



Policy Brief

April 2017



RISC-KIT

RESILIENCE-INCREASING
STRATEGIES FOR COASTS – TOOLKIT
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Disaster Risk Reduction strategies in EU coastal areas – recommendations for EU, national, and regional policy makers



The Challenge

EU Vulnerability

More than 40% of EU population lives in the 439 coastal regions across the 22 Member States (Colett & Engelbert 2013).

Seven of the 22 member states have coasts have more than one coastline bordering a marine area.

Assets of about 959 billion Euros are potentially at risk (Hinkel et al 2014).

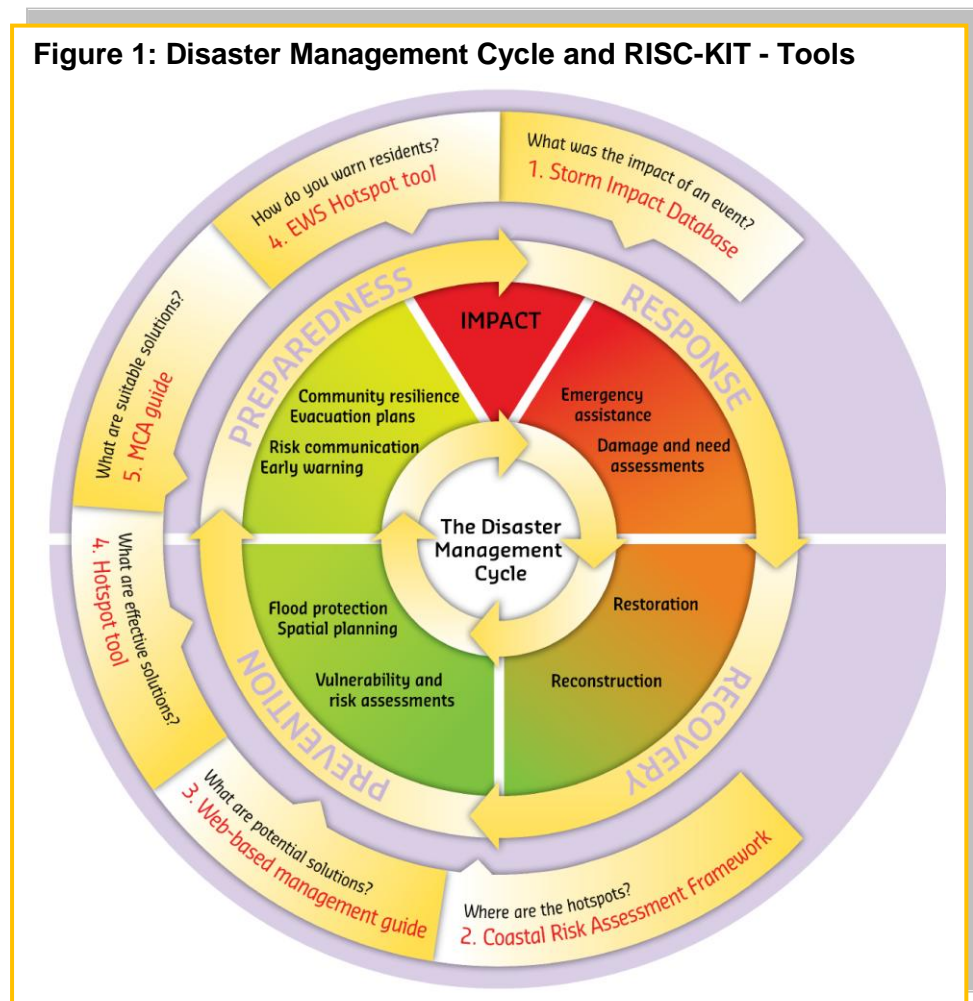
Recent and historic low-frequency, high-impact events have demonstrated the flood risks faced by exposed coastal areas in Europe. Among these events are the 2014 St. Agatha storm in the Adriatic, the 2013 Xavier/St. Nicholas storm in North-West Europe, and the 2010 Xynthia storm in France. However, historic events such as the 1953 flood in Northwest Europe and the 1962 flood in Hamburg or the 1872 flood in the Southern Baltic Sea and others prior, demonstrate that these devastating impacts are a long-standing part of Europe's history. The same holds true worldwide.

According to the IPCC, these risks to coastal zones are likely to increase in the future as both the hazards (such as sea level rise) and impacts (due to on-going development) increase. This 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; ecosystem-based solutions) and *preparedness* (e.g. Early Warning Systems, EWS) *measures*.

For this reason, applied research is needed to enhance forecasting, prediction, and early warning capabilities; improve the assessment of long-term coastal risk; and optimize the mix of prevention, mitigation, and preparedness measures.

In 3½ years, the RISC-KIT project has developed tools and approaches to record historic and recent impact events that can identify coastal areas which are most at risk, provide a set of potential DRR measures, and assess the effectiveness and suitability of these measures. All tools have been demonstrated with end-user input in ten case study sites in Europe and can be placed in the Disaster Management Cycle as shown in Figure 1.

Figure 1: RISC-KIT tools and their place in the Disaster Management Cycle (by van Dongeren et al. (forthcoming) and adapted from an original by and courtesy of Mr. C. van de Guchte, Deltares).



The Political Commitment

More information about the Sendai Framework: <http://www.unisdr.org/we/coordinate/sendai-framework>

The RISC-KIT project is based in part on the **Priorities for Action of the UNISDR Hyogo Framework for Action (HFA) (2010–2015)**. The relevance of the RISC-KIT approach and methodology as well as the project’s findings are confirmed by the new **Sendai Framework (2015–2020)**, which contains the goal to prevent new and reduce existing disaster risks, through an all-of-society and all-hazards risk approach across economic, social and environmental policy areas by reducing vulnerability and increasing resilience. Specifically, the RISC-KIT project’s

research approach is aligned with the Sendai Framework Priorities for Action 1, 2, and 4, and the following ‘Guiding Principles’

§19d: Engagement from all of society;

§19g: Decision-making to be inclusive and risk-informed while using a multi-hazard approach;

§19i: Accounting of local and specific characteristics of disaster risks when determining measures to reduce risk;

§19f: Empower local authorities and local communities to reduce disaster risk;

More information about the EU Floods Directive: http://ec.europa.eu/environment/water/flood_risk

The **Floods Directive (FD) 2007/60/EC** is the European legislation for managing flood risk from floods of all flood types (fluvial, pluvial, marine, groundwater, artificial water bearing infrastructure). For the assessment of coastal floods, RISC-KIT contributes with methodologies and tools to better define the impact of such floods.

A draft report on “Flood Risk Management in the EU and the Floods Directive's 1st Cycle of Implementation (2009–15)” (EC 2016) highlights obstacles and challenges found by Member States in the implementation of the FD. These include: the production of high quality, consistent national receptor datasets for the assessment of flood impacts on infrastructural assets and especially social and cultural assets, the low uptake of ecosystem-based approaches in coastal DRR plans due to a lack of evidence base, and the need for guidance on the assessment of the effects of non-structural measures on flood risk. These issues have been addressed in RISC-KIT.

Achievements of RISC-KIT



In practical support of the implementation of the Sendai Framework and the EU Floods Directive, the RISC-KIT project developed a ‘toolkit’ to support strategies for reduced risk and increased resilience in coastal areas. The tools are open-source and freeware, and support the implementation of the Sendai Framework and the EU Floods Directive.



The tools have been tested and applied in the ten case study sites of the RISC-KIT project along all five of the EU's regional seas (see Figure 2). The sites showcase the diversity of Europe's coastal regions, covering a variety of geomorphic settings, hazards (overwash, erosion, flooding, etc.), land use and socio-economic profile.

The five RISC-KIT Tools with corresponding needs of EU Member States for the second FD implementation phase are displayed on the following page.

Figure 2: RISC-KIT case study sites along each of Europe's regional seas.

Needs for the 2nd FD implementation phase expressed by Member State(s) (see EC 2016)

Improved information on significant historical floods and their impact. A centralized database for registration of flood events and the damage that they have caused.

New tools to analyse flood and erosion risks using higher-precision modeling and knowledge.

A comprehensive catalogue potential of DRR measures.

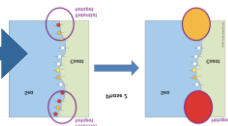
Assessment of effectiveness of DRR solutions to reduce risk. Impact-oriented Early Warning Systems

More emphasis on active involvement of various stakeholders in flood risk management; increase public involvement and acceptance; and prioritize measures.

RISC-KIT Tools



The [Storm Impact Database](#): a repository of socio-economic and physical data of the impact of historical storms in the project's countries. It is the first of its kind in Europe, providing an overview of events from the present day, stretching back to the year 1304.



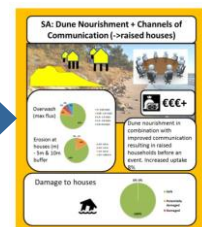
The [Coastal Risk Assessment Framework \(CRAF\)](#) identifies the coastal areas which is most at risk, in two stages: first in a quick-scan at the regional level it identifies *potential hotspots*, while in the second stage, an evaluation and selection of the *hotspot* is made using more detailed techniques under present and future climate change conditions, taking into account not only direct damages but also indirect damages, systemic disruptions and recovery.



The [Web-based Management Guide](#) provides potential DRR measures (including prevention, mitigation and preparedness, structural and non-structural, grey, green and combined approaches) that can be used in local DRR plans.



The [Hotspot Tool](#) is used in the Planning Phase to assess the effectiveness of DRR solutions in reducing risk to the hazards of erosion and flooding. The Tool can also be used as an impact-oriented Early Warning System in the advent of a storm. This system does not focus on the hazards alone but also on the impacts. Its generic design allows this tool to be adapted and used with existing local systems and software.



The [Multi-Criteria Analysis Tool \(MCA\)](#) provides a method to evaluate the acceptability, sustainability and feasibility of DRR solutions using stakeholder engagement and interaction between civil society and government, cross-sectoral cooperation.

Recommendations

On the basis of our findings from the development and application of the RISC-KIT tools, we highlight the lessons-learned and provide a number of recommendations addressed to different actors. We reflect on how these findings bear relevance in particular to the Sendai Framework and the Floods Directive.

I. From single hazard to multi-hazard impact assessments.

The RISC-KIT project progressed from analysing single hazards to multiple hazards, and from assessing direct impacts to indirect impacts, systemic disruptions and recovery, because **an impact-based approach is crucial to risk reduction decision-making**. Understanding where and how these multiple hazards will likely affect social and economic systems and infrastructure in coastal areas enables a more intelligent and cost-effective selection of DRR measures and emergency management. The Sendai Framework likewise refers to the need to assess and anticipate the potential economic and social impacts of disasters (§31 (d)).

RISC-KIT recommendations on impact – based approach

*“Promote the **development and use of impact-based assessments and early warning systems and decision support systems**”*

Who should act? EU member states, national and regional administrations, coastal managers.

II. Promote information and assessment tool development

RISC-KIT has developed a **generic suite of tools which make a significant contribution to coastal DRR in Europe** and beyond. These provide contributions to the Sendai Framework’s Priorities 1, 2 and 4. RISC-KIT developed **generic tools**, but ensured that these were **flexible** enough to be adapted to local circumstances. Within RISC-KIT two main tools types have been developed: **informative** (Storm Impact Database and Web-based Management Guide) and **assessment** (CRAF, Hotspot Tool, Multi-Criteria Analysis) tools. These tools answer needs expressed in the Flood Directive implementation.

RISC-KIT recommendation on tool development

*“Promote the **application of coastal risk information and assessment tools to optimise resources** to be spent on coastal risk management.”*

Who should act? EU member states, national and regional administrations, coastal managers, academic community, consultants.

III. Reduce overlap in national and regional DRR competencies

Through in-depth analysis of 10 European case study sites and their governance structures, the RISC-KIT project has revealed a **broad range of approaches to European DRR and coastal management**. Despite these differences, some common challenges have become evident. These relate primarily to the need for clarity in **governance structures and procedures** as well as the **importance of citizen engagement**, both in terms of providing local knowledge and in terms of awareness-raising for effective coastal DRR responses. Where corresponding levels of

RISC-KIT recommendation on coastal risk governance

*“Find ways in which authorities and/or competences can be streamlined to **reduce overlap** and ensure that local authorities have **adequate financial and logistical resources** to act.”*

Who should act? National, regional and municipal administrations.

funding for local implementation are lacking, a **tension between responsibility and capacity to act** can emerge. Priority 3 of the Sendai Framework (§30 (a)) directly addresses this issue, pointing to the need to allocate the necessary financial and logistical resources at all levels of administration.

IV. Improve data quality and accessibility of economic and social impacts of disasters

All tool applications have shown a need for spatially-accurate and up-to-date **topographic, physical, and impact data (e.g. on vulnerability or socio-economic impacts) using uniform standards**. Priority 1 of the Sendai Framework also points to the need to systematically evaluate, record, share, and publicly account for disaster losses and understand the economic, social, health, education, environmental and cultural heritage impacts, as appropriate, in the context of event-specific hazard-exposure and vulnerability information (§24 (d)).

V. Support more multi-disciplinary collaborations

The development of the RISC-KIT tools was only possible with a project team consisting of engineers, modellers, economists, historians, anthropologists, and social scientists, all undertaking and applying **multi-disciplinary research methods and learning** outside their comfort zones. This important aspect was central in the two Summer Schools for Young Scientists. This integration of knowledge systems furthermore contributes to the Sendai Framework (§24 (h)) which highlights the need to promote and **improve dialogue and cooperation among scientific and technological communities**.

VI. Promote combinations of measures including ecosystem-based solutions

In some RISC-KIT case study areas, single DRR measures did not provide adequate risk reduction. Rather, the **combination of more than one DRR measure can be a more effective solution**. In particular, the combination of prevention with mitigation measures was positively received in dialogue with RISC-KIT end-users. However, **ecosystem-based solutions (EBS)**, which are inspired and supported by nature that bring nature and natural features and processes into land- and seascapes) as part of the mitigation measures were seldom selected and taken up by the end-users. Two main causes for this were identified: 1) a **lack of clear evidence** that EBS could be as effective as traditional DRR measures; 2) EBS generally

RISC-KIT recommendations on data

*“Establish protocols and systems to **compile standardised EU datasets** that allow for better understanding and prediction of impacts.”*

*“Build the knowledge base on coastal flood impacts in Europe through **historical research and standardised protocols for post-event recording** with awareness-raising on the need for such information.”*

Who should act? EU and EU Member States to provide framework; implementation by local administrations.

RISC-KIT recommendation on multi-disciplinarity

*“Facilitate multi-disciplinary approaches by providing colleagues with **dedicated support and practical guides** to accompany the process, including dedicated translators and data processing staff where necessary.”*

Who should act? National and international research consortia and funding bodies

RISC-KIT recommendation on DRR measures

*“When planning DRR, consider that **combinations of measures**, especially prevention and mitigation, can be preferable to standalone measures and try to include **ecosystem-based solutions**. To demonstrate the effectiveness of EBS an evidence base with **practical examples of EBS** should be built.”*

Who should act? Academic community, consultants, local governments.

require **more physical space** than traditional structural DRR measures. If these barriers could be overcome, EBS can be more effectively integrated into DRR planning.

VII. Stronger stakeholder involvement

Stakeholders, not only **experts but also ordinary citizens** played an important role as providers and recipients of information on coastal risk and approaches to DRR. In the RISC-KIT project, local residents are understood as **gatekeepers of important historical and cultural knowledge**, who often hold the key to understanding behaviours and attitudes in relation to coastal risk and DRR approaches and measures. The importance of this type of engagement is also reflected in the Sendai Framework guiding principles (§19 (d)), which note that effective disaster risk reduction requires an **'all-of-society' engagement and partnership**. This is also an important component of the implementation of the Floods Directive (§9), which aims for the 'active involvement of all interested parties'

RISC-KIT recommendation on stakeholder involvement

*"Cultivate **inclusive stakeholder processes** to support 'all-of-society' approaches and ensure that **local knowledge is recognised and valued** as a complement to scientific knowledge to develop an **integrated understanding of coastal risk** and to devise locally appropriate DRR approaches and measures."*

Who should act? Policy makers at national and local level; academic community; consultants and research funding bodies.

VIII. Dissemination: tailor research output to the audience

RISC-KIT took advantage of **online and offline media tools and networking to inform the public, stakeholders and end-users** about the project and its products. RISC-KIT has paid particular attention to adapt the language and format of the message to each of the target audiences in question. The Sendai Framework recognises the need to disseminate disaster risk information, not only to decision makers but to the general public and communities at risk of exposure to disaster, in an appropriate format (§24 (c)) towards empowerment and inclusive, accessible and non-discriminatory participation (§19 (d)).

RISC-KIT recommendation on dissemination

*"**Tailor research outputs** to your audience: create products that are accessible and understandable for at-risk communities in the broader public as well as creating products that provide the necessary detail to decision-makers and academics."*

Who should act? Academic community; consultants.



Additional information

RISC-KIT is funded by the European Commission's Seventh Framework Programme (FP7) under contract 603458.

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Websites

More information about RISC-KIT, including the developed tools, can be found at:

<http://www.risckit.eu/>

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