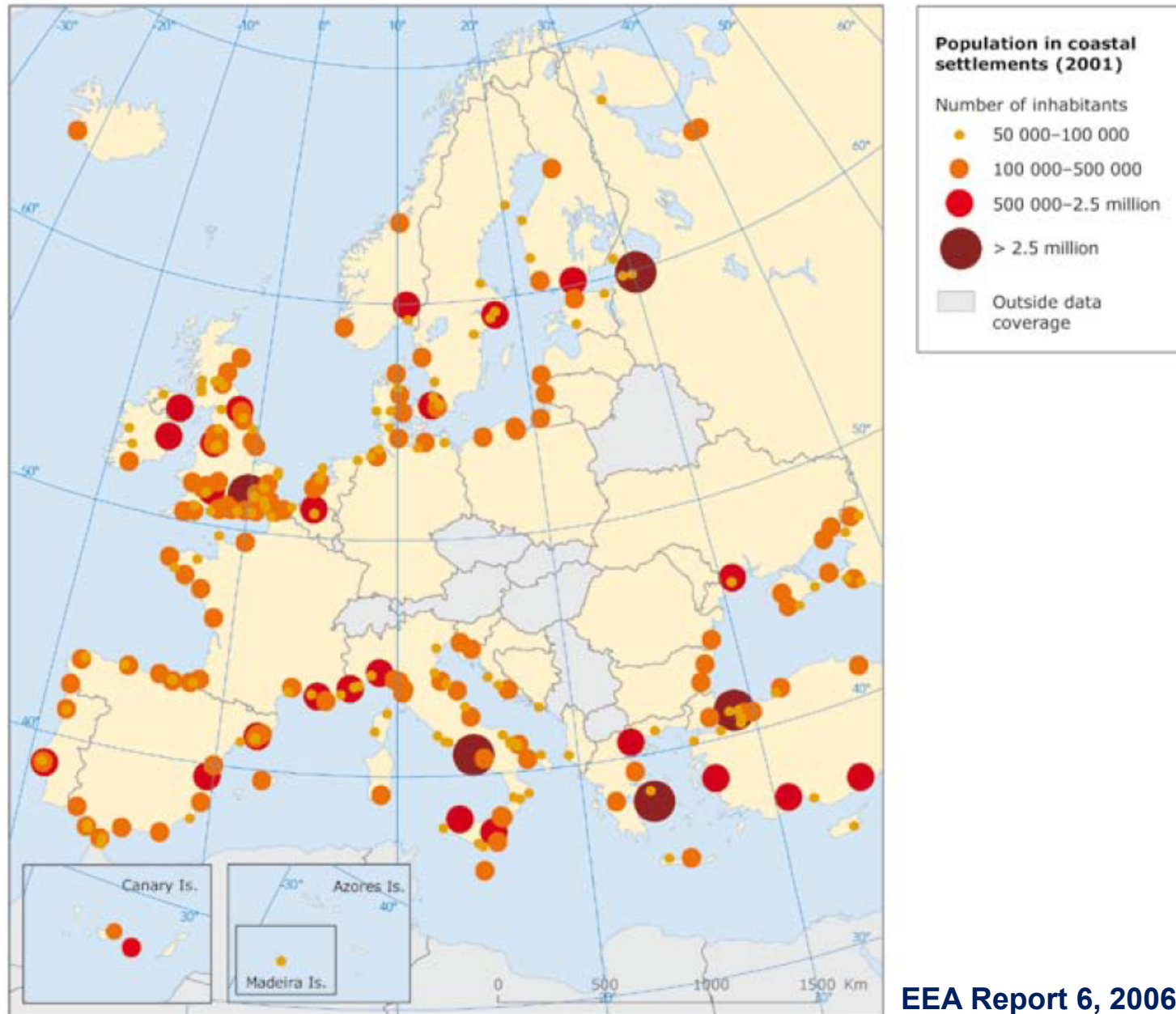
## Problems & challenges at European coasts

European Commission (1999): Towards a European Integrated Zone Management Strategy

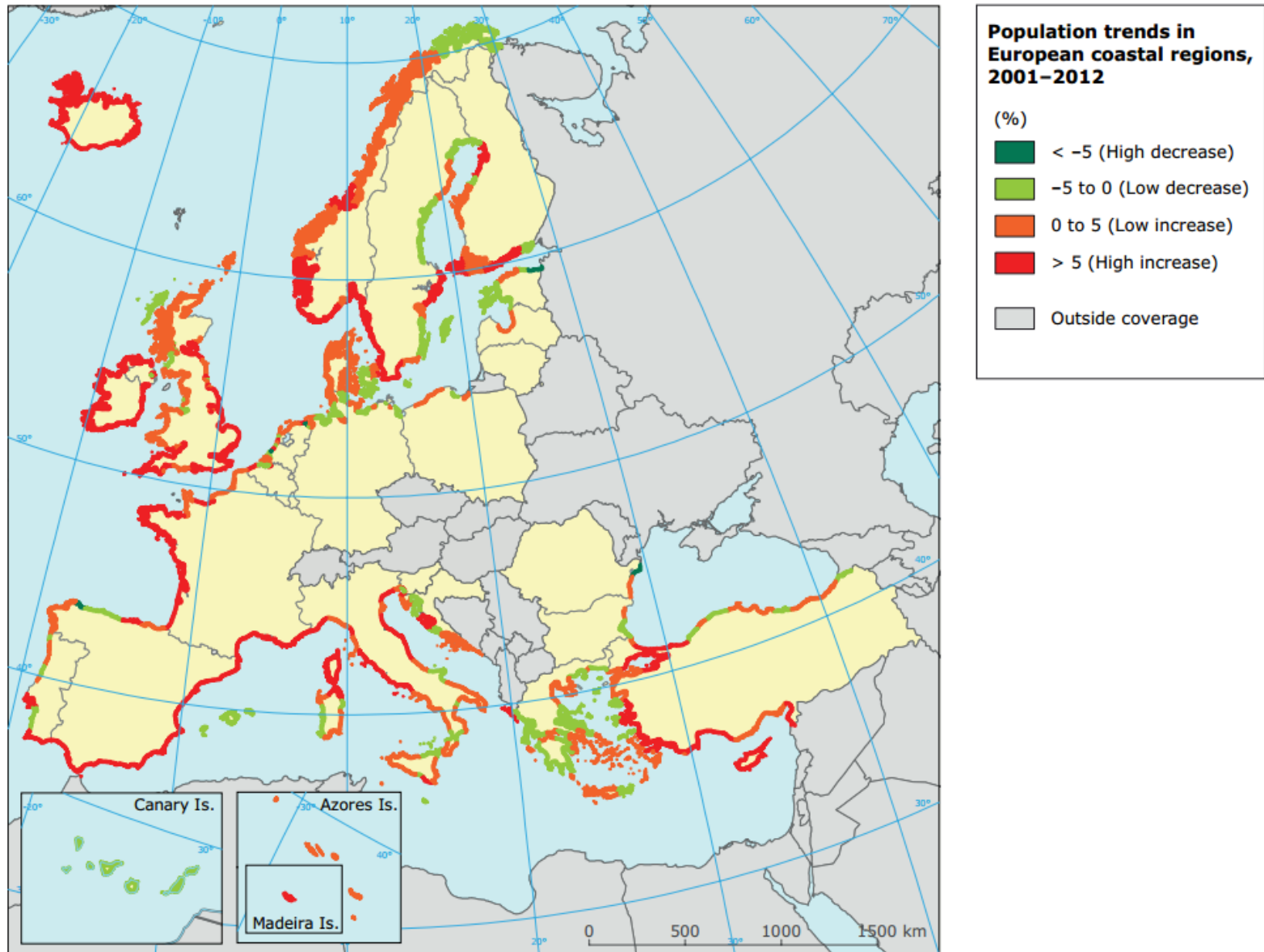
- Alternative energies
- Growing aquaculture
- Coastal fishing
- Tourism and recreational use of the coast
- Public access to the foreshore and beaches
- Second homes and urban sprawl
- Public health
- Chemical and heat pollution
- Dredging and aggregate extraction
- Transport and accessibility
- Fair competition in ports and marine industry
- Protection of landscapes and cultural heritage
- Habitat destruction and loss of biodiversity
- Natural catastrophes and climate change
- Coastal erosion
- Water management

 **Are the problems solved?**

# Population in coastal settlements in 2001



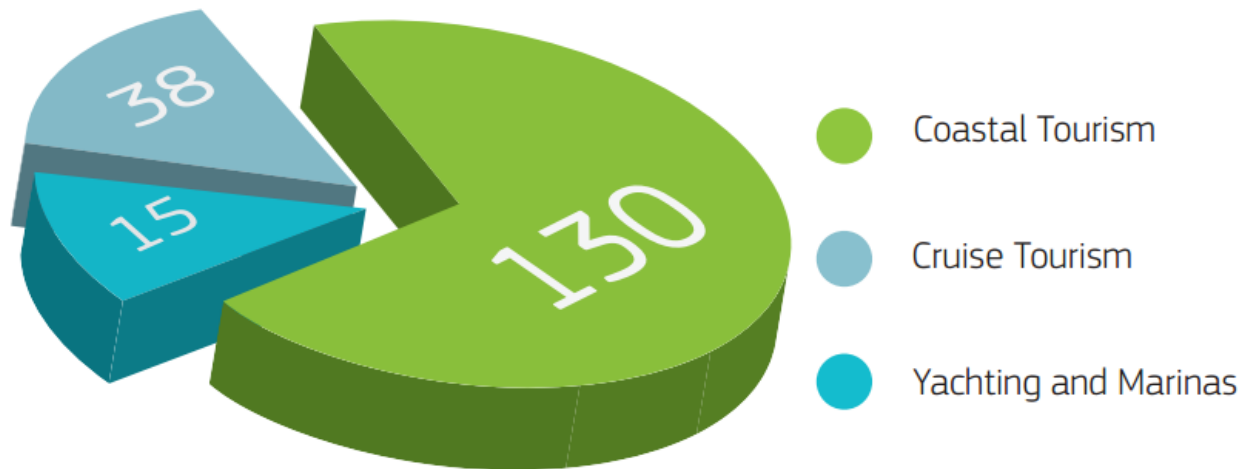
# Population trends in coastal regions, 2001 - 2012



**Source:** ETC/SIA, population data by coastal region (NUTS 3) from Eurostat.

## Coastal & marine tourism (2011)

“Coastal and maritime tourism is the largest maritime activity in Europe and employs almost 3.2 million people, generating a total of € 183 billion in gross value added.”

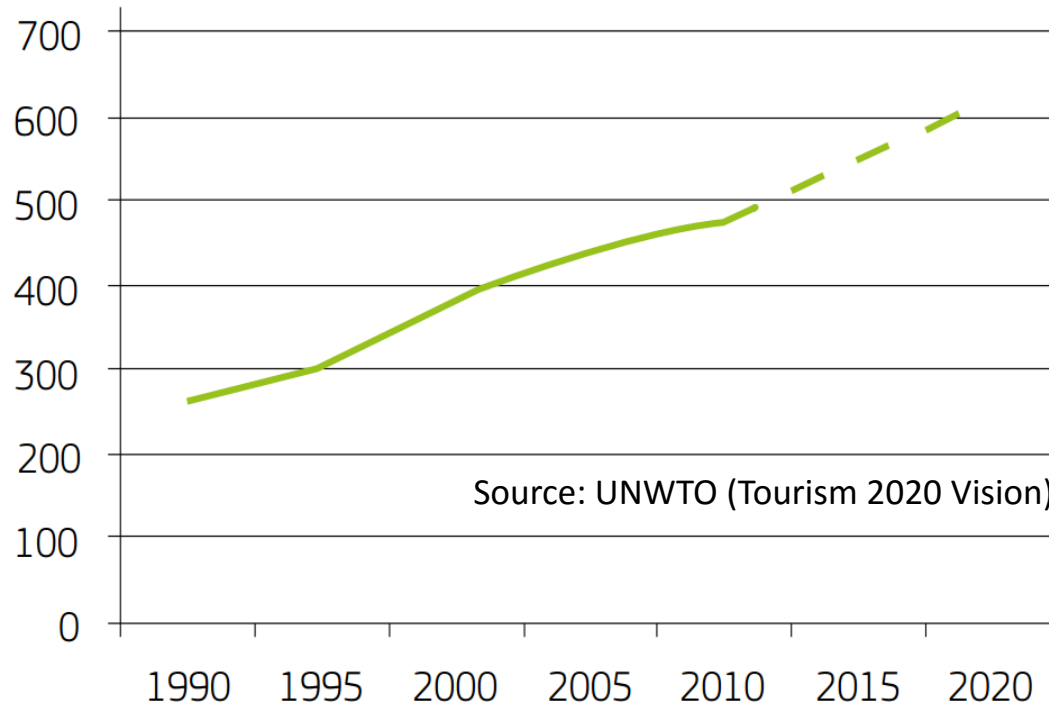


“As much as 51% of bed capacity in hotels across Europe is concentrated in regions with a sea border.”

Source: EC (A European Strategy for more Growth and Jobs in Coastal and Maritime Tourism)

## Coastal & marine tourism

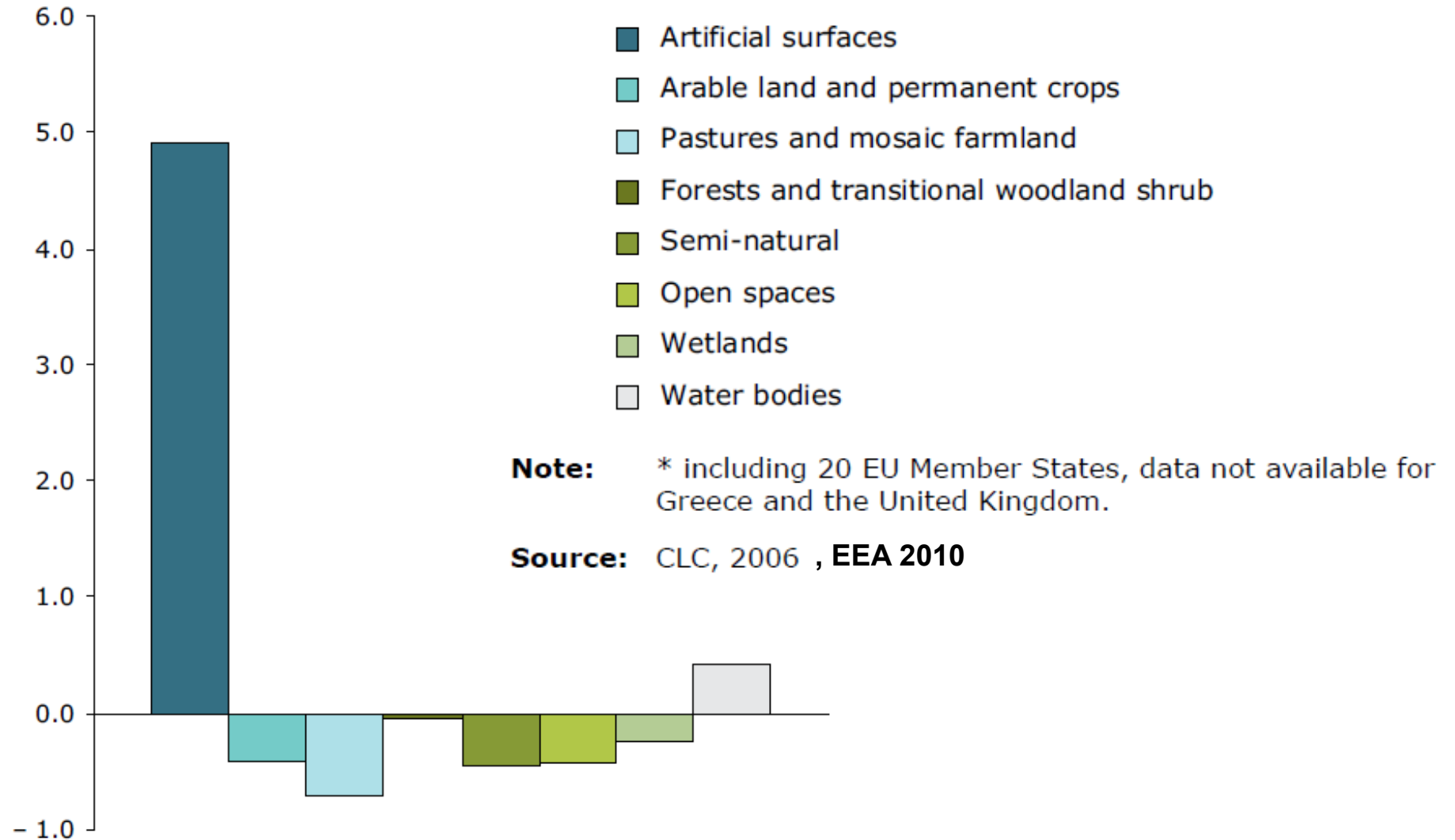
International tourist arrivals in Europe (millions)



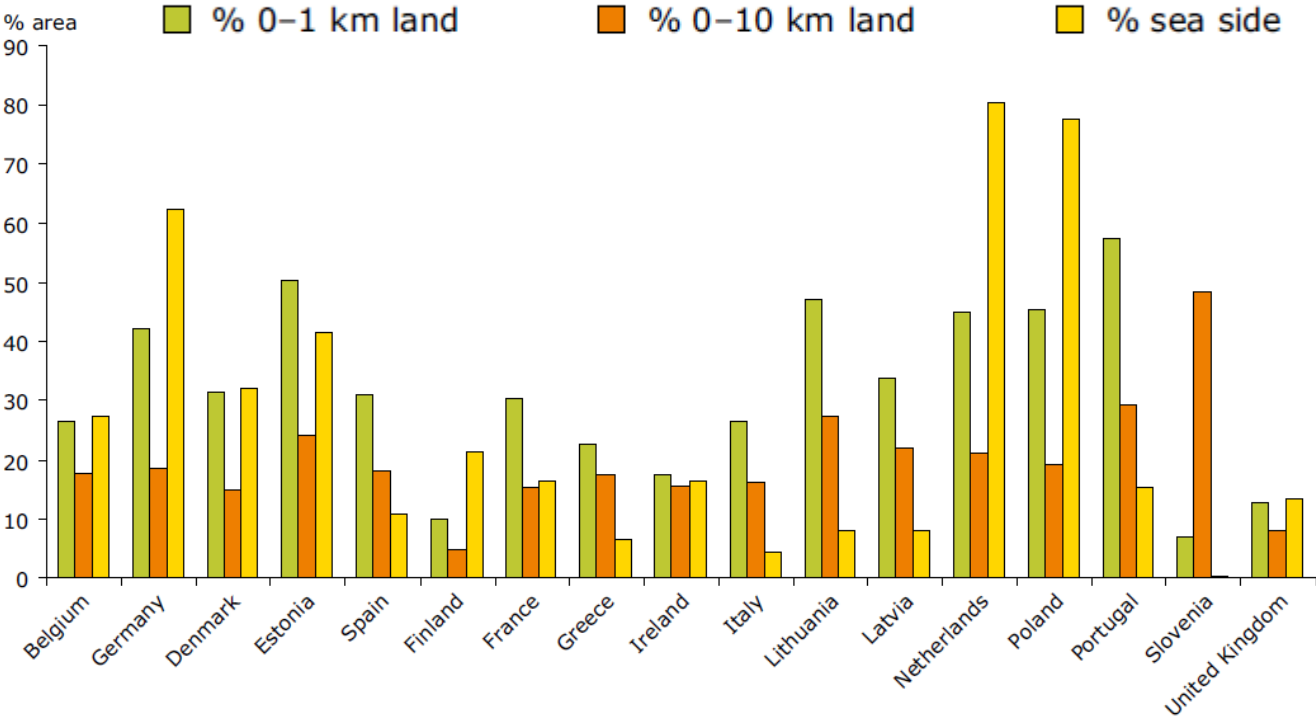
Growth in employment in the tourism sector has almost always been more pronounced than in the rest of the economy. (Source: COM/2010/0352 final)



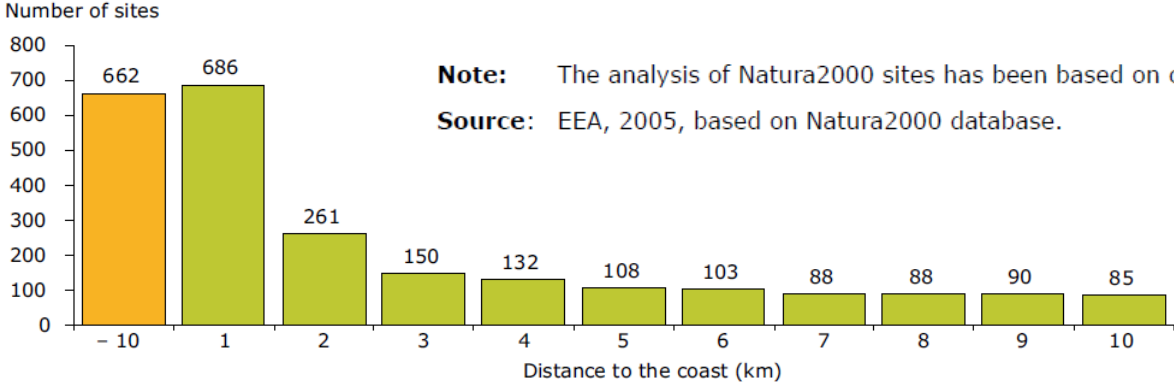
# Change of land cover (%) between 2000-2006



# Coastal zones covered by Natura 2000 sites (2005)

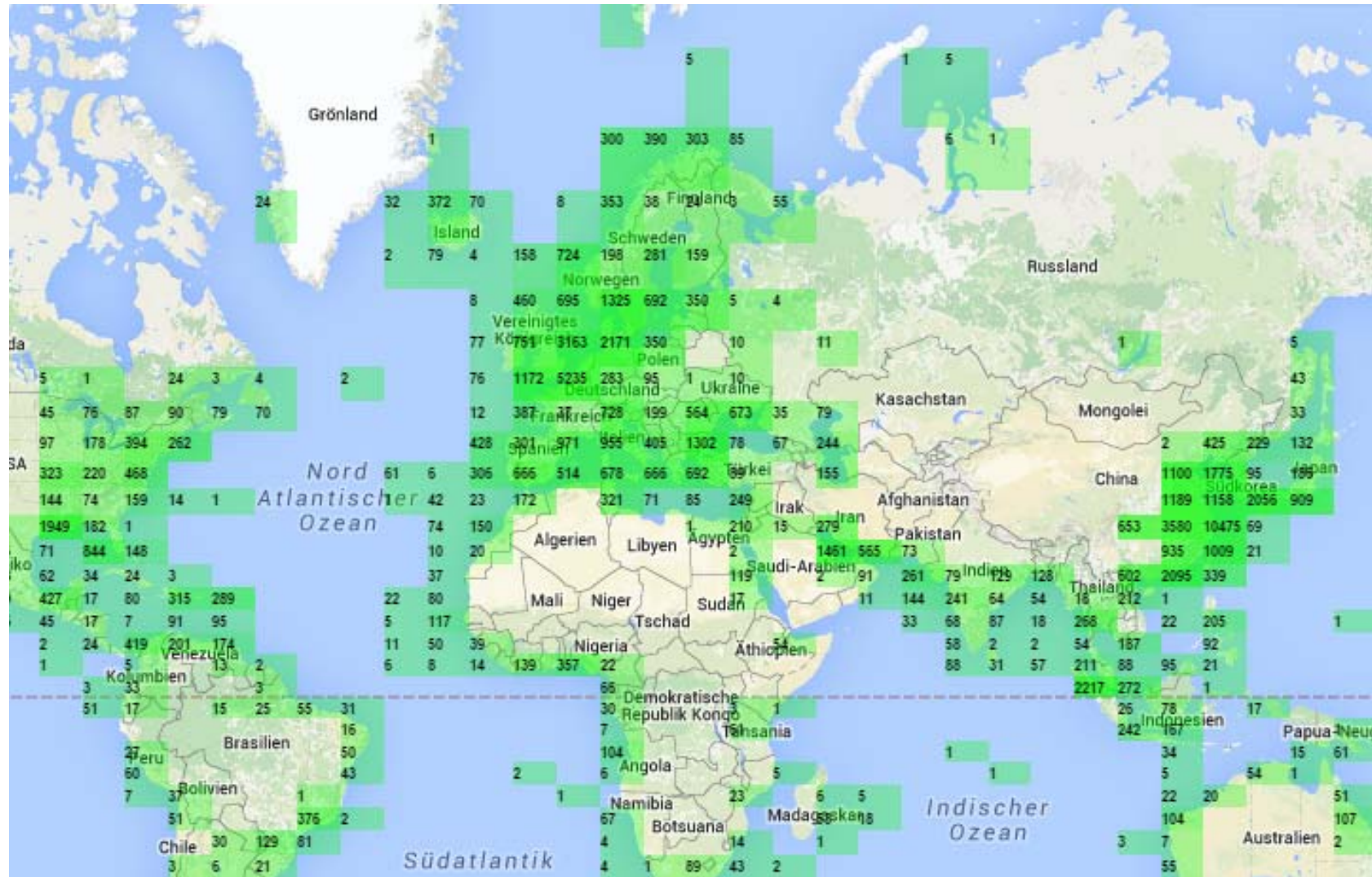


# Distribution of Natura2000 sites from the coastline



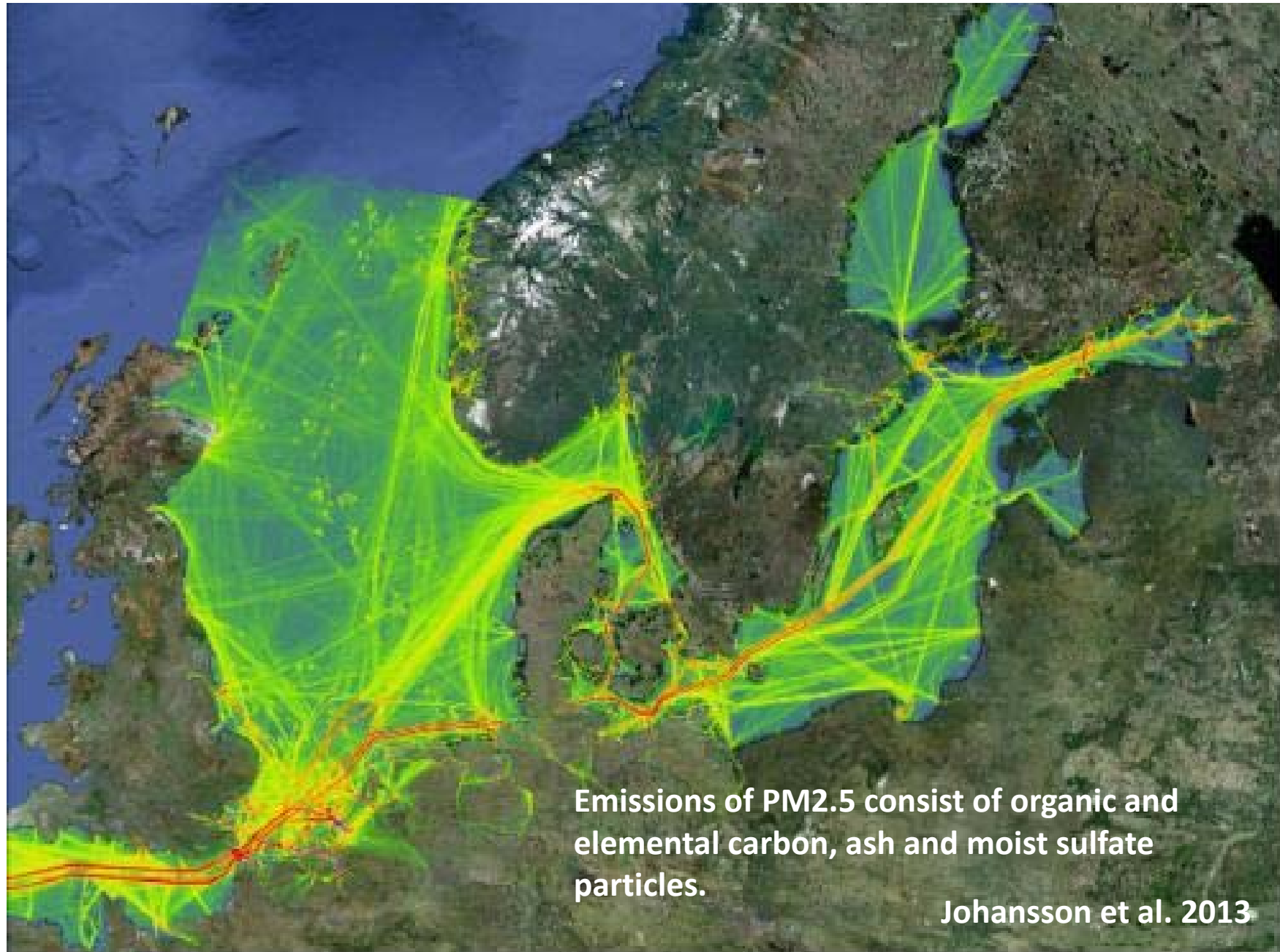
**Note:** The analysis of Natura2000 sites has been based on centre points of the actual site areas.  
**Source:** EEA, 2005, based on Natura2000 database.

# Total number of ships in different sea regions (April 2016)

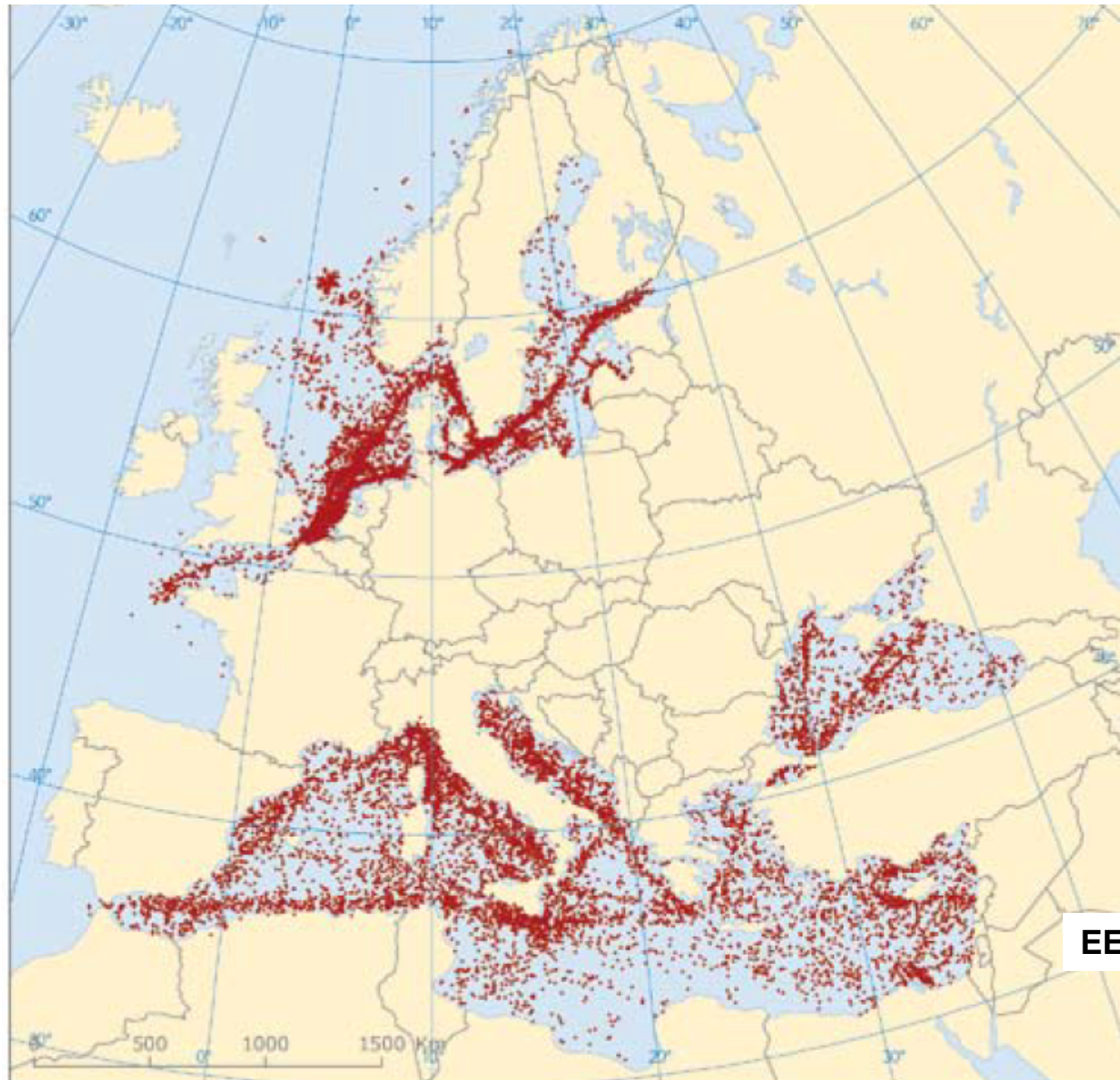


<http://www.marinetraffic.com/>

## Intensity & geographic distribution of shipping emissions, 2011



## Oil spills (2000-2004)



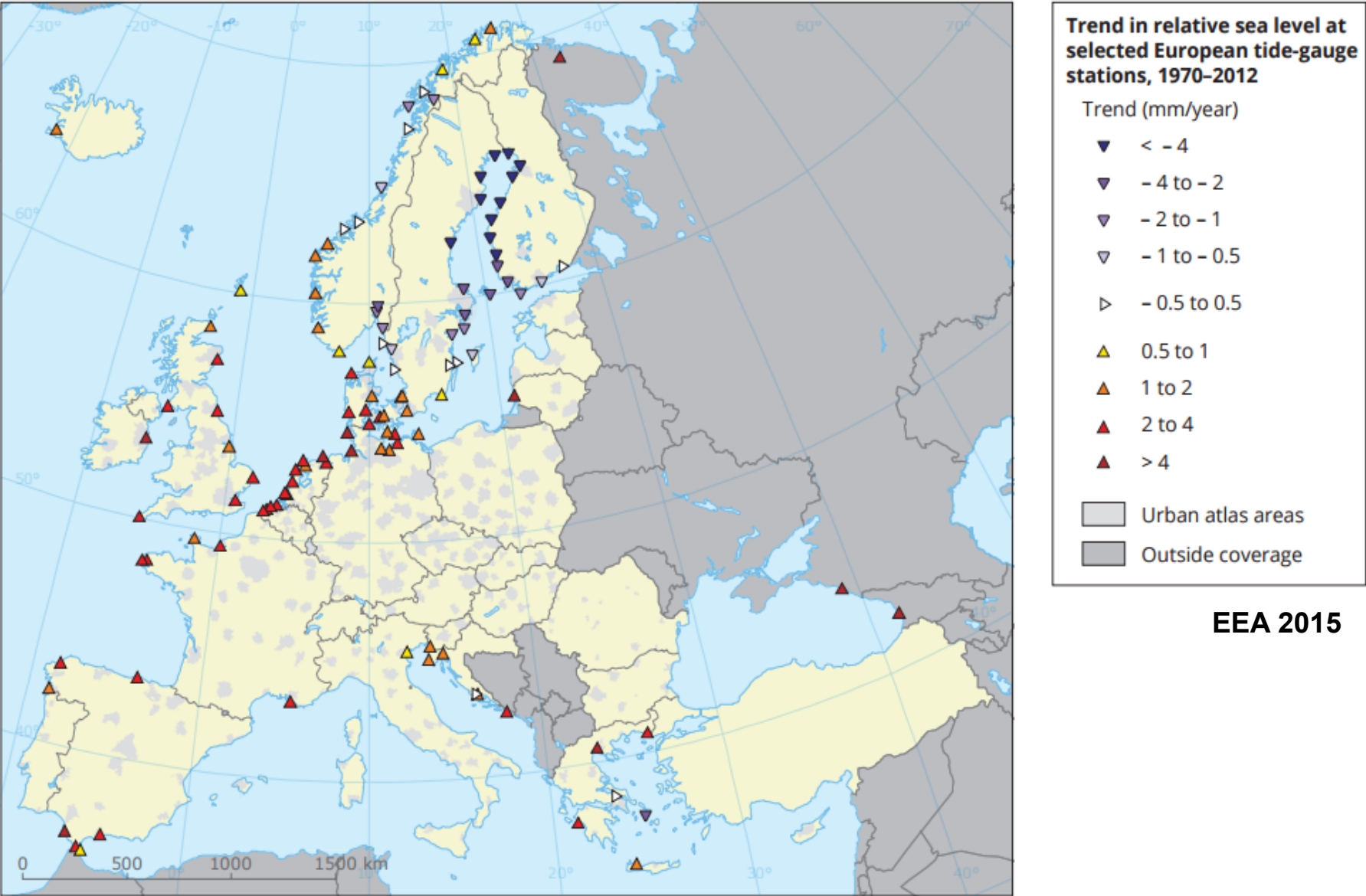
### Oil spills detected in the European regional seas (2000–2004)

- Oil spills

**Note:** In the North and Baltic Seas the oil spills were detected by aerial surveillance, but in the Mediterranean and Black Seas by radar images (e.g. probable spills). Varying amount of surveillance in different seas may represent disproportionate amount of pollution.

EEA Report 6, 2006

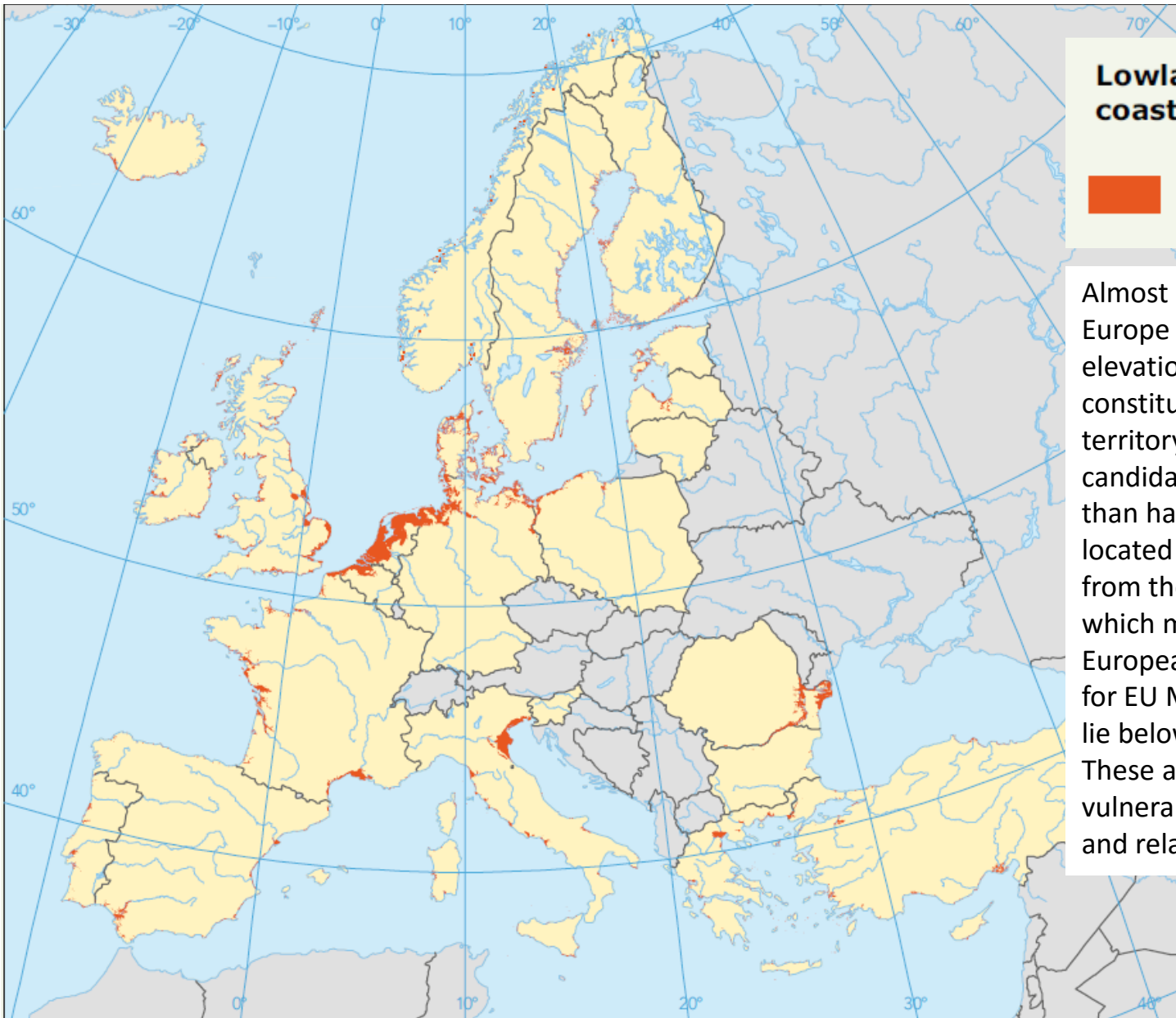
# New challenges: Relative sea level trends (1970-2012)




EEA 2015

Source: EEA, 2014c.

## Lowland in coastal countries



### Lowland in coastal countries

 Below 5 m elevation

Almost 100 000 km<sup>2</sup> of Europe lies below a 5 m elevation. This figure constitutes 2 % of the total territory of 20 coastal EU (and candidate) countries. More than half of this area is located closer than 10 km from the sea (10 km zone), which means that 9 % of all European coastal zones (12 % for EU Members States) lie below a 5 m elevation. These areas are potentially vulnerable to sea level rise and related inundations.



## Key messages on Coastal Ecosystems

(European Environment Agency, 2010)

- As an interface between land and sea, European coastlines provide vital resources for wildlife, but also for the economy and human health and well-being.
- **Multiple pressures, including habitat loss and degradation, pollution, climate change and overexploitation of fish stocks, affect coastal ecosystems.**
- **Coastal habitat types and species of Community interest are at risk in Europe;** two thirds of coastal habitat types and more than half of coastal species have an unfavorable conservation status.
- Integrated and ecosystem-based approaches provide the foundation for sustainable coastal management and development, supporting socio-economic development, biodiversity and ecosystem services. Coordinated action at the global, regional and local levels will be key to sustainable management of coastal ecosystems.





**Conflicts between uses and activities at the coast  
are not solved...**

**...on the opposite, the concentration of activities is  
increasing...**

**and new challenges (e.g. climate change) are  
causing additional pressure!**



**Integrated Coastal Zone Management (ICZM) was  
supposed to be the solution to coastal problems in  
Europe...**

**...but it vanished from the political agenda!**

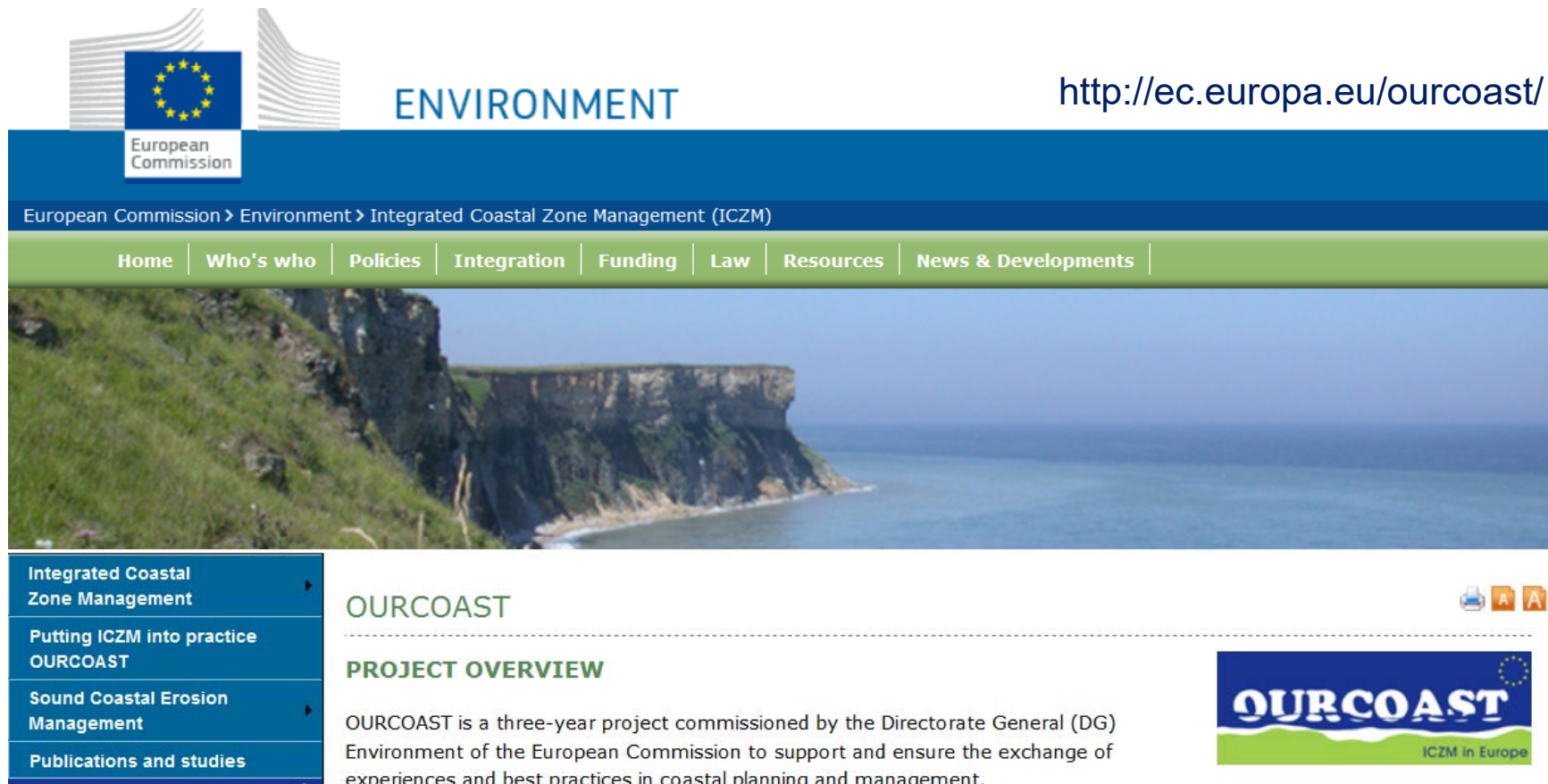
**What went wrong?**



## **Brian Shipman (Littoral 2012 in Oostende):**

- ICZM has been slow to evolve and is losing ground to “rivals”
- Status quo is not an option
- ICZM needs to continually reinvent itself , to make itself relevant - but from a practical and legitimate foundation
- It needs to be easy to use, interactive ...and essential
- iCZM 2.0

# Coastal management best practice case studies in Europe



The screenshot shows the OURCOAST website interface. At the top, there is the European Commission logo and the word "ENVIRONMENT" in blue. To the right, the URL <http://ec.europa.eu/ourcoast/> is displayed. Below this is a blue navigation bar with the text "European Commission > Environment > Integrated Coastal Zone Management (ICZM)". A green navigation bar contains links for "Home", "Who's who", "Policies", "Integration", "Funding", "Law", "Resources", and "News & Developments". The main content area features a large image of a coastal cliffside. On the left, a blue sidebar menu lists: "Integrated Coastal Zone Management", "Putting ICZM into practice OURCOAST", "Sound Coastal Erosion Management", and "Publications and studies". The main text area is titled "OURCOAST" and "PROJECT OVERVIEW". It states: "OURCOAST is a three-year project commissioned by the Directorate General (DG) Environment of the European Commission to support and ensure the exchange of experiences and best practices in coastal planning and management." To the right of this text is the OURCOAST logo, which includes the text "OURCOAST" and "ICZM in Europe" with a small European Union flag icon.

More than 350 'best-practice' European case studies on coastal management are collected in the EU-OurCoast database with the aim to provide lessons learnt for managers and scientists to improved management practice in Europe.



# Are the case studies really good examples? Can we learn from it? Do they help practitioners?

An indicator based assessment of the ICZM processes and results:





## Evaluation of case studies

- ICZM is often understood in a broad sense and case studies only partly reflect the ideas of an integrated management.
- Success indicators usually were not defined in the beginning and post-evaluations of success are most often lacking.
- Concrete lessons learnt that can be transferred to other case studies and/or have relevance for ICZM in practice are lacking.



**A systematic, stepwise, user-friendly approach/tool with high practical relevance that guide through a full ICZM cycle is largely lacking.**



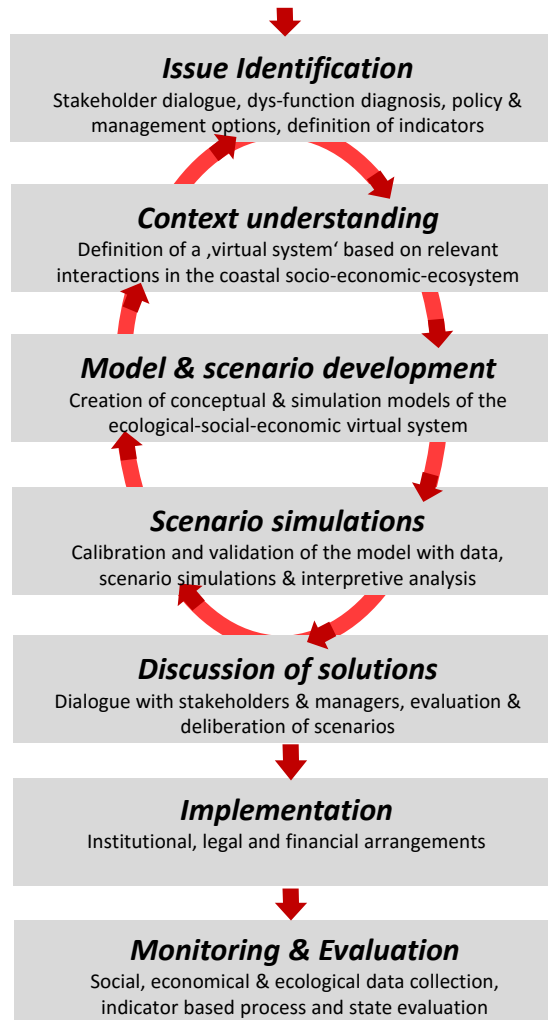
## A Systems Approach Framework (SAF) for ICZM: Theory and practice



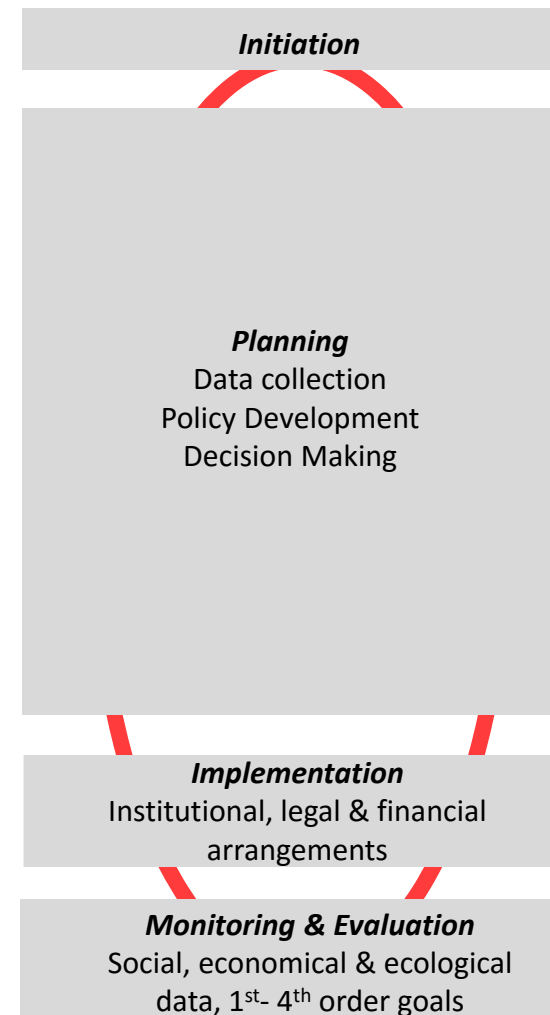


# ICZM-cycle & Systems Approach Framework

## Systems Approach Framework: Ecological-Social-Economic-Assessment



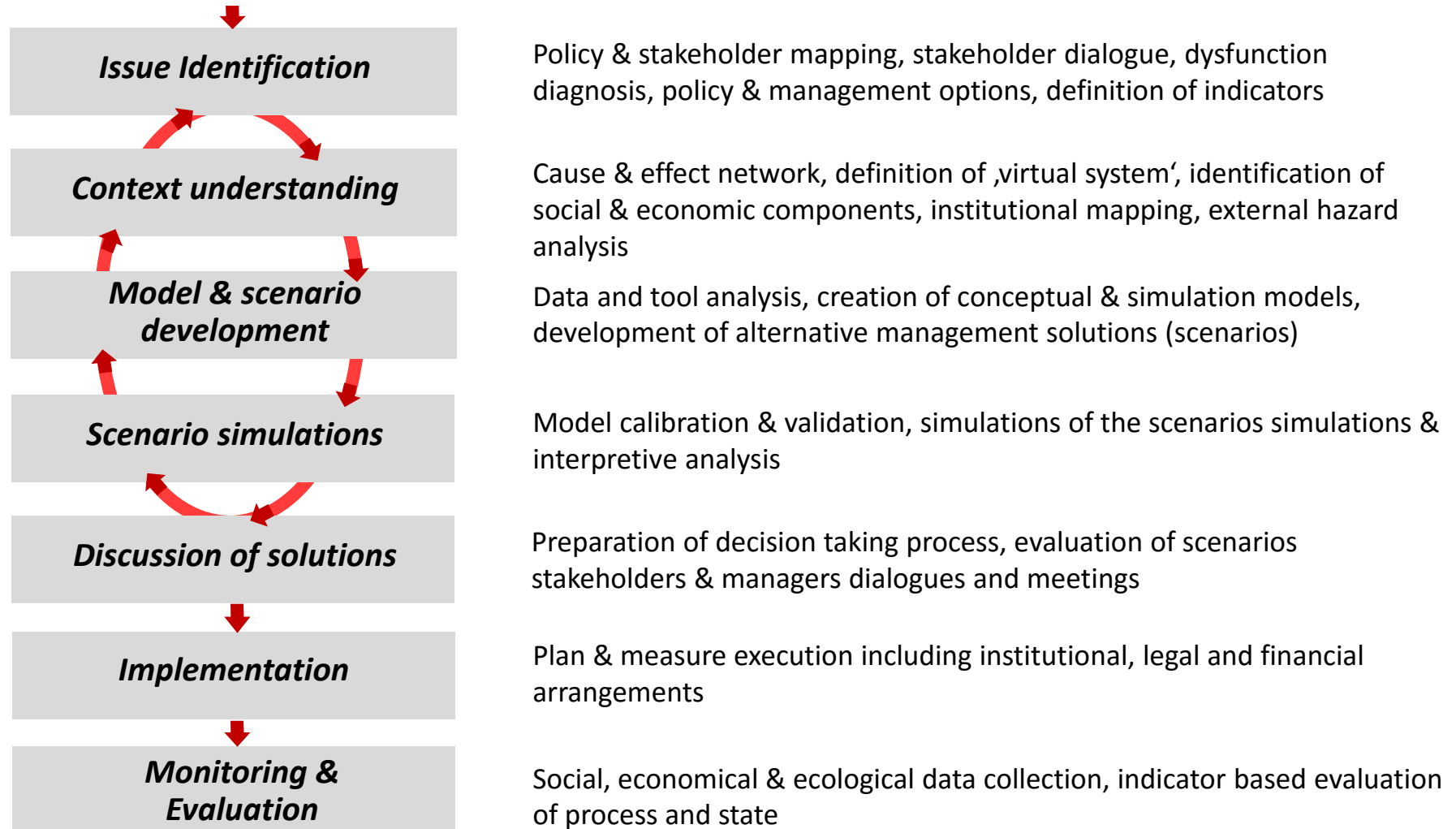
## ICZM-Cycle (<http://www.coastlearn.org/>)





# Systems Approach Framework

## Ecological-Social-Economic-Assessment



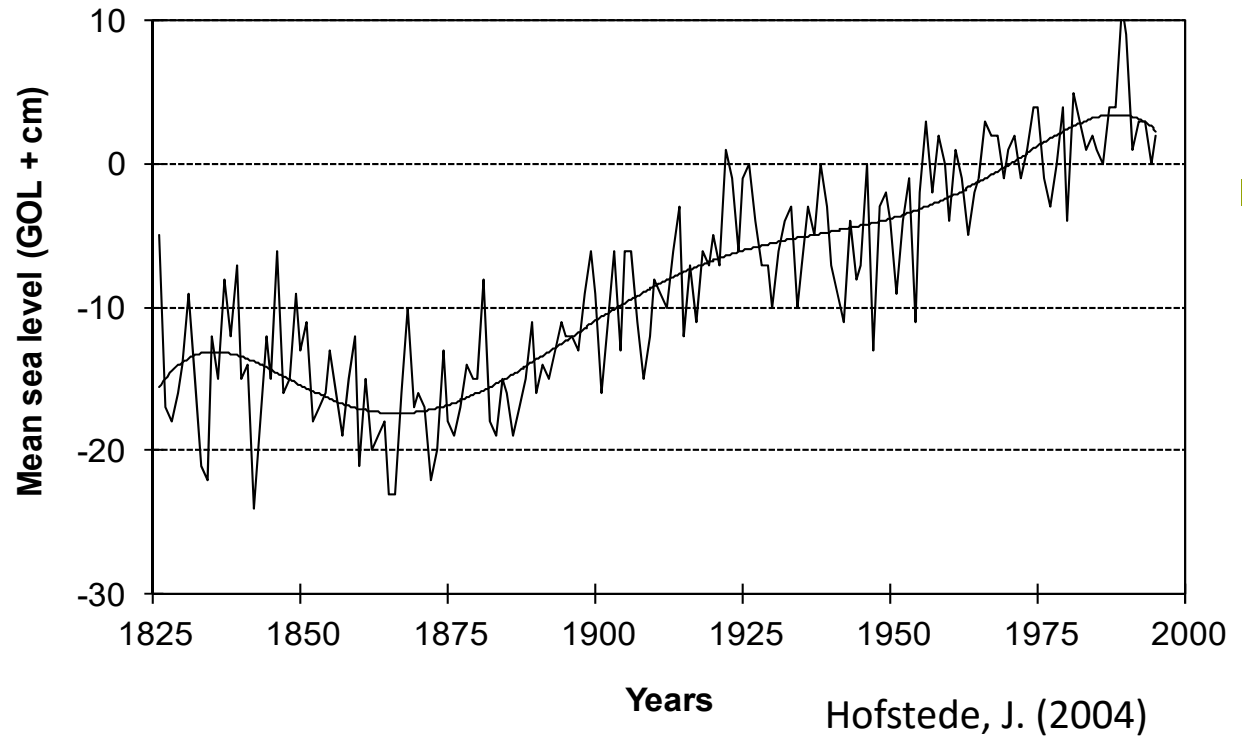




Coastal management best practice example:  
**Integrated Flood Risk Management  
in Timmendorf, Germany**



## Issue Identification



Coastal lowlands  
( $< \text{GOL} + 3 \text{ m}$ )  
Area: 12 km<sup>2</sup>  
Inhabitants: 5,667  
Economic values:  
1.760 billion Euros

*Timmendorfer Strand*

*Scharbeutz*

0 2 4 km

Hofstede, J. (2004)



# Context understanding

## Improved large-scale coastal flood defence



### Background conditions (summer 1999):

- Coastal flood defence (beach wall ca. MSL +2.2 m) is deficient
- Responsible for coastal flood defence are the municipalities (State administration gives technical and financial assistance)
- Local population is very sceptic towards coastal flood defence (negative impact on tourism)
- Some local demands for protection against coastal erosion (supplement, groins), to be financed by the State
- Prerequisite for State funding is an integrated (coastal protection and flood defence) concept for the entire lowland
- Local demand for active participation in the establishment of such a concept

**After a stakeholder mapping 65 persons were invited to a first public meeting organized by the ministry and a consultant company.**





## Context understanding



**Moderated by a consultant company, local stakeholder met 5 times (max 25 participants) between 27.01.2000 and 19.07.2000 and conducted the following steps (Sensitivity Model of Prof. Vester©):**

1. Characterisation of the region with variables (e.g. security against natural hazards, economic power, quality of life),
2. definition of the effects (strength and direction) of the variables on each other, i.e. establishment of a model,
3. definition of a sub-model coastal defence (e.g. risk of flooding) and of five coastal defence scenarios (e.g. zero-scenario),
4. simulation of future development with the sub-model for each scenario.



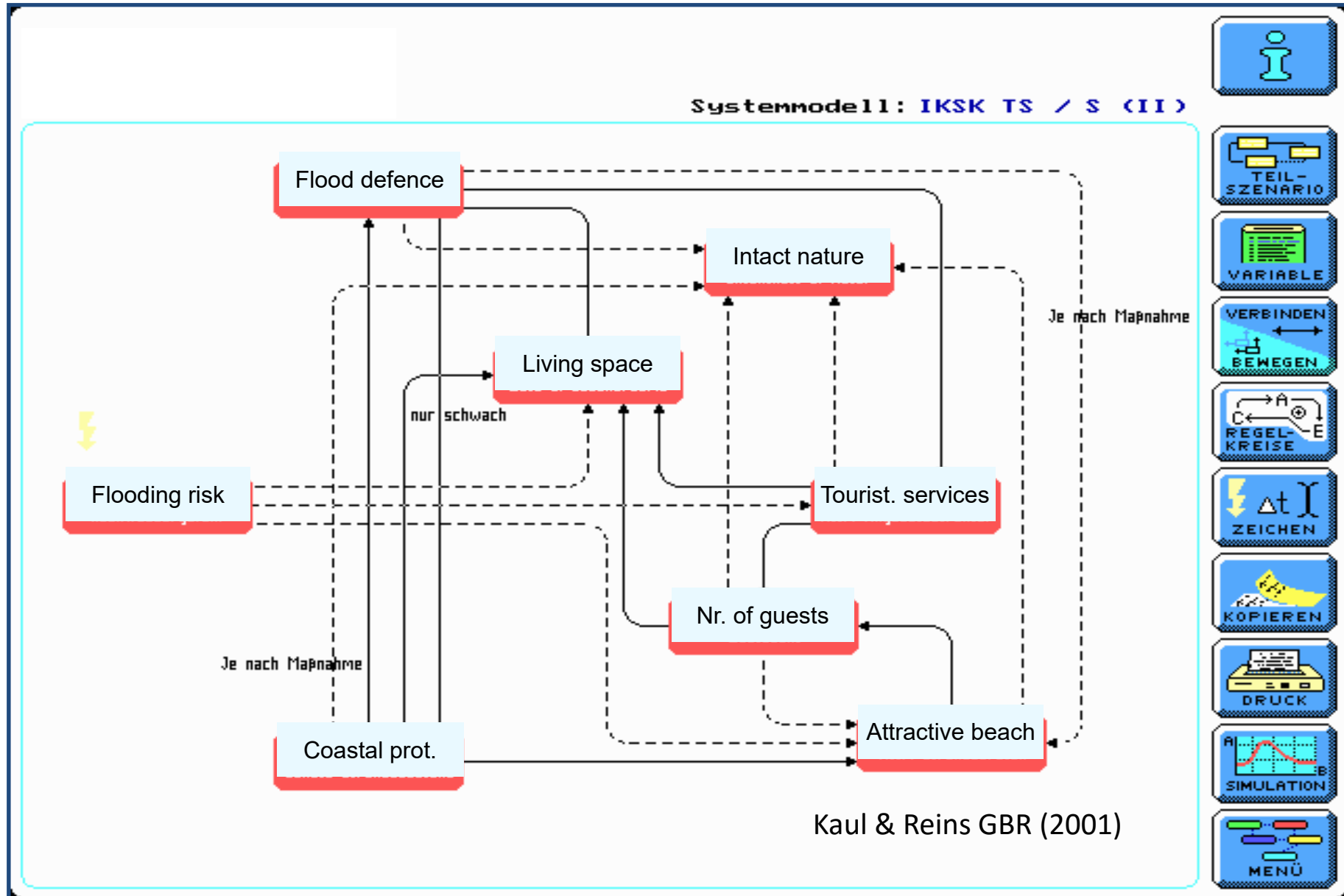
# Model development: Variables and interactions

Konsensmatrix 17.05.2000		Economic power	Tourist services	Degree of employment	Nr. of inhabitants	Nr. of guests	Attractivity beach	Coastal protection	Quality of living	Security of people	Recreational services	Intactness of landscape	Intactness of seascape	Effective infrastructure	Budget municipality	Future policy	Image of the municipality	Traffic development
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Effect of	on	→																
1	Economic power		3	3	0	0	0	0	0	0	1	1	0	0	2	2	0	2
2	Tourist services	2		3	0	3	2	0	1	0	2	2	1	2	2	0	3	2
3	Degree of employment	1	0		2	0	0	0	2	0	1	0	0	0	3	0	0	0
4	Nr. of inhabitants	2	0	0		0	0	1	2	1	1	1	1	0	3	1	0	2
5	Nr. of guests	3	1	2	0		2	0	0	1	0	1	1	0	3	1	0	2
6	Attractiveness beach	1	3	2	1	3		1	3	0	1	1	0	1	2	0	3	0
7	Coastal protection	1	0	0	1	1	2		3	3	0	0	0	1	1	0	1	0
8	Quality of living	1	0	0	3	2	0	0		0	0	0	0	0	0	1	2	0
9	Security of people	0	0	0	3	1	0	0	2		0	0	0	0	0	0	2	0
10	Recreational services	2	3	1	2	3	1	0	3	0		1	1	0	2	0	2	2
11	Intactness of landscape	1	2	1	2	3	1	1	3	0	1		2	0	0	0	2	0
12	Intactness of seascape	2	3	2	2	3	3	0	2	1	1	1		0	0	0	2	0
13	Effective infrastructure	3	2	2	2	3	1	1	3	0	1	2	0		0	0	1	1
14	Budget municipality	1	2	1	0	0	1	2	1	1	2	0	0	3		2	0	2
15	Future policy	1	2	1	2	1	2	2	2	1	1	1	0	2	2		0	1
16	Image of the municipality	2	0	0	2	2	0	0	0	0	0	0	0	0	0	0		0
17	Traffic development	2	1	0	0	1	0	0	2	1	1	1	0	0	0	0	0	

Kaul & Reins GBR (2001)



# Model development: Simplified model focussed on coastal defence





## Coastal defence scenarios

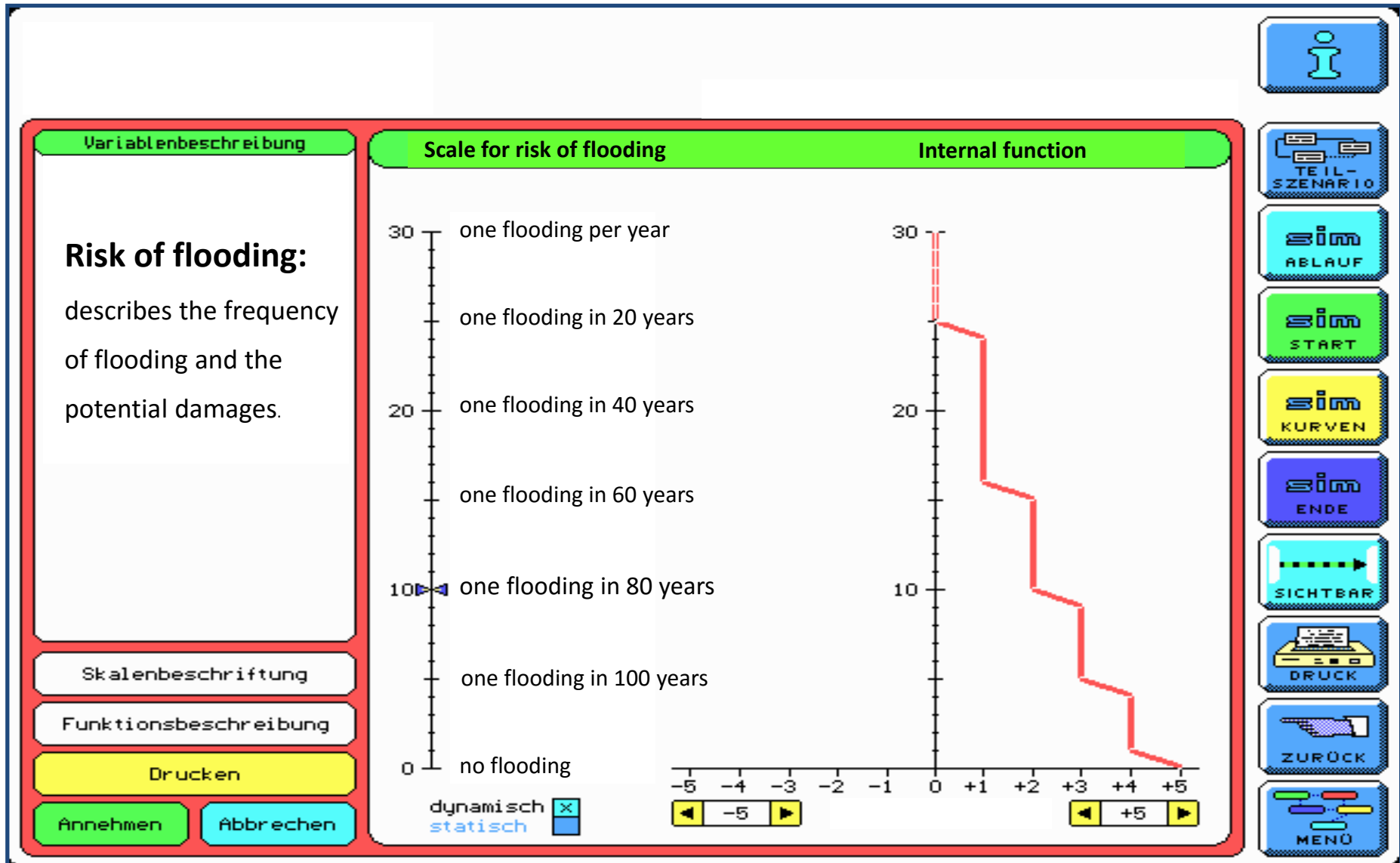
1. No coastal defence
2. Only coastal erosion protection measures
3. Only local measures to reduce flooding
4. Combination of 2 and 3
5. Dike on the beach (optimal protection)





# Systems Appraisal:

## Simulation of the flood risk related to different scenario/strategies



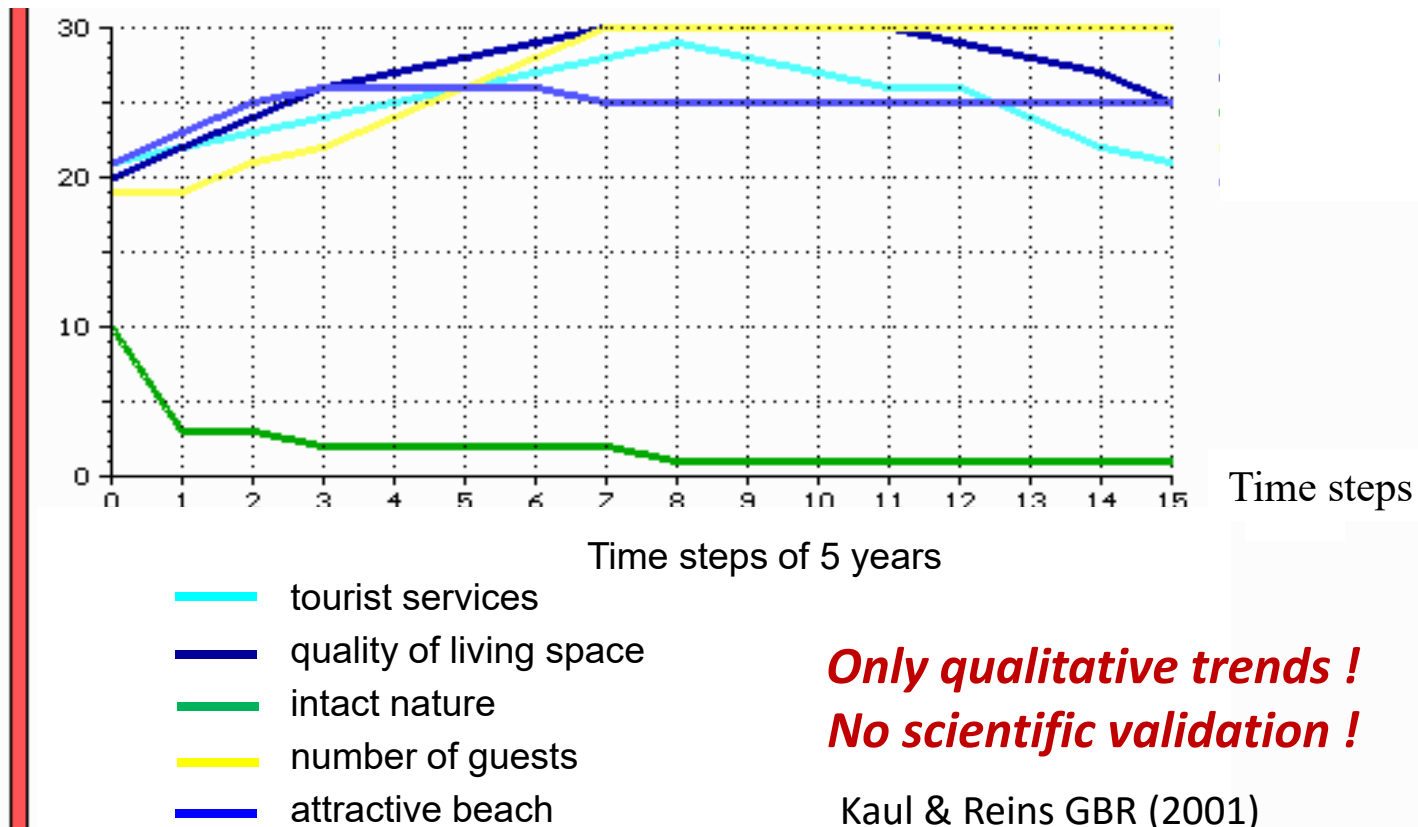




# Scenario simulations:

## The combined solution - flood defence and coastal erosion protection

### Development of variables with time



**Only qualitative trends !**

**No scientific validation !**

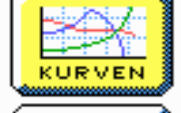
Kaul & Reins GBR (2001)

zurück

vor

Bildschirmausdruck

Ende



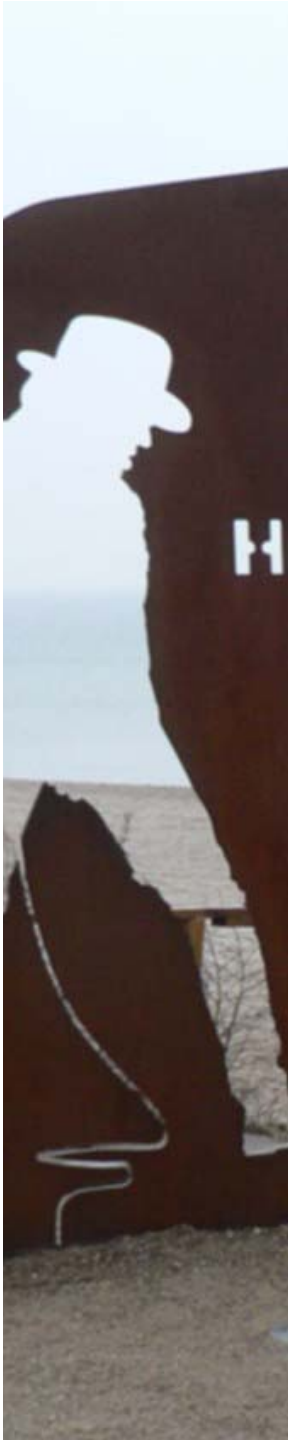
## Discussion of solutions



### **Presentation and discussion of the results on a public meeting as well as agreement on joint recommendations:**

- the group unanimously supports the results of the sensitivity analysis, especially those of the simulations with the coastal defence model,
- the group recommends a combination of coastal protection and flood defence measures (that fits into the landscape) to be implemented, and
- the group demands further active participation in the process as a technically qualified interest group.

**From the perspective of the state coastal defence administration, the Systems Approach as a guiding process worked very well and a solution was obtained !**





## Implementation (2007-2009)



Source: [umweltbundesamt.de](http://umweltbundesamt.de)

**12 km coastal improved protection caused investment costs of 30 Mio. Euros !**



## Present situation(2015)





# Present situation (2015)



# Evaluation: SWOT-analysis



## Strength

- active involvement of the affected
- systematic approach
- transparency of the results
- Stakeholder processes finished within a year

## Weaknesses

- low number of participants (compared to the affected)
- tiresome and time-consuming procedure
- depending upon volunteers

## Opportunities

- recognition of the problems
- awareness of the responsibilities
- acceptance of possible solutions

## Threats

- results may not be conform to contractors expectations
- loss of interest during humdrum meetings
- not enough participants
- slow implementation

After Hofstede, J. (2004)



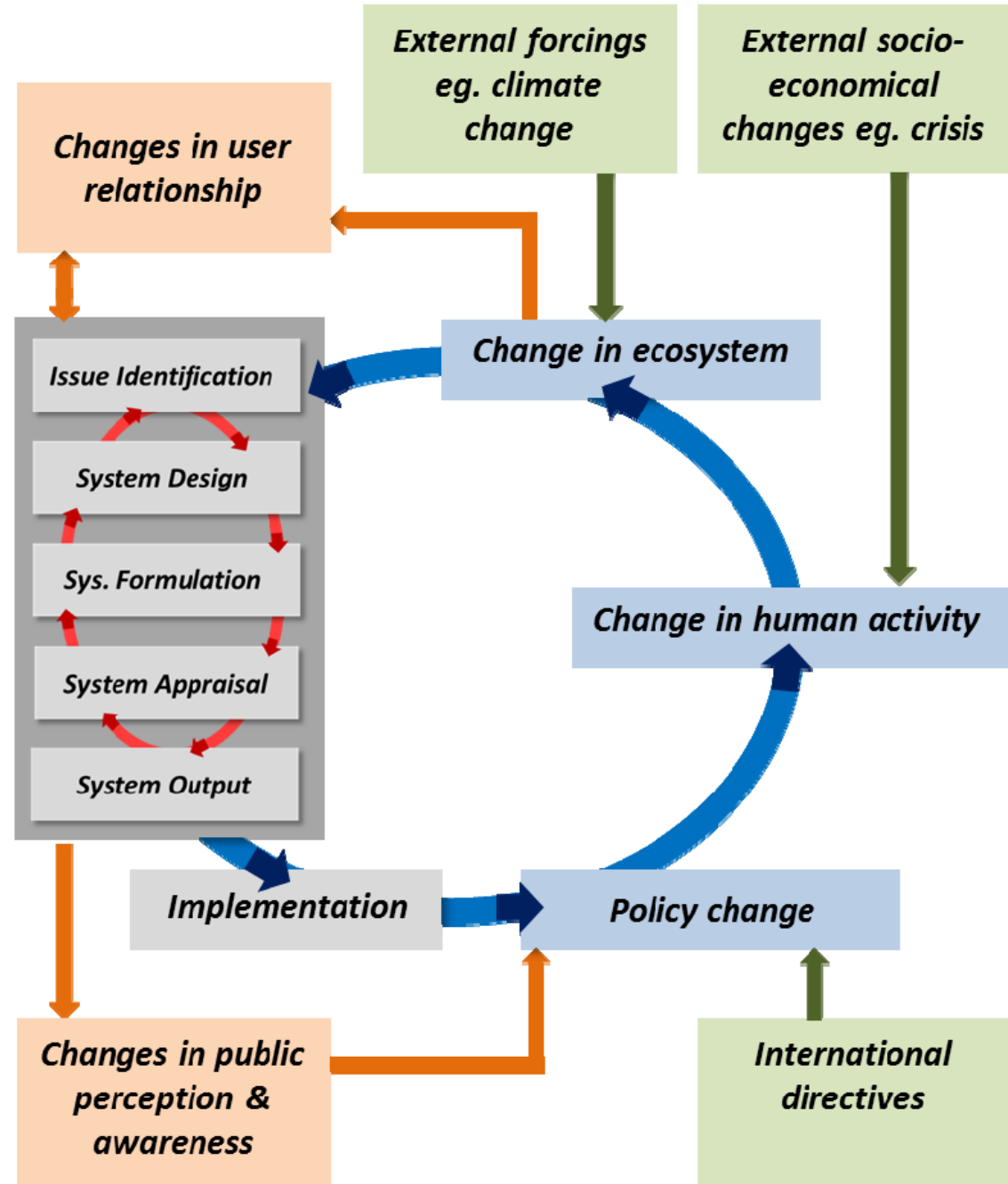
**Outstanding example for the application of a Systems Approach (without calling it so) including a successful implementation**



# Systems Approach Framework (SAF)

The Systems Approach Framework serves as broader context for the Ecological-Social-Economic-Assessment (ESE).

It takes into account changes, resulting from the assessment process itself or from external drivers, that lead to revision or modification of the ESE.





## Conclusion

### **Integrated Coastal Zone Management is not dead but still urgently needed!**

- Major ideas of an Integrated Coastal Zone Management are widely accepted and aspects are included in most recent strategic and policy documents and directives.
- The EC-Directive on establishing a framework for maritime spatial planning deleted ICZM in the title but kept the ICZM elements. ICZM is running under a different label.
- The Systems Approach Framework is a systematic, stepwise, user-friendly tool with high practical relevance that guides through a full ICZM cycle.
- It may help to overcome a major weakness of ICZM and allows to shorten the time between recognition of a problem until the implementation of a sustainable solution.



**Thank you for your attention!!**

