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## Abstract

European urban agglomerations face increasing flood risks due to urbanization and the effects of climate change. These risks are addressed at the European, national and regional policy levels. A diversification and alignment of Flood Risk Management Strategies (FRMSs) can make vulnerable urban agglomerations more resilient to flooding, but this may require changes in their institutional embedding. While much technical knowledge on Flood Risk Management is available, scientific insights in the actual and/or necessary institutional embedding of FRMSs so far are rather limited and fragmented. STAR-FLOOD addresses this knowledge gap by introducing the Flood Risk Governance Arrangements (FRGAs) approach which allows us to integrate insights from policy scientist and legal scholars into one coherent framework that can be used to identify, analyse, explain and evaluate (shifts in) existing Flood Risk Governance practices. Insights into the institutional embedding of FRMSs are crucial to enable the identification of design principles for flood risk governance. Such design principles are expected to provide action perspectives to actors at the level of the EU, its member states, regional authorities, and public-private partnerships.

## Flood Risk Management Strategies (FRMSs)

Literature on Risk Management often refers to a chain of responses to flood risks (Borja et al. 2006). Inspired by those links in the risk chain, we identify five different FRMSs: risk prevention, flood defence, flood mitigation, flood preparation and flood recovery. Apart from the category of flood mitigation, our categorisation resembles that of EU flood risk policies. Each conceivable Flood Risk Management measure would fit under at least one of the five strategies listed below:



Figure 1. Five ideal-typical Flood Risk Management Strategies (FRMSs)



## Analysing Flood Risk Governance Arrangements

To analyse the institutional embedding of FRMSs, we have denominated the notion of Flood Risk Governance Arrangements. We have defined these as the constellation resulting from a dynamic interplay between actors or actor coalitions involved in all policy domains relevant for flood risk management – including water management, spatial planning and disaster management; their dominant discourses; formal and informal rules of the game; and the power and resource base of the actors involved (Hegger et al. 2013). One can logically expect that a broadening and linking of FRMSs requires innovative FRGAs. There is a need for new partnerships (actors), new policy programmes and coordination with existing programmes (discourses), new procedures and instruments (rules) and new resources (e.g. interaction resources).

## Explaining stability and change in Flood Risk Governance

In STAR-FLOOD we have identified five types of factors explaining stability and dynamics in Flood Risk Governance Arrangements:

- i) physical circumstances;
- ii) physical and social infrastructure;
- iii) structural factors;
- iv) change agency and
- v) shock events.

In general, institutional arrangements can be expected to have a certain degree of stability, inertia and predictability. Through in-depth and more comparative empirical research, we expect to be able to refine these explanatory factors and to determine their relative importance. This may also provide insight into possible action perspectives for changes in flood risk governance.

## Evaluating Flood Risk Governance Arrangements

As a final step, after analysing and explaining the institutional embedding of FRMSs, we will evaluate this institutional embedding with the help of the overall criteria of *appropriateness* and *resilience*. (Adger et al. 2003; Aerts et al. 2008). The choice for these criteria is based on two starting assumptions. The first assumption is that urban agglomerations vulnerable to flooding will be more resilient, if multiple FRMSs are applied simultaneously and are aligned. A resilient approach is one that is intended to enable society to cope with flood risks in a flexible and multifaceted way and to recover to the initial state as quickly as possible after a flood event. The second assumption is that implementation of a diverse, resilient, set of FRMSs in a certain area is only possible if these strategies and their coordination are appropriate, i.e. properly institutionally embedded given the opportunities and constraints of their physical and social context.

## CONCLUSION

The four step framework of identification, analysis, explanation and evaluation of flood risk governance can be expected to be a good starting point for researching the institutional embedding of flood risk management strategies. Next research steps will include comparative analyses of FRGAs in different regions. We expect that such comparative analyses lead to the identification of good practices, which can be translated into policy design principles as well as concrete recommendations for policy and law at the level of the EU, its member states, regional authorities, and public-private partnerships.



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