

# Towards improving the implementation of integrated flood risk management

## SUMMARY

*As the 2013 floods in Germany, the Czech Republic, Austria, Switzerland, Slovakia, Poland and Hungary and the 2014 floods in the UK have shown again, flood risks form a significant threat to human lives and economic value in urban areas across Europe. Flood risks will increase due to climate change, population growth and urbanisation. To respond to these pressures, further action is required. Under the framework of the Floods Directive (2007/60/EC), EU Member States are currently reflecting on their Flood Risk Management approaches, aiming to improve and integrate their Flood Risk Management Strategies and enhance societal resilience.*

*Implementation of Flood Risk Management Strategies is strongly dependent on the organisation or governance arrangements in which they are embedded. To ensure implementation, the responsible actors, policies, legislation, financial and other resources need to be well organised. Fragmentation in Flood Risk Governance Arrangements may delay or even obstruct the implementation of new, integrated strategies. Fragmentation is often due to little coordination and collaboration between the policy domains of water management, spatial planning and disaster management and between public and private actors. Introducing bridging mechanisms that connect different strategies, actors, perspectives, rules and resources may provide a solution.*

### STAR-FLOOD: ONGOING RESEARCH

STAR-FLOOD is a research project about Flood Risk Governance. The project investigates strategies for dealing with flood risks in 18 vulnerable urban regions in six European countries: Belgium, England, France, The Netherlands, Poland and Sweden (see Figure 1). The project assesses the embedding of these strategies in Flood Risk Governance Arrangements from a combined public administration and legal perspective, with the aim to make European urban regions more resilient to flood risks. The STAR-FLOOD project (EU FP7 308364) runs from October 2012 to March 2016.



This policy brief presents the first results of the STAR-FLOOD project, concerning the state-of-the-art in flood risk management and our framework for analysing flood risk governance. The results and recommendations may be relevant for developing new approaches to flood risk management, for example in drafting Flood Risk Management Plans when implementing the Floods Directive (2007/60/EC). It is anticipated that insights from our analysis will be relevant to other EU countries and urban regions, and possibly worldwide. Our findings will include a number of policy and legal recommendations and best practices relating to flood risk governance, and will be presented in future policy briefs.

## 1. Flood risk

Flood risk is commonly understood as a function of the probability and consequences of flooding. There are various routes through which floods occur: local precipitation (pluvial); rivers or seasonal snow melt (fluvial); sea (tidal, storm surge); or precipitation in steep catchments and fast runoff (flash floods). As floods are influenced by the complex and dynamic interaction between physical and human systems, flood events are highly unpredictable.

Of all the natural hazards in Europe, flooding is the most common, and accounts for the largest number of casualties and highest economic damage (Guha-Sapir et al. 2013, average value 2002-2011). Unlike other natural hazards, no European country is free from the risk of flooding. Between 2000 and 2005, Europe suffered nine major flood disasters, which caused 155 casualties and economic losses of more than € 35 billion (Barredo 2007). The 2013 floods in central Europe (12 casualties and significant economic damage) and the winter 2013/2014 floods in the UK highlight the growing challenge and importance of effective Flood Risk Management.

Table 1 shows the main causes of flooding in the six EU Member States that are part of the STAR-FLOOD project (see Figure 1). The table also indicates that the significance of flood events in terms of damage and fatalities differs between countries, with the UK, France and Poland suffering most between 2002 and 2013 and Sweden, Belgium and the Netherlands suffering least (DG Environment 2014).

Without additional actions, both the probability and potential consequences of floods in Europe are expected to increase. Climate change is expected to result in sea-level rise and to induce more extreme weather events, increasing the probability of flooding (IPCC 2011). Soil subsidence may aggravate flood risks. At the same time, the potential consequences of extreme weather events are enlarged by population growth, economic growth and urbanisation (Barredo 2009; Mitchell 2003).





Figure 1. Countries in the STAR-FLOOD consortium

Table 1. Types of flooding and number, costs and fatalities of flood events between 2002 and 2013 (DG Environment 2014) in the STAR-FLOOD consortium countries

	Causes of flooding	No. of flood events 2002-2013	Total costs over all events 2002-2013 (extrapolated)	Total no. of fatalities 2002-2013
Sweden	Pluvial, fluvial, snow-melt	1	€ 320 million	0
United Kingdom	Pluvial, fluvial, tidal, surge, flash floods	48	€ 23,000 million	57
Netherlands	Pluvial, fluvial, tidal, surge	3	€ 14 million	0
Belgium	Pluvial, fluvial, tidal, surge	10	€ 180 million	5
France	Pluvial, fluvial, flash floods	48	€ 8,700 million	152
Poland	Pluvial, fluvial	10	€ 24,000 million	24

## 2. Flood Risk Management

Flood Risk Management in European member states has traditionally focused on structural solutions to defend against flooding: 'keeping the water away from people'. However, it is now recognised that effective Flood Risk Management requires a portfolio of structural and non-structural options to prevent, defend, mitigate, prepare, respond and recover from flood events; with the intention of minimising both the *likelihood* and *consequences* of flood events. Recent policy documents such as the EU Floods Directive (2007/60/EC) and the UNISDR Hyogo Framework for Action call for such approaches that entail a diversification of Flood Risk Management Strategies. These efforts are reflected in the five



Flood Risk Management Strategies which have been categorised in the STAR-FLOOD project and are illustrated in Figure 2 (this categorisation may be refined in the course of the project).



Figure 2. Flood Risk Management Strategies as categorised in STAR-FLOOD

Throughout the course of STAR-FLOOD, the assumption that resilient solutions require a diversity of Flood Risk Management Strategies will be tested. On the one hand, a diverse approach creates redundancy. For instance, in case flood defences fail: the economic damage can still be reduced by flood adapted building; inhabitants can be evacuated according to well prepared evacuation scenarios; and insurance schemes can enable a quick recovery after the flood. This enables a region to overcome flood events and to return to business as usual with as little disruption as possible. On the other hand, it may not be beneficial to implement all Flood Risk Management Strategies simultaneously at all locations. The number and quality of the actual measures and how they are implemented determines resilience to flooding. For instance, the Flood Risk Management approach in the UK appears to be very broad (See Section 3). Still, flood events between 2002 and 2013 were significant (Table 1) and the Winter 2013/2014 floods also demonstrated that there is still room for improvement. The floods highlighted tensions between policy agendas and public expectations about appropriate action, and demonstrated the interplay between a host of discourses and the powerful influence of the media in fuelling these debates.

### 3. Flood Risk Governance Arrangements

The successful implementation and alignment or integration of Flood Risk Management Strategies is dependent on a proper embedding in *Flood Risk Governance Arrangements*. This means that 1) the relevant *actors*, such as spatial planners, water managers, emergency services and insurance companies, take responsibility and collaborate to implement the strategy, 2) the strategy is embedded in the actors' *discourses*, e.g., in thinking, discussions and policies, 3) the implementation is backed up by formal and informal *rules* and 4) the actors have the necessary *power and resources* (finances, knowledge, political and interaction skills). Table 2 gives an overview of the dimensions of these Flood Risk Governance Arrangements.

Using the framework in table 2, STAR-FLOOD is identifying, analysing and explaining stability and change in Flood Risk Governance Arrangements in the six countries participating in the project. The first research results indicate that governance arrangements differ significantly. Prominent differences



include the division of responsibilities among the actors involved (collective/public versus individual/private), how priorities are set, how Flood Risk Management Strategies are integrated with other societal ambitions, the standards of protection that are in place, financing structures, the distribution of costs and benefits and how risks are communicated.

Table 2. Dimensions of Flood Risk Governance Arrangements

Actors	Discourses	Rules	Power & Resources
<ul style="list-style-type: none"> <li>- Public actors</li> <li>- Private actors</li> <li>- Coalitions and oppositions</li> <li>- Interaction patterns</li> </ul>	<ul style="list-style-type: none"> <li>- Relevant scientific paradigms and uncertainties</li> <li>- Policy programmes, policy objectives (perceived issues) and policy concepts</li> <li>- Historical metaphors/narratives</li> <li>- Policy and Legal Principles</li> </ul>	<ul style="list-style-type: none"> <li>- Legislation</li> <li>- Constitutional, procedural &amp; substantive norms</li> <li>- Procedural instruments</li> <li>- Legal traditions</li> <li>- Cross-country and cross-sector alignment of rules (integration)</li> <li>- Policy and legal principles</li> <li>- Informal norms, culture</li> </ul>	<ul style="list-style-type: none"> <li>- Legal authority, including the right to regulate property (expropriation)</li> <li>- Financial power</li> <li>- Knowledge</li> <li>- Informal political networks</li> <li>- Interaction skills</li> </ul>

Table 3 gives an overview of the *status quo* in the countries participating in STAR-FLOOD. All countries have implemented structural flood defence measures, but the degree to which other Flood Risk Management Strategies have been introduced and implemented differs. In the UK, all five strategies have been implemented. Poland and Sweden seem to rely mostly on structural measures but have made a start with setting-up flood warning systems. France, Belgium and the Netherlands are all trying to broaden their approach, especially with the strategies of Flood Mitigation and Preparation (and proactive spatial planning in France).

Table 3. Institutional embedding of Flood Risk Management Strategies in STAR-FLOOD consortium countries (preliminary research findings, subject to further validation)

	1. Risk prevention	2. Flood defence	3. Flood mitigation	4. Flood Preparation	5. Flood recovery
Poland	Absent	Present	Discussed but hardly practiced	Emerging	Absent
Netherlands	Present	Highly institutionalised	Present / Emerging	Present / Emerging	Discussed but hardly practiced
Sweden	Present	Highly institutionalised	Emerging	Present	Present
Belgium	Present	Present, deep historical roots	Present	Present	Present
France	Present	Institutionalised	Emerging	Institutionalised	Institutionalised
United Kingdom	Highly institutionalised	Highly institutionalised	Highly institutionalised	Highly institutionalised	Highly institutionalised



Current Flood Risk Governance Arrangements in the six countries seem somewhat fragmented. Co-ordination and collaboration could be improved, between the policy domains of water management, spatial planning and disaster management and between public actors and private actors, such as insurance companies. This would provide opportunities for further integration and for improving the implementation of new, integrated strategies and measures.

Besides by governance arrangements, changes in strategies and governance arrangements can be influenced by a multitude of factors, such as the physical, socio-economic and political context and the strategies chosen in the past. STAR-FLOOD will further analyse and explain changes over time. The project will also evaluate Flood Risk Management according to the criteria of *resilience* and *appropriateness*. This will help inform further recommendations and design principles for future governance arrangements, in the step towards enhancing societal resilience to flooding.

One of the major challenges in implementing a more integrated Flood Risk Management approach is to develop and implement bridging mechanisms that create synergies between strategies. Such mechanisms are elaborated in the next section.

## 4. Policy Challenges & Recommendations

From the first STAR-FLOOD results, we identified a number of challenges and preliminary recommendations for enabling and accelerating the implementation of well aligned or truly integrated Flood Risk Management. Although these suggestions are preliminary and their validity needs to be further established by empirical research, they may provide some useful directions for policymakers and other Flood Risk Management stakeholders, in particularly those involved in the implementation of the Floods Directive.

### 1. Combine multiple Flood Risk Management Strategies

In several European countries, engineers dominate the Flood Risk Management domain and propose mainly flood defence measures. Although this often appears to be an effective and economically efficient strategy, other strategies could enrich and enhance Flood Risk Management. By combining multiple Flood Risk Management Strategies (or enhancing the assembly of measures within these strategies) loss of lives and social, economic, environmental and cultural losses can be decreased and recovery or smart adaptation after a flood event can be enabled. This increases the resilience of regions against flooding. As there is no 'one size fits all solution', we recommend to evaluate the pro's and con's of each strategy and each combination of measures in countries and regions. This way an approach can be developed that is tailored to local physical, socio-economic and institutional conditions.

This first recommendation is well in line with the requirements of the Floods Directive. Chapter IV states the need to develop Flood Risk Management Plans for flood prone areas by 22 December 2015. The plans should specify appropriate objectives for reducing the likelihood and adverse effects



of flooding and measures for achieving these objectives. Strategies to be considered include prevention, protection and preparedness, as well as mitigation through sustainable land use practices, water retention and controlled flooding. Furthermore, the measures should take into account characteristics of the particular river basin. The following recommendations address the governance challenges that may be encountered when implementing Flood Risk Management Plans in specific countries or regions.

## **2. Develop or improve Flood Risk Governance Arrangements**

Implementation of Flood Risk Management Strategies is strongly dependent on governance arrangements. To ensure implementation, the responsible actors, policies, legislation, financial and other resources need to be organised well. All these governance aspects need to function together and a missing link may hamper implementation. Basic requirements include a clear specification of the normative objectives of authorities, a clear division of responsibilities (potentially shared by several actors), structures for deliberation and collaboration between relevant stakeholders (information and active involvement of all interested parties is also required by the Floods Directive), sufficient and transparent financing, adequate legislation and policies, transparent societal debates on acceptable protection levels, etc.

## **3. Overcome existing institutional fragmentation with bridging mechanisms**

Flood Risk Governance Arrangements tend to be problem-oriented, which in some cases causes fragmentation: different actors are responsible for risk prevention, flood defence, mitigation, preparation and recovery. The perceptions of these actors on flood risk management, their policies and legislation, and their financial and other resources often differ. Combining multiple Flood Risk Management Strategies introduces the challenge to link and align the governance arrangement of which these actors are part. This calls for the development and implementation of inspiring bridging mechanisms that can bring different actors together, enable effective cooperation and create synergies in a joint effort to reduce flood risk.

Examples of bridging arrangements that will be addressed in the STAR-FLOOD project include:

- Coordination, collaboration and mutual learning initiatives. This may include collaboration and learning between authorities from different policy domains (e.g., water management, spatial planning, disaster management), as well as involving businesses (e.g., insurance companies, infrastructure managers, companies in flood prone areas), research institutes (optimising the science-policy interface), citizens in flood prone areas (creating awareness and action perspectives), etc;
- Bridging administrative boundaries by combining the power and resources of different actors (e.g., political agreements). A key challenge for the parties involved is to combine their financial and other resources in an efficient way. Leadership may be key in bridging administrative boundaries;
- Translating general Flood Risk Management principles into a set of more specific organisational, substantive and procedural provisions. This may include procedures for problem analysis and se-



lection (like EIA and Water assessment in spatial planning), financing and implementation of measures. Such procedures may need to be backed up by legislation;

- Coordination mechanisms between several policy domains (such as integrated planning, water assessment in spatial planning, signal areas and risk mitigation in building requirements);
- Realising a shift in thinking and in the way Flood Risk Management is discussed. For instance by introducing inspiring scientific and policy concepts like Solidarity and No shift (both elaborated in the Floods Directive) and Adaptive management.

Bridging mechanisms will only result in changes in Flood Risk Management Strategies if they are appealing to key actors. It is an open question which concepts are appealing in practice and what factors account for this.

### STAR-FLOOD: OPEN FOR COLLABORATION

STAR-FLOOD will further address the research questions by analysis at the national and regional case study level in each partner country. From this, we will further define and refine the challenges and recommendations mentioned in this Policy brief.

During the project, the STAR-FLOOD team is open to collaborate with other research initiatives and with flood risk management policymakers and practitioners. For instance, we have already organised a joint workshop on flood risk management strategies and governance issues with policymakers from across the EU participating in Working Group F on Floods of the Common Implementation Strategy for the Water Framework Directive. If you have any questions or suggestions, we invite you to contact us through [www.starflood.eu](http://www.starflood.eu).

## References

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## Further reading

- STAR-FLOOD Work Package 1 Deliverable: Flood Risk Management in Europe:
- [The flood problem and interventions](#)
- [An exploration of Governance Challenges](#)
- [European flood regulation](#)
- [Similarities and differences between the STAR-FLOOD consortium countries](#)
- [EU JRC Floods portal](#)
- [EU Floods Directive](#)
- [UNISDR Hyogo Framework for Action](#)
- GFDDR report [Cities and Flooding: A Guide to Integrated Urban Flood Risk Management for the 21st Century](#)
- [EEA Guide on Urban adaptation to climate change in Europe](#)
- [FLOODsite results: Best practice guide on flood risk assessment and management](#)
- NeWater results: [The Adaptive Water Resources Management Guidebook](#)
- FLOOD-probe results: [Guidance on Technologies for the Cost-effective Flood Protection of the Built Environment](#)

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