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RESILIENCE-INCREASING
STRATEGIES FOR COASTS - TOOLKIT
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RISC-KIT: Resilience-Increasing Strategies for Coasts – toolKIT

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www.risckit.eu

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Flood risks in Europe and beyond

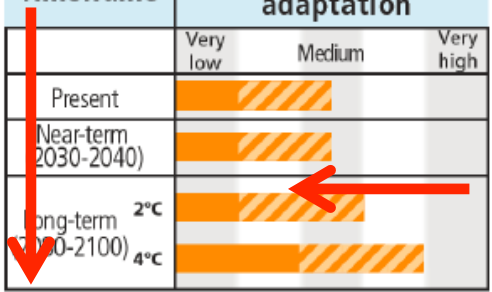
- Recent and historic low-frequency, high-impact events demonstrated coastal risk

- This is only to get worse, because risk (prob. hazard * consequences) is increasing due to (IPCC, 2014)
  1. Increase in hazard intensity/frequency due to
     - increased winds,
     - extremes in rainfall
     - sea level rise
  2. Increase in consequences due to increased coastal development

- Without adaptation, flood damage on European coasts increase up to 11 billion Euros per year

IPCC 2014: three key risks of climate change for Europe

Europe

Key risk	Adaptation issues & prospects	Climatic drivers	Timeframe	Risk & potential for adaptation
Increased economic losses and people affected by flooding in river basins and coasts, driven by increasing urbanization, increasing sea levels, coastal erosion, and peak river discharges (*high confidence*) [23.2-3, 23.7] **FLOOD**	Adaptation can prevent most of the projected damages (*high confidence*). • Significant experience in hard flood-protection technologies and increasing experience with restoring wetlands • High costs for increasing flood protection • Potential barriers to implementation: demand for land in Europe and environmental and landscape concerns			

High confidence in likelihood of

increased hazards and consequences =

increased risk

- High confidence in effectiveness of adaptation measures
- Obstacles:
  - Cost (3.5 billion Euros per year by 2100)
  - Land use/ environment
  - Regional differences

Upshot: Risk can be reduced through adaptation measures.

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Risk reduction through adaptation

Adaptation requires a

- re-evaluation of coastal disaster risk reduction (DRR) strategies and
- a new mix of

  prevention (e.g. dike protection),

  mitigation (e.g. limiting construction in flood-prone areas) *and preparedness* (e.g. Early warning systems, EWS) *measures*.

<u>Risk</u>

- How can we identify hotspots of coastal risk?

<u>Adaptation</u>

- What DRR measures work where and why?
- What are the socio-cultural and historic aspects of DRR measures?
- How can we quantify the effectiveness of DRR measures?
- Can a generic approach be applied across Europe, in data-rich and data-starved environments?

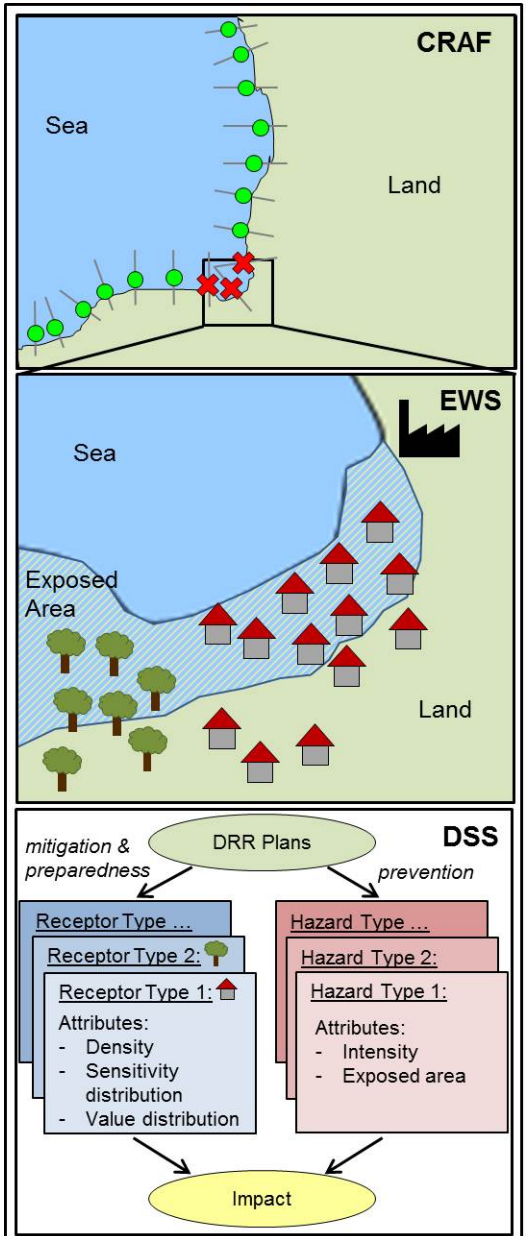
RISC-KIT Concept and context

- Develop a Toolkit of methods, tools and management approaches to reduce risk and increase resilience

- Fits in supranational efforts:
  - EU Floods Directive
  - United Nations Office for Disaster Risk Reduction (UNISDR)'s Hyogo Framework for Action (HFA)

- Both are not specific on coastal risk, specifically:
  - Hazards of overtopping, breaching, erosion and flash floods.
  - Non-stationarity of surge and flash flood events.
  - Morphodynamic response
  - EWSs are recommended, but are not implemented

What is in the RISC-KIT Toolkit?



1. Coastal Risk Assessment Framework (CRAF) to identify - at the regional scale (100's km) - present and future hot spot areas of coastal risk

2. Quantitative, high-resolution Early Warning and Decision Support System (EWS/DSS) for use on these hot spots (with a scale of 10's of km) and

3. Web-based management guide offering innovative, cost-effective, ecosystem-based DRR measures;

4. Coastal Risk Database of present and historic socio-economic and physical data.

Application at 11 case study sites

- 10 Located on all EU regional seas (★)
- One site in Bangladesh
- Diversity of geomorphic settings

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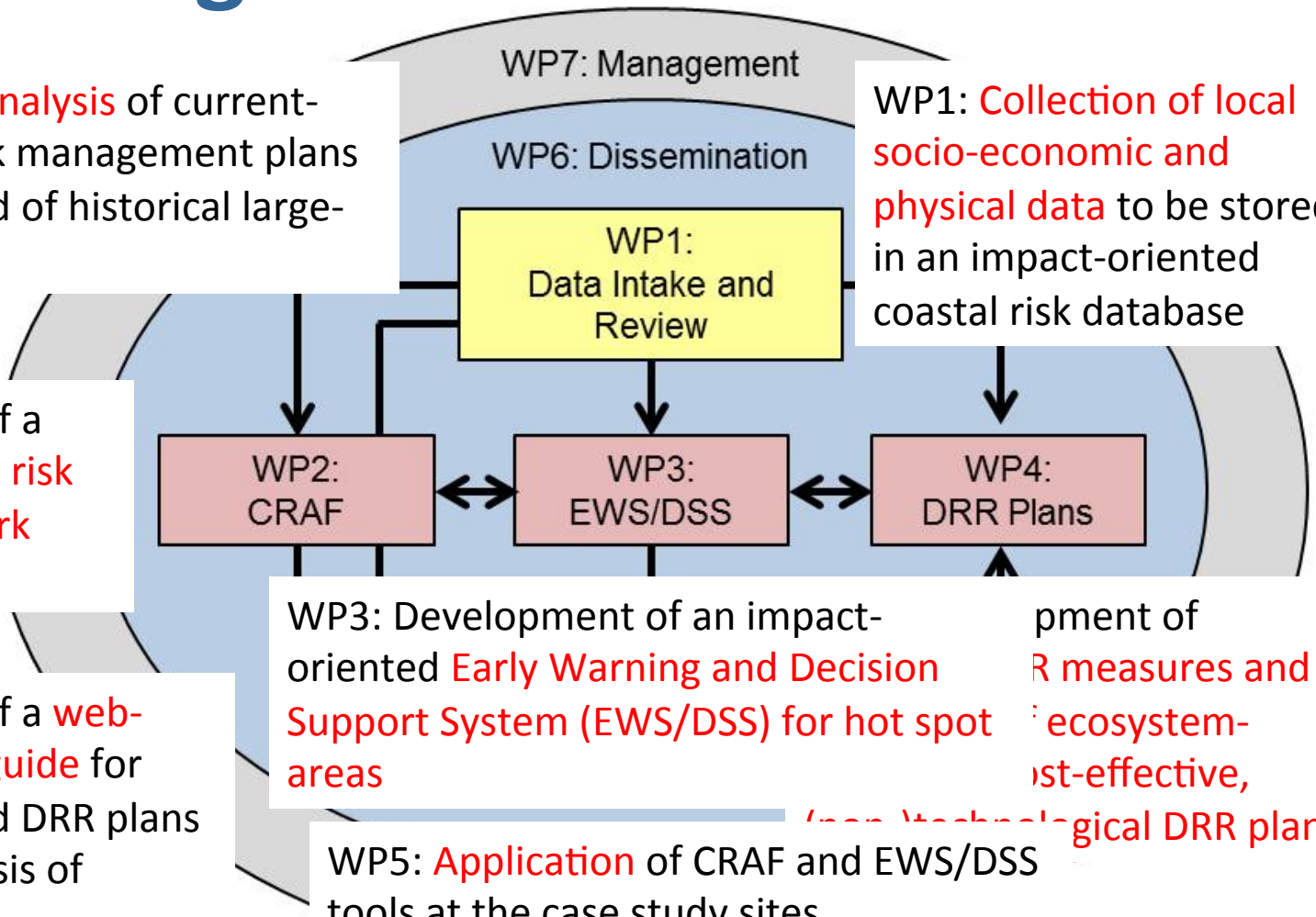
Workpackages

WP1: Review and analysis of current-practice coastal risk management plans and lessons-learned of historical large-scale events

WP1: Collection of local socio-economic and physical data to be stored in an impact-oriented coastal risk database



WP2: Development of a regional-scale coastal risk assessment framework (CRAF)

WP3: Development of an impact-oriented Early Warning and Decision Support System (EWS/DSS) for hot spot areas

pment of
R measures and
ecosystem-
st-effective,
gical DRR plans

WP6: Development of a web-based management guide for developing integrated DRR plans and provide a synthesis of lessons learned

WP5: Application of CRAF and EWS/DSS tools at the case study sites

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RISC-KIT partners

- 18 partners of different backgrounds

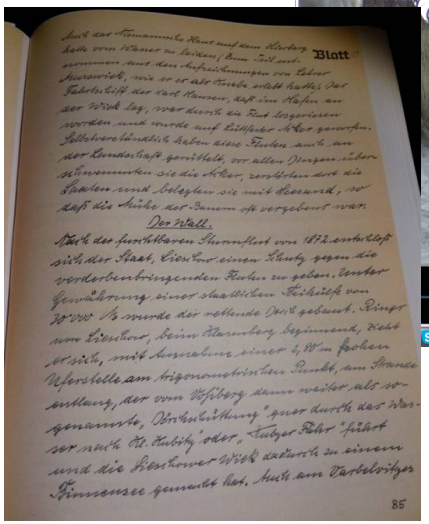
Deltares (NL)	CNRS LIENS (FR)	Eurocean (PT)
Ecologic (DE)	TU Delft (NL)	SEI (SE)
CfR (IT)	WMO (Int/CH)	MU (UK)
UAlgarve (PT)	UPC (ES)	UniCaen (FR)
IMDC (BE)	CIMA (IT)	UCAM (UK)
IO-BAS (BG)	BaW (DE)	UNESCO-IHE (Int)

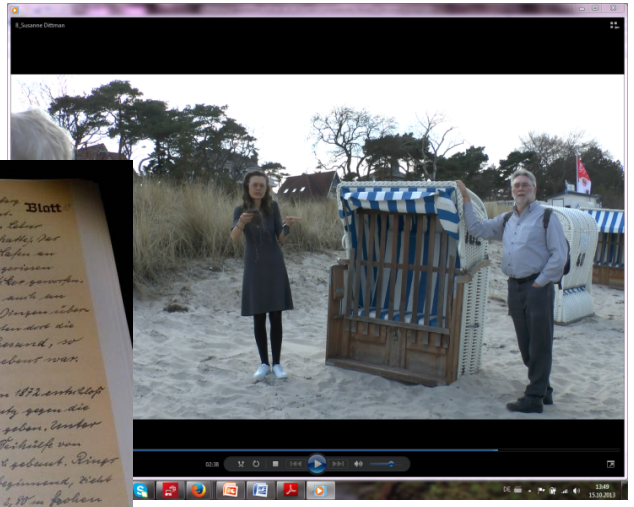
- Background in physical geography and oceanography, coastal geomorphology, coastal engineering, risk assessment, environmental sciences, climate change, socio-economics, history, meteorology, policy.
- Local end-user at each case study site

WP1: data intake and review

- 100 interviews in 11 sites with local stakeholders on socio-economic, cultural and historical perspectives and attitudes
- Collection of physical data.
- Review and analysis of current-practice coastal risk management plans and lessons-learned of historical large-scale events

Interviews in Bangladesh

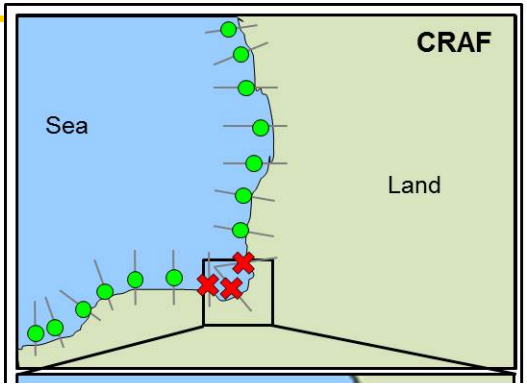




Interviews with local beach users in Kiel, Germany

Chronicle describing the construction of a seawall in 1872)

WP2: Coastal Risk Assessment Framework



- Rapid assessment of hotspots of risk on the regional scale of O(100) km

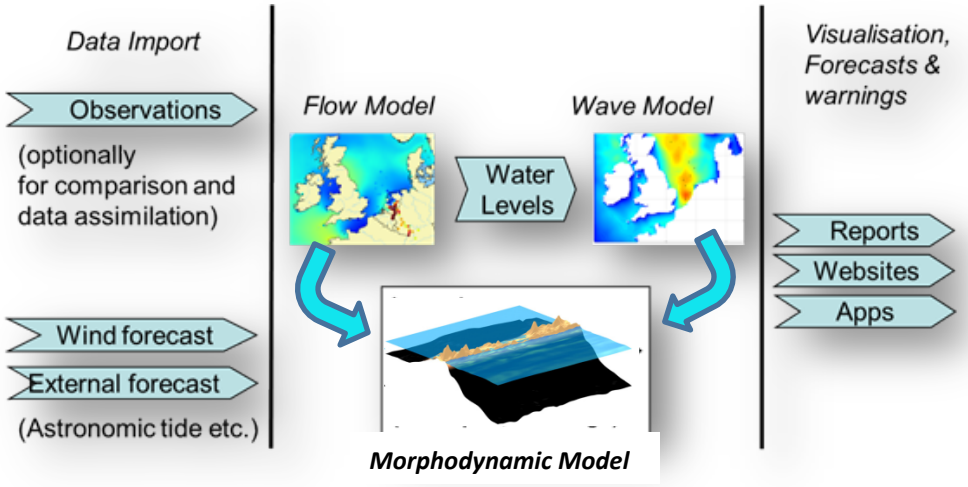
- Hazard and exposure module
  - Dynamic response to overtopping, erosion and inundation
  - Provides exposures in terms of depth, velocity, duration of flooding
- Vulnerability and impact module
  - Addresses geomorphic setting, ecosystems, built environment, human population, critical infrastructure
  - Development vulnerability library
- Risk module
  - Visualization of hazard and direct and indirect impacts
  - Multi-Criteria Analysis to reveal the potential hotspots

WP3: Development of hotspot tools

- Quantitative, high-resolution Early Warning and Decision Support System (EWS/DSS) for use on hot spots
- To be used as EWS but also as ex-ante DRR evaluation tool
- Based on Delft-FEWS

  but now for coasts
- Results stored in Bayesian

  Belief Network
- Progress:
  - Model adapters developed to link (partner's) software: SWAN, WWIII, Delft3D, XBeach, SELFE, Telemac, JMA
  - Input for application and evaluation of DRR measures



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Expected impacts

1. **Faster attainment of the disaster risk reduction goals of UNISDR (United Nations International Strategy for Disaster Reduction).**
   - Products geared to meet the Hyogo Framework for Action (HFA)'s five Priorities for Action.

2. **Design of cost-effective risk-reduction plans, based on the proposed tools and solutions.**
   - RISC-KIT tools of CRAF, EWS/DSS, database and management guide will help coastal design.

3. **Improve risk governance and preparedness through the provision of timely information and warnings to decision-makers.**
   - Development of EWS/DSS tool for events.
   - CRAF and the scenario evaluation tool help decrease the ex-ante coastal risk.

End-users

Site	Organization	Name	Consortium Partner and contact
La Faute sur Mer France	La Faute-sur-Mer townhall	Mayor Rene Marratier	LIENSs
Ria Formosa, Portugal	Portuguese Sea and Atmosphere Institute	Miguel Miranda	UAlg
Tordera delta, Spain	Ministry of Agriculture, Food and Environment, Coastal Protection	Dolores Ortiz Sanchez	UPC
	Catalunya Water Agency	Diego Moxó	
Bocca di Magra, Italy	Civil Protection Agency	Franco Gabrielli	CIMA
Porto Garibaldi, Italy	Geological Service, Emilia-Romagna Region	Luisa Perini	CFR
Varna, Bulgaria	Regional Government	Mr. Kosta Basitov	IO-BAS
Kristianstad and Åhus, Sweden	City of Kristianstad	Mayor Jan Pallson	SEI
Kiel Fjord, Germany Schleswig-Holstein Agency for coastal defense, nature reservate and marine protection	Schleswig-Holstein Agency for coastal defense, nature reservations and marine protection	Dr. Detlef Hansen	BAW
	Sporthafen Kiel GmbH (marina management)	Philipp Muehlenhardt	
North Norfolk UK	Environment Agency	Mr. Doug Whitfield	UCAM
Zeebrugge Belgium	Flanders Government, Dept. Of Public Works – Marine Accessibility	Youri Meersschaut	IMDC
Sandwip Bangladesh	WMO - CIFDP project	Dr. Val Swail	WMO, CFR
	Regional Integrated Multi-Hazard Early Warning System (RIMES)	A.R. Subbiah	WMO, CFR
	Bangladesh Water Development Board (BWDB)	Mr. Amirul Hossain	WMO, CFR

Dissemination

- Special sessions at conferences
- 2 policy briefs
- Academic papers
- Belmont Forum Networking Event (Brussels, June 2015)
- 2 summer schools (Summer 2016)
- Final conference in Brussels

Upcoming dissemination events

- **ECCA Conference, special session (proposed), Copenhagen, 12- 14 May.**

- **IAHR Conference, 28 June – 3 July, The Hague, Special Session on "Coasts at Threat in Europe".**
  - Submit your abstracts before 15 October on iahr2015.info, with copy to me.
  - Ap.vanDongeren@deltares.nl