

## Brief description of relevant areas of the Integrated Project FLOODsite for the 1<sup>st</sup> pilot call of the ERA-NET CRUE

### 1. Overall objectives of FLOODsite

The management of flood risk is a critical component of public safety and quality of life. The main objective of the **FLOODsite** Integrated Project is to provide an integrated framework for flood risk management from operational to strategic planning time horizons. The research in **FLOODsite**, therefore, is dealing with the development of a European methodology for a consistent approach to risk analysis, risk assessment and risk reduction. **FLOODsite** is considering the whole flood risk system; this comprises the natural hazard, the socio-economic and ecological vulnerability as well as societal interventions by physical measures and policy instruments. Flooding is considered from rivers, estuaries and coasts in a uniform way. Specific flood processes and mechanisms ranging from the high level of risk at a river-basin, estuary and coastal-process-cell scale down to the detailed site-specific conditions are being investigated. Of special interest are simulations of comprehensive risks of river floods including multiple areas of vulnerability, flash floods and flash flood forecasting, coastal extremes and coastal morphodynamics. **FLOODsite**, moreover, seeks to identify technologies and strategies for sustainable flood mitigation and defence, recognising the complex interaction between natural bio-physical systems and socio-economic systems, to support spatial and policy planning in the context of global change and societal advance.

Several pilot studies are included in **FLOODsite** representing all main types of floods. These are the Elbe River basin (CZ-DE), the Tisza River basin, 4 flash flood basins (IT, FR, ES), the Thames River estuary (UK), the Scheldt River estuary (NL), the Ebro River delta coast (ES) and the German Bight coast (DE). The integrated methodology of the project will be developed under consideration of the specific requirements of flood risk management at these sites. Thus, in some sites emphasis is put on sustainable risk reduction in the long-term (e.g. the Elbe River basin), whereas at other sites the operational defence plays an important role (e.g. the Thames River estuary). New technologies for flash flood forecasting are aimed at in the flash flood basins. In terms of integration, **FLOODsite** will also develop decision support systems (DSS) for long-term planning and operational flood risk management.

As far as the harmonisation of the thematic area of floods and the dissemination of the research results is concerned, **FLOODsite** has already drafted a common language of risk, and will provide guidance and tools for dissemination and communication, and professional training packages. Thus it builds upon the previous and current European and national research related to river and coastal flood processes as well as practice in flood risk mitigation methods to promote consistency of the approach.

### 2. Specific objectives of Theme 2 and Tasks 12 - 14

Within the structure of the **FLOODsite** Integrated Project Theme 2 is dealing with “*Innovative mitigation and sustainable flood risk management*”. Sub-theme 2.1 aims at the *pre-flood* evaluation of measures and instruments for risk reduction. Its focus is the long-term prevention of flood risks management, whereas operational management of flood events is referred to in sub-theme 2.2 and the post-flood perspective of relief and recovery is mainly not further elaborated within **FLOODsite**. Task 12 is dealing with *ex-post* evaluation of already applied measures and instruments. Task 13 carries out investigations on societal flood risk management strategies. Task 14 is dedicated to the formulation and *ex-ante* evaluation of scenarios of future developments of the flood risk system under consideration of a wide range of different physical and societal conditions. Due to close relation to the first pilot call of ERA-NET CRUE, in the following objectives, approaches and expected results of these three tasks are further explained.

## **2.1 Task 12 - Identification and ex-post evaluation of existing flood mitigation and defence measures**

The overall performance (including intended and unintended effects, robustness, flexibility, effectiveness and efficiency) needs to be assessed for the physical measures and policy instruments currently applied to pre-flood risk reduction. The perspective of ex-post evaluation is to investigate these aspects after implementation and after specific events. On the one hand, ex-post evaluation can be used to for the control of performance of previous action. On the other hand, it generates information for the design and selection of measures and instruments in the future. Research subjects can range from single measures or instruments to comprehensive strategic alternatives for whole basins.

Task 12 will deliver a “methodology for ex-post evaluation of pre-flood measures and instruments (ex-post EFM)” for determining (side) effects, effectiveness, efficiency, robustness and flexibility of physical measures as well as regulatory, financial and communication instruments. The methodology consists of a systematisation of measures and instruments and covers criteria and methods for the retrospective evaluation considering different natural and societal conditions at project level. The validity of the framework will be ensured by plausibility analysis and expert judgement. Most criteria and methods will be tested in seven case studies, which mainly correspond with the overall pilot study sites of **FLOODsite**. Finally, conclusions will be formulated on the suitability of individual measures and instruments or local combinations of them as well as on the applicability of criteria and methods used for their assessment. The recommendations will provide guidance for a more detailed and harmonised approach of ex-post evaluation of pre-flood risk reduction in Europe with the aim to improve future flood prevention.

## **2.2 Task 13 - Integrated Strategies Combining Planning and Communicative Instruments**

In order to develop combinations of measures and instruments with high probability of effective implementation, a strategic approach to pre-flood risk management is required. Strategies can be defined as combinations of physical measures and policy instruments which take into account the societal context and processes within urban and regional development. The development of strategies requires the co-operation of stakeholders and authorities, e.g. co-operation of water authorities, regional planners and local authorities.

For a comprehensive understanding of strategy, three dimensions should be distinguished. Strategies encompass a *content* dimension (e.g. strategic alternatives of combining physical measures and policy instruments) as well as a *process* dimension to define the appropriate planning mode (strategic programming, scenario-based planning, and so forth) and to describe how strategic alternatives can be implemented. There is no best strategy regardless of the societal situation of specific river basins or coastal areas. Therefore, strategies cover a *context* dimension to consider the societal conditions of urban and regional development.

Despite recent advances in flood risk management, strategies for pre-flood risk management have to be analysed comprehensively with regard to different types of floods and various contexts of implementation both on urban and regional level. Research work within Task 13 aims at developing a framework for describing strategies for pre-flood risk management. The framework will serve as a basis for recommendations to local and regional flood risk managers. Three specific challenges are met. Firstly, Task 13 analyses the similarities and differences between strategies for the prevention of different types of floods (e.g. plain floods, flash floods). Secondly, strategic alternatives are investigated with regard to the requirements for their implementation. Thirdly, especially spatial planning at local level and resilience strategies are taken into consideration.

Research work within Task 13 uses a comparative descriptive case study approach. On the basis of the framework, the current strategies of local and regional actors are analysed. It is assumed that the type of flood has a significant effect on the current strategy of local and regional actors. Therefore, similarities between the management responses to two flash floods (case studies “Weisseritz River”

and “Adige River”) will be analysed with ample attention to cultural, political, social and other conditions. The case study “Vereinigte Mulde River” analyses strategies for managing the risk of plain floods and the study “Thames River estuary” considers the specific features of estuaries.

### **2.3 Task 14 - Design and prospective evaluation of innovative strategies for flood risk management**

To deal with future risk reduction of complex flood risk systems, measures and instruments have to be suitable combined and ex-ante evaluated. Task 14, therefore, aims to demonstrate how sustainable strategic alternatives as combinations of single measures and instruments can be derived (method of design) and how their social, economic and ecological (side) effects, effectiveness, efficiency and other aspects can be assessed in advance while considering different situations (method of evaluation). Accordingly, Task 14 delivers methods for the design and evaluation of the sustainability of comprehensive strategic alternatives of flood risk management. It includes trends of natural (climate), demographic and economic developments in comprehensive scenarios. These scenarios, for example, are composed using different world-views from social cultural theory.

As part of the ex-ante evaluation, methods from risk analysis are used for the prediction of future impacts. To determine the sustainability of different scenarios single- and multi-criteria assessments are considered. Finally, the specification of uncertainty is an additional major item. The research will reflect how to include uncertainty analyses and how to communicate the results with the targeted end-users.

The development of the methods is supported by testing the approach in two pilot studies (Elbe River for fluvial and Scheldt River for estuarine/coastal). The results will be used to draw conclusions on ‘the best strategic alternatives’ for certain situations.

## **3. Potential links to ERA-NET CRUE research projects**

Research of **FLOODsite** provides a systematisation of tasks and components of an integrated flood risk management and the methodology for its operational use. Thus, it may contribute to a harmonisation of flood research in the European Research Area (ERA) with benefits for practical flood risk management in all EU Member States. Future reference to **FLOODsite** will strengthen this effect. The ERA-NET projects are also aiming at the harmonisation of research funding. Therefore, it is important to relate textual and administrative affairs in the field of flood research.

As far as the thematic area of Sub-theme 2.1 with Tasks 12, 13 and 14 of **FLOODsite** is concerned, the principal methodologies may be developed in the Integrated Project. Within this framework, a further enhancement and adaptation is required of the measures and instruments considered, as well as a further elaboration of methods. This is especially the case for a more detailed specification of conditions of flood risk management in the EU Member States. In particular, the societal and political concepts and regulations do strongly influence the scope of probable measures and instruments. **FLOODsite** outcomes should, therefore, be further adapted to the regional and local conditions in Europe.

In addition, the number of pilot study sites of **FLOODsite** is restricted to a certain number of Member States. For this reason, it would be valuable to develop parts of the new methodologies also in countries which are currently not represented as pilot sites. This could lead to a benefit for both sides. For the research projects of ERA-NET CRUE it may facilitate the integration of certain aspects in the overall flood risk management methodology. For **FLOODsite** it would provide an opportunity to use the ERA-NET CRUE results for the further differentiation and enhancement of the site-specific context of its deliverables.