

**REPORT**



# Sub-Report Phase 3: Flood Risk Management Plans of the Elbe River Basin

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## 1 Introduction

In the FLOOD-WISE project the German federal states Brandenburg and Saxony are working close together. It seems to be not a cross border project, but different federal rules in Germany can hamper the cooperation and common development of a FRMP like different national rules. So the experiences and results of the cooperation between Brandenburg and Saxony could be transferred to other international cross border cases.

The report gives an overview and a comparison of methods of the development of FRMP in Germany and the Czech Republic, but in depth between Brandenburg and Saxony.

### 1.1 Work plan phase 3 for the river basin Elbe

The work plan for phase 3 (July – December 2011) was written by the project partners in April 2011, adapted in December 2011 and is reproduced as Annex 1.

#### 1.1.1 Issues

For phase 3, Flood Risk Management Plans (FRMP), the river basin pilot team share the following aims:

- Agreement on the objectives and benefits of common FRMP
- Inventory on policies, strategies and general objectives in the region
- Joint appropriate objectives in the region
- Common FRMP for the pilot area
- Aspiration towards a political commitment for the implementation of the FRMP in the region
- Development of Action Plans towards the implementation of the FRMP

#### 1.1.2 Planned Activities

- River basin meetings to discuss the above mentioned issues
- Several knowledge exchange meetings regarding flood risk mapping and flood risk management
- 2 Stakeholder meetings
- 2 Workshops on mapping and implementation of the Floods Directive with the Czech Republic
- several workshops for achieving political commitments for the implementation of the FRMP in the region

#### 1.1.3 Outputs

The outputs of phase 3 of the Project FLOOD-WISE are described below.

## 1.2 River Basin pilot team

The river basin team and its objectives are described in the Sub-Report of phase 1.

### 1.2.1 Regional River Basin Meetings and meetings at working level

Date	Topic	Location
19 September 2011	<ol style="list-style-type: none"> <li>1. Status of work in the pilot area</li> <li>2. Implementation of flood risk management plan (Inventory report phase 3)</li> <li>3. Discussion and concertation Political Statement</li> <li>4. Preparation 3rd PPM in Cluj-Napoca (RO)</li> </ol>	Dresden
02 November 2011	<ol style="list-style-type: none"> <li>1. Status of work in the pilot area</li> <li>2. Common pilot project flood hazard and risk maps with the Czech Republic</li> <li>3. Presentation and discussion project statement</li> <li>4. Preparation knowledge transfer meetings</li> <li>5. Participation of political representatives 3<sup>rd</sup> and final PEF</li> </ol>	Potsdam
10 November 2011	<ol style="list-style-type: none"> <li>1. Schedule for hydronumeric modelling</li> <li>2. Usage of hydronumeric results for FHM/FRM</li> <li>3. Design of FHM/FRM</li> <li>4. Reports on FHM/FRM</li> <li>5. Development of FRMP based on FHM/FRM</li> <li>6. Preparation of Stakeholder-Meeting</li> </ol>	Dresden
27 February 2012	<ol style="list-style-type: none"> <li>1. Consideration of Natura 2000-management plans</li> <li>2. Inclusion of SEA and Article 6 assessments concerning Natura 2000 sites</li> <li>3. Objectives for FRMP</li> <li>4. Development of measures</li> <li>5. Data management</li> </ol>	Cottbus

### 1.2.2 Involvement of Stakeholders

At the beginning of December 2011 the 4th FLOOD-WISE-stakeholder meeting was held in the pilot area "Elbe near Mühlberg". Aim of the meeting was the presentation of the results (final FHM and FRM and the development of the FRMP) developed within the project and the discussion of the next steps with the stakeholders.

After a discussion of possible objectives for the FRMP during the 3rd stakeholder meeting in July, at the 4th meeting should be talked about possible measures to achieve these objectives. Basis of the discussion was a list of possible measures, designed for FRMP in Germany. The participants were asked to evaluate the proposed measures from "uninteresting" to "very interesting" for or in the region. The company entrusted with the processing of the FRMP will use the rated and supplemented list for the development of "appropriate objectives" and the classification of measures.

During stakeholder meeting 3 the interested parties agreed to aspire political commitments for the implementation of the FRMP in the region. This should be discussed at the stakeholder meeting. A proposal how a kind of declaration of interests or a letter of commitment from municipalities and counties might look was presented. The participants were asked to discuss the proposal with their mayor or district administrator.

With the stakeholders a fifth and perhaps final meeting during summer of 2012 was decided. This meeting is scheduled for the discussion of the FRMP-documents developed in FLOOD-WISE. Additionally the political commitments and the implementation of the FRMP shall be discussed.

## 2 Approach to make a flood risk management plan

### 2.1 Process of the development of a flood risk management plan

#### 2.1.1 Superior guidelines

In the international Flood Action Plan of 2003 the ICPER documented several fields with influence on the Elbe floods. These will form the background for the development of objectives and measures in the FRMP. The relevant points are:

- Measures in the Elbe river basin:
  - Enhancement of the retention capacity of the basin area
  - Limiting, legal definition and usage of inundation areas
  - Reactivation of former inundation areas and design of additional retention areas
- Priority measures at the Elbe river and its tributaries:
  - State-specific restoration programs for the Elbe-dikes in Germany
- Optimisation of flood information systems:
  - Concept for the technical modernisation of measurement and communication
  - Recommendation for optimising flood defence and risk precautions by citizens and companies in hazard
  - Recommendation for enhancing the public information and the flood awareness

In Germany additional recommendations were prepared by the LAWA<sup>1</sup>. In chapter 5.5 "Identification of possible actions" ten fields are described in which measures could be taken:

1. Precautionary Land Use
2. Natural Water Retention
3. Technical Flood Protection
4. Precautionary Building
5. Protection against Risks
6. Information
7. Precautionary Behaviour
8. Provision of Resources and Preparation of Hazard Prevention and Civil Protection
9. Flood Response
10. Recovery

Similar to the ICPER fields of action these recommendations of the LAWA will be used for the development of objectives and measures in the FRMP.

The German River Area Association Elbe (FGG) has decided to prepare the FRMP Elbe according to the scheme of three levels:

A - international level of ICPER (Germany, Czech Republic, Austria, Poland)

B - national level of FGG (ten federal states in Germany with their part of the Elbe river basin)

C - level of the federal states (Saxony and Brandenburg)

The FRMP "Elbe near Mühlberg" will be developed on the C-level. Complying with the aims of FLOOD-WISE the maps and reports of both partners will be the same as far as cross-border cooperation is possible<sup>2</sup>. At the C-level both states are going to prepare own and different compilations of the different working sections of the A-level FRMP "Elbe". The common FRMP "Elbe near Mühlberg" will

<sup>1</sup> LAWA (German working Group on Water Issues of the Federal States and the Federal Government): Recommendation for the Establishment of Flood Risk Management Plans, 25/26 March 2010, Dresden

<sup>2</sup> Because of the landscape structure Brandenburg has to focus on a large area that is far from the border to Saxony. This area will not be covered by the Saxon version of the FRMP "Elbe near Mühlberg".

be part of these compilations. Its contents and the data created with this FRMP will fit to the standards given for the A- and B-level. In the notification process each state will notify the texts, data and maps relevant for its territory. The common structure of the FRMP "Elbe near Mühlberg" is shown in Annex 2.

### 2.1.2 Saxony

The flood protection concepts (HWSK) and plans developed after the flood 2002 shall be used for the implementation of the floods directive. Since 2004 HWSK are available for almost all main rivers (so called river 1. Order). For some smaller river (so called river 2. Order) HWSK were also created in the last years. The HWSK covers a large part of the requirements of the FD and the therein contained data, maps and other information shall be used. The measures of the HWSK are mainly technical flood protection measures.

Plans and already implemented or further to be developed measures of other fields of the flood risk managements exist beside the HWSK. These include plans, policies and objectives in frame of the state development plan (Landesentwicklungsplan) and regional plans (Regionalpläne), organization of the flood defence (Wasserwehr), flood warning and –forecasting, legislation for flood precaution etc. These measures are appropriate for different sizes of spatial units and will also be part of the FRMP.

By involving all operators of the Saxon flood risk management shall be ensured that the effort for the implementation of the Directive will benefit fully the improvement of flood protection and the reduction of flood risk.

The FRMP will be developed as a comprehensive documentation of measures and plans for flood risk management. Beside the water management contributions from other subject areas, such as civil protection, spatial planning has to be taken into account. So a better exchange of information between all parties and continuation of an effective coordination of different actions on a variety of areas of flood risk management can be achieved.

### 2.1.3 Brandenburg

Because of its floodprone lowland character Brandenburg and its predecessors in the GDR and before did not establish flood action plans or alike documents over a long time. The main interest has always been the safety against floods, mostly by technical flood protection measures. This was, as recent historical research on behalf of the LUGV Brandenburg shows, accompanied by intensive works on the melioration, especially the dewatering, of the lowlands.

Detailed plans were restricted to the preparation of the restoration of the flood protection constructions. In other areas of the state where larger regions with more complex facilities are to be supervised specialised plans ("Generalplan", "Masterplan", "main document of works") for the reconstruction have been installed but not in the pilot region.

The reconstruction works have been prepared and coordinated within the German and international organisations for the Elbe river. Brandenburg has used basin-wide and international documents to develop its strategy of flood risk management (see 3.3.2).

In 2006 Brandenburg has started to work on a methodology for the development of Flood Risk Management Plans. The work led to a draft completed in November 2007 that fulfils all the requirements of the FD and goes beyond this. The methodology comprises specifications for hydraulic and hydro numeric modelling, a flood risk assessment, the mapping of flood hazards and flood risks and the establishing of a FRMP. Moreover, it contains specimens of specifications for procurement procedures, e.g. for the measurement of channels, it demands a process of plausibility checks based on the regional experiences with floods and it specifies the legal definition of inundation areas with restrictions of usage. This methodology is compliant with the recommendations of the LAWA and the decisions of the River Basin Association Elbe. The draft of the methodology has been put on trial with a pilot project in the basin of the river Stepenitz, a right tributary of the Elbe in the northwest of Brandenburg. This led to a few changes but as a whole the methodology can be used. Furthermore, for the production of the maps designed in the methodology a so called "Karten-Tool" (mapping tool) based on the GIS ArcGIS by ESRI was developed.

Where applicable, the standards of the methodology are used for the development of the cross-border maps and the FRMP "Elbe near Mühlberg".

### 2.1.4 Czech Republic

"Flood protection is based on the Czech National Flood Protection Strategy, approved by Government Resolution no. 382 of 19 April 2000.

Flood protection management is assured by flood protection authorities, following flood-event management plans. Flood Committees are the flood protection authorities during floods; they co-operate with the units of the Integrated Rescue System (Fire Rescue Service of the Czech Republic, Medical Rescue Service, Czech Police, etc.).<sup>3</sup>

For the implementation of FD a working group consisting of representatives from the Ministry of Environment, the Ministry of Agriculture, the Povodís (state enterprises) and the Institute of Water Management was formed.

The whole area of the Czech Republic is divided into three river basins. As in Germany there will be flood risk management plans for the three main river basins: Elbe (Labe), Oder and Danube, including a general description of the measures at the level of the river basins (in Germany: A level). Detailed management plans for the tributaries are not created. At the level of the tributaries (in Germany: B level), there will only be a detailed description of the essential measures (no statements on issues of significance, no strategic environmental assessment, etc). Existing plans and determined flood areas will be applied to implement the directive.

Currently, the methodological and organizational preparatory work in the Czech Elbe river basin is still ongoing. Monthly reports on the implementation will be agreed between involved parties. The award is ongoing or is still in preparation. Therefore in-depth analysis of methods and experiences can not carry out.

## 2.2 Comparison of approach across the border

General concepts for the development of the FRMP already exist on both sides of the border. But there are differences in the status of work. Existing plans and measures will be used for the implementation of the directive.

In the German Elbe river basin, there will be only one FRMP for the Elbe. The different States develop FRMP for the parts of the sub-basins within their territories. This is coordinated within the River Area Association Elbe (FGG Elbe) by the riparian German federal states. Comparable three plans for the Czech Republic are created: for the Elbe/Labe, the Danube and the Oder/Odra.

## 3 Existing information at each side of the border

### 3.1 Organizations involved in flood risk management

#### 3.1.1 Germany

Cooperation between all specialised disciplines is essential in flood risk management. The German Working Group on Water Issues of the Federal States and the Federal Government (LAWA) indicates the following sectors and stakeholders involved in the development of FRMP<sup>4</sup>:

- Spatial planning
- Building law and local planning
- Disaster and emergency planning
- Water management
- Agriculture and forestry
- Nature conservation
- Stakeholders
- Insurers

All sectors should be involved from an early stage. Whereby the water management agencies have a key role and should take the responsibility of initiation and coordination of the FRMP.

§ 5 (2) of the Federal Water Act (WHG) demands that every person who might be affected by floods has to take precautional measures against negative consequences of floods and for the mitigation of harms as far as possible and reasonable. Out of this the objective of FRM to stress the importance of

<sup>3</sup> [http://www.mzp.cz/en/flood\\_protection](http://www.mzp.cz/en/flood_protection)

<sup>4</sup> LAWA (German working Group on Water Issues of the Federal States and the Federal Government): Recommendation for the Establishment of Flood Risk Management Plans, 25/26 March 2010, Dresden

individual risk precaution by citizens will lead to a more responsible land use. This is taken into account by the water management agencies.

### Organization in Saxony

The civil protection and calamity management in Germany is task of the federal states. The Free State of Saxony is responsible for planning, building and maintenance of dikes, flood protection walls, flood retention basins, dams, water reservoirs and other constructions of flood protection on main rivers. Municipalities are responsible for construction on tributaries. The Saxon Ministry of Interior is the supreme level of civil protection.

Institutions involved in Saxon flood risk management:

- Saxon Ministry of Environment and Agriculture (SMUL)
- Saxon Ministry of Interior (SMI)
- Saxon State Agency for Environment, Agriculture and Geology (LfULG)
- Saxon State Reservoir Administration (LTV, Landestalsperrenverwaltung)
- Regional councils (Landesdirektionen)
- Rural districts (Landkreise) and towns (kreisfreie Städte)
- Municipalities (Kommunen)

### Organization in Brandenburg

The responsibilities in Brandenburg resemble the organisation in Saxony. Institutions involved in flood risk management in Brandenburg:

- Ministry of Environment, Health and Consumer Protection (MUGV)
- State Office for Environment, Health and Consumer Protection (LUGV) with several divisions
- Rural districts and towns (kreisfreie Städte)
- Municipalities and prelacies
- Ministry of Interior <sup>5</sup>
- State school and technical centre for fire and catastrophe protection <sup>5</sup>

### Organizations involved within the pilot area

Organization	Free State of Saxony	Brandenburg
Scientific authority	LfULG LTV	LUGV-Oe5
Water management authority	LfULG LTV	LUGV-RS5
Lower water authority	Landkreis Nordsachsen	Landkreis Elbe Elster
Civil protection authority	Landkreis Meißen	
Nature conservation	-	NaturSchutzFonds Brandenburg
Municipality	Stadt Strehla Gemeinde Cavertitz Stadt Belgern Gemeinde Stehla	Stadt Mühlberg/Elbe
Private	-	Südzucker AG Ev. Pfarramt Mühlberg

Table 1: List of involved organizations within the pilot area “Elbe near Mühlberg”

<sup>5</sup> disaster prevention during an actual flood. More information: [www.lste.de](http://www.lste.de) (in German)

### 3.1.2 Czech Republic

Institutions involved in flood risk management planning in Czech Republic are:

- Ministry of the Environment of the Czech Republic (MoE)
- Ministry of Agriculture of the Czech Republic (MoA)
- 5 State Enterprises (povodí): Povodí Vltavy, Povodí Ohře, Povodí Labe, Povodí Odry and Povodí Moravy
- 14 regions (kraje)
- Czech Hydrometeorological Institute and its Flood Alert and Forecast Service

The concepts and templates for the maps and the flood risk management plans are given by the Czech Ministry of Environment (MoE). The planning for the whole catchment area is also made by the MoE.

Czech significant watercourses are administered by the "Povodí", state enterprises in the competence of the Ministry of Agriculture. The Povodís do the preliminary work for the water resources data, such as risk areas, flood plains and are responsible for creating risk maps by specification of the MoE.

The regions (Kraj) provide the basic information, e. g. land use data, to develop maps and plans.

The Flood Forecasting and Warning Service is provided by the Czech Hydrometeorological Institute in co-operation with the administrator of the watercourse (Povodís).

## 3.2 Cross border committees

Depending on the scope of the committees relevant for or concerning with flood risk management planning at the Elbe different members are working together in these organizations (Table 2).

Cross border (flood) cooperation	Involved Elbe countries / federal states
<b>IKSE</b> (International Commission for the Protection of the Elbe River)	Czech Republic, Germany
<b>FGG Elbe</b> (German River Area Association Elbe)	Brandenburg, Free State of Saxony
<b>LAWA</b> (German Working Group on Water Issues of the Federal States and the Federal Government)	Brandenburg, Free State of Saxony
<b>Czech – Saxon Commission for Transboundary Waters</b>	Czech Republic, Free State of Saxony
<b>LABEL</b> (LABE-ELBE Adaptation to flood risk)	Czech Republic, Free State of Saxony
<b>FLOOD-WISE</b>	Brandenburg, Free State of Saxony
<b>CROSS-DATA</b> (Spatial information system)	Czech Republic, Free State of Saxony

Table 2: List of cross border committees within the Elbe River Basin

## 3.3 Existing flood risk plans

### 3.3.1 Saxony

Since the August 2002 flood the State Government has initiated and implemented comprehensive measures to improve flood protection, like increasing the retention areas in reservoirs, the construction or expansion of flood retention basins, bank protection, the increase in the flow profile of bridges, upgrading, relocation and the new building of flood protection constructions, but also the improvement of warning systems and information service.

### State Development and Regional Plans

To implement the objectives for preventive flood protection of the State Development Plan (Landesentwicklungsplan) are more than 380 km<sup>2</sup> as priority areas and about 408 km<sup>2</sup> as reserved areas designated. A detail of the Regional Plan Westsachsen with the pilot area is shown in Figure 1. The Regional Plan is the spatial plan for a planning region. It's developed from the State Development

Plan, which specifies general objectives and principles by regional characteristics and is a framework for communal urban land use planning.

### Flood Control Concepts (HWSK)

For all Saxon main rivers flood control concepts have been compiled. These HWSK already include substantial content that will be required in the Floods Directive. Therefore they are an important basis for the implementation of the directive.

The HWSK include

- an inventory of the current flood control level
- an analysis of risk and potential damage
- a concept of measures
- hazard maps

The following steps were taken in order to achieve an integrated river-based flood prevention concept:

- analysis of meteorological and hydrological situation and of sedimentation/erosion processes (including a detailed analysis of the flood 2002)
- calibration of hydraulic model, validation of calculated water tables and flood areas
- analysis of potential damage and the existing protection level
- identification of risk areas including analysis of hydraulic capacity of watercourses, bridges and flood protection constructions

The Saxon flood control concepts are integrated river-based concepts. They give the possibility to find out the most suitable measures by estimating and comparing the effectiveness, feasibility and economic efficiency as well as ecological impacts of measures.

### Designated Inundation Areas

Furthermore flooded areas were identified by the appropriate authorities according to WHG § 32 and § 100 (1), (3), (5) set SächsWG. In Saxony, 350 areas were designated with a total area of 64,000 hectares as flood plains. That's about 3.5 % of the country area. Arable land is most affected with a percentage of 54 %, followed by grassland (16%), urban areas (14%) and forest (13%).

### Flood Generation Areas (HWEK)

With the amendment of the Saxon Water Law (SächsWG) in 2004 the protection category "flood generation areas" was adopted for the first time. The legal determination of the flood generation areas is done by the responsible water authorities. This protected area is mainly located in low mountain range and hilly countries. Furthermore, a flood generation area is characterised as an area where there is extreme runoff after heavy precipitation or short-time melting of snow. The new category shows the importance of the capability of seepage and water retention in these areas for the origin and the level of floods.

### Flood Information and Alert Service

The flood information & alert service in Saxony is headed by the Saxon Flood Centre based in the Saxon State Office for Environment, Agriculture and Geology. The Saxon Flood Centre is responsible for flood information and early warning for all main rivers in Saxony.

It monitors and receives regularly:

- Flows and water levels of more than 100 flood level gauges
- Precipitation and thaw forecasts of the German Meteorological Service (DWD)
- Flows and water levels of reservoirs provided by the Saxon State Reservoir Administration
- Relevant hydrological and meteorological data for the river Obere Elbe and its tributaries in the Czech Republic are provided by the Czech Hydro-Meteorological Institute
- Further relevant flows and water levels transmitted from the neighbouring countries

After an evaluation for a possible flood generation the Saxon Flood Centre provides relevant flood information directly to each authority with flood defence responsibilities as well as to any third parties (private persons) with particular risk of flooding.

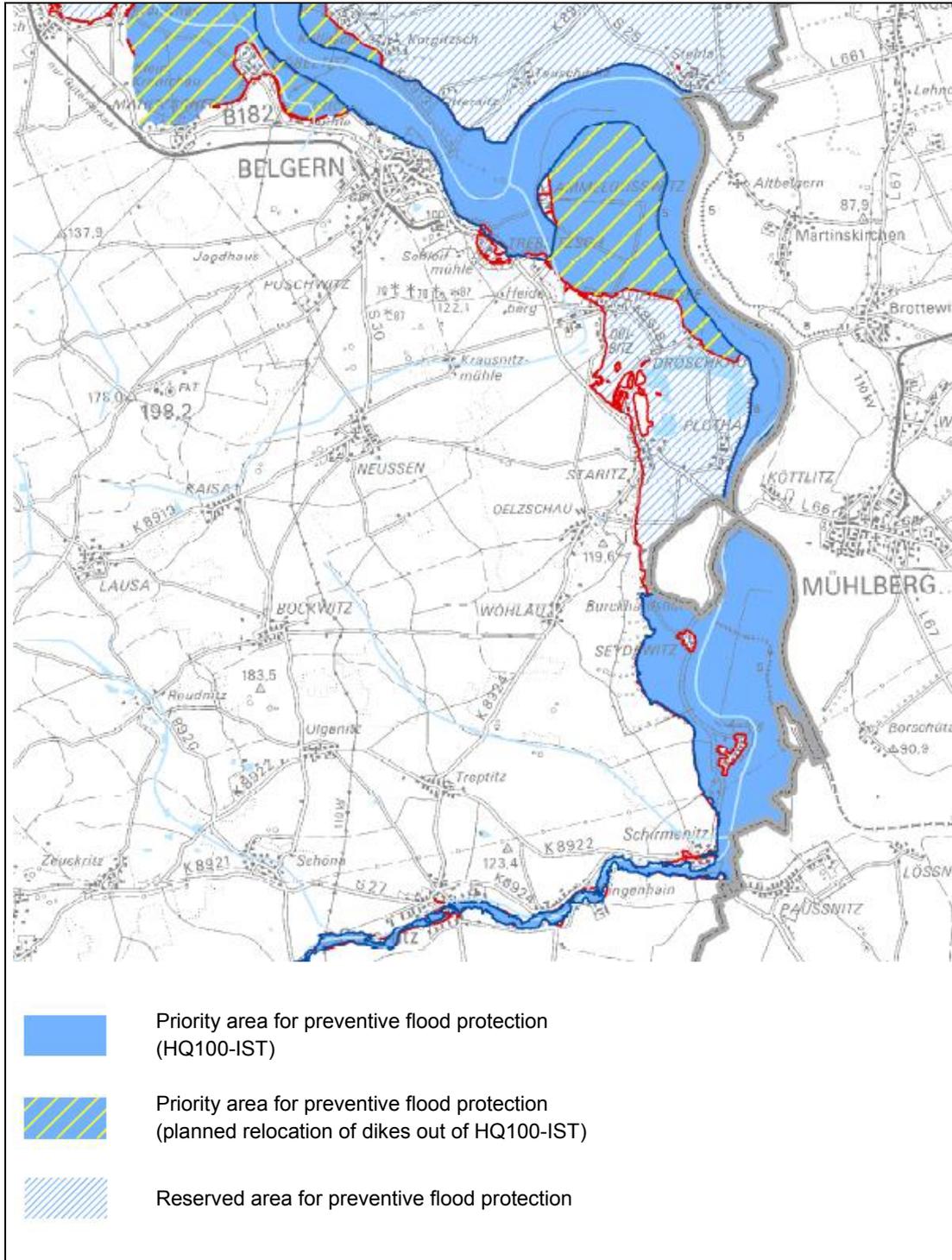


Figure 1: Detail of the Regional Plan Westsachsen 2008

### 3.3.2 Brandenburg

Out of the several fields of flood management Brandenburg has implemented

- the reduction of flood levels via the recovering of bogs and fens or the restoration of the rural water regime,
- the designation of inundation areas,
- the building and reconditioning of flood protection measures and
- the organisation of disaster protection and management.

At the national level the “River Area Association Elbe” (FGG Elbe) has published a report on the implementation of the FD<sup>6</sup>. This report defines the necessities and the circumstances for the implementation. Brandenburg follows the strategy defined there closely.

In 2004 the Brandenburg State Office for Environment finished a concept on retention areas in Brandenburg. This is used as informal background for the allocation of possible retention areas. In there the inundation area in the foreshore up- and downstream of Mühlberg is calculated to 637 ha. In maximum around Mühlberg 1309,02 ha of inundation area could be reconnected to the Elbe.

The information compiled during the concept on retention areas was used for spatial planning. Spatial planning in Brandenburg is accomplished together with Berlin that forms a separate state totally surrounded by Brandenburg. Both states have adopted a treaty on common spatial planning and have developed several shared spatial planning documents and plans (see 3.4.1). In the plan most important for the FRMP “Elbe near Mühlberg”, the State Development plan Berlin – Brandenburg, most of the regional inundation area of the Elbe is defined in “principle” as “risk area flood” (Figure 2). A “spatial planning principle” in German law has to be taken into account in subsequent planning and decision processes; it can be overcome but the reasons and the decision for the prioritised objectives have to be documented and will be checked by responsible authorities.

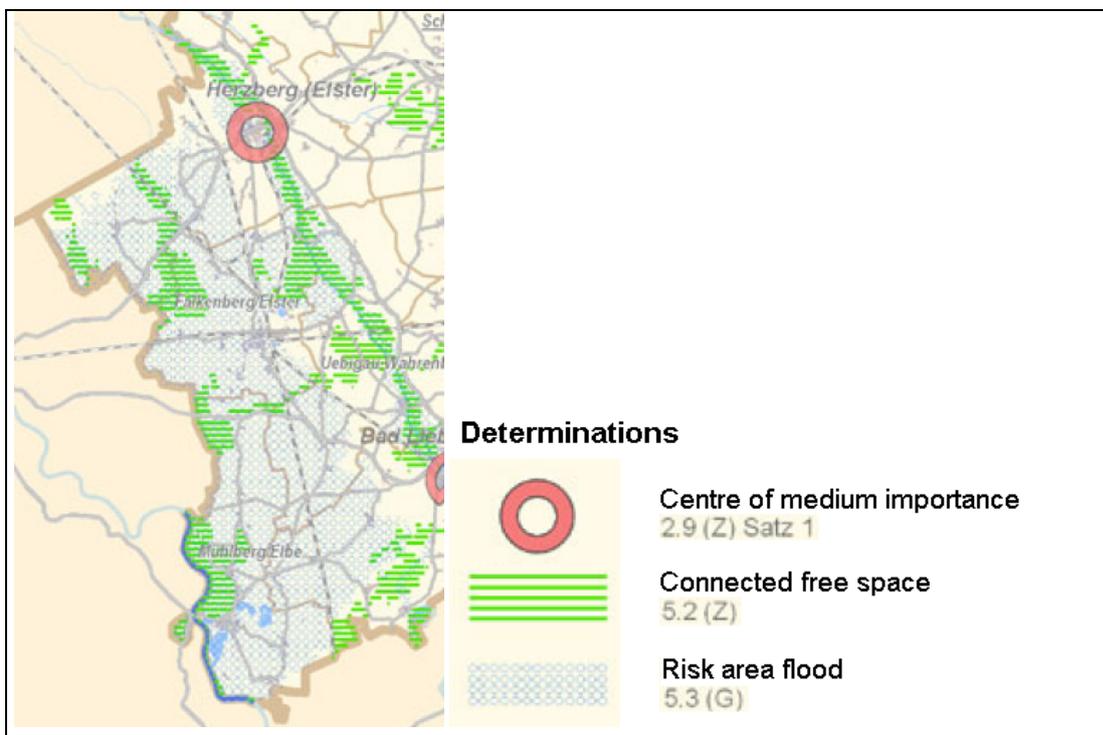


Figure 2: Detail of the State Development Plan Berlin – Brandenburg with the Elbe at the lower left.

The INTERREG III B-project “ELBE - LABE Preventive flood management measures by transnational spatial planning” (ELLA)<sup>7</sup>, finished in 2006, led to maps showing flood hazards by the inundated areas of HQ<sub>100</sub>- and HQ<sub>extrem</sub>-scenarios without flood protection facilities.

### 3.3.3 Pilot area Elbe near Mühlberg

In the pilot area already flood protection constructions exist, inundation areas are defined legally and several organisations are working hierarchically in disaster protection and management. The achievements and experiences with these implementations will be reflected in the FRMP, e.g. in the development of measures.

In the “Action Plan for the Flood Protection in the Elbe River Basin” of the ICPEP of 2003<sup>8</sup> the following measures are described (Figure 3, Figure 4):

<sup>6</sup> Umsetzungskonzept zur Richtlinie der EG über die Bewertung und das Management von Hochwasserrisiken (HWRM-RL) in der Flussgebietsgemeinschaft ELBE. Arbeitsgruppe Hochwasserschutz der Flussgebietsgemeinschaft Elbe (AG HWS) 09.03.2009

<sup>7</sup> <http://www.ella-interreg.org/>

<sup>8</sup> <http://www.ikse-mkol.org/index.php?id=82&L=2>

- with priority the reconditioning of dikes between Gaitzschhäuser and Stehla (Elbe-km 121 - 135),
- the possible withdrawal of dikes near Borschütz in the south of Mühlberg, opening 260 ha

In the audit of this report of 2005 the inundation area possible near Borschütz has been reduced to 100 ha according to feasibility studies. The sanitation of the dikes near Mühlberg had begun with the part near Stehla. The audit of 2008 mentions the designation of inundation areas between river and dike and the restriction of actions therein by law. It refers to the intention of making FRMP for 7 river basins in Brandenburg of which the Elbe near Mühlberg is one. For the area downstream of Köttlitz the usage as uncontrolled retention polder for HQ<sub>20</sub> and above is planned. As organisational measure a concept for the action of flood services has been adopted.

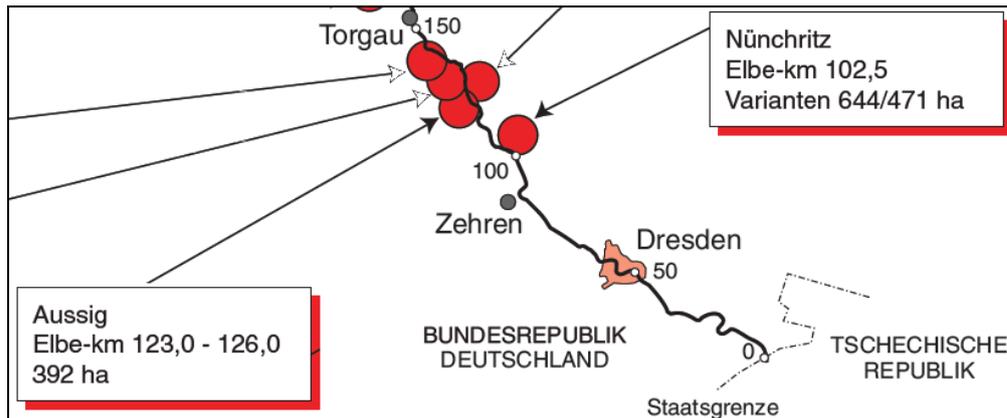


Figure 3: Possible locations for the construction of adjustable flood polders (IKSE 2008)

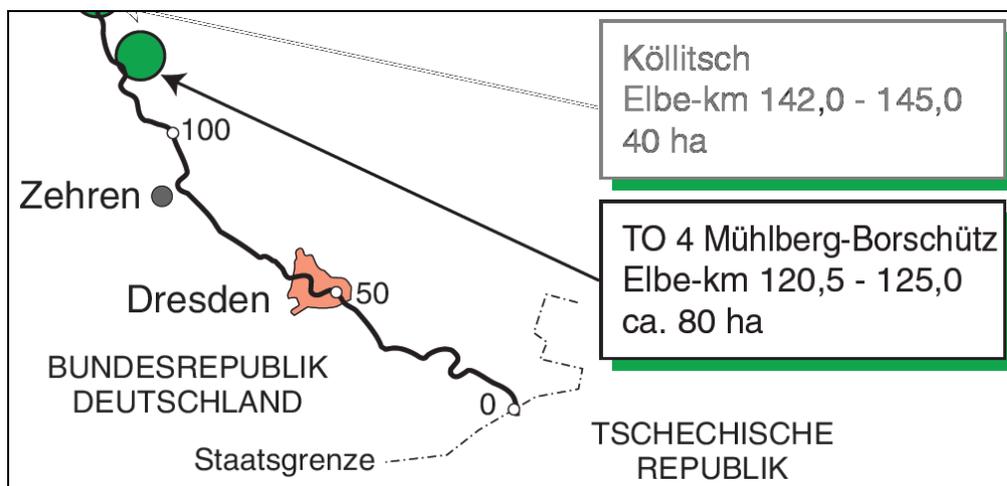


Figure 4: Possible location for the relocation of dikes (IKSE 2008)

In 2009 the Joint Research Centre in Ispra (I) has published its report on the impact of retention polders, dyke-shifts and reservoirs on discharge in the Elbe river<sup>9</sup>. This report takes into account the hydraulic effects of the withdrawal of dikes (“dike enlargement”) planned near Borschütz in the south of Mühlberg in Brandenburg together with the polders at Nünchritz and Aussig/Seydewitz in Saxony.

### 3.3.4 Czech Republic

In the Czech Republic flood protection plans as well as flood plain areas were prepared by the Ministry of the Environment. Flood plain areas are administratively determined areas exposed to flooding in case of flood. The flood protection plans include a factual part (information of a structure, municipality, river basin or other territorial unit), an organisational part (names and addresses, relevant communi-

<sup>9</sup> [http://natural-hazards.jrc.ec.europa.eu/downloads/public/2008\\_EUR\\_23699\\_EN\\_IKSE\\_Elbe\\_report.pdf](http://natural-hazards.jrc.ec.europa.eu/downloads/public/2008_EUR_23699_EN_IKSE_Elbe_report.pdf)

cation links, assignments of the individual participants, organisation of the warning and watching service) and a graphical part (maps, plans).

### 3.4 Existing objectives and measures per layer of the flood risk management cycle (prevention, protection, preparedness, emergency response, recovery)

In making a FRMP Brandenburg and Saxony cover the whole FRM-cycle and involve all relevant stakeholders, by integration of existing plans and measures and implementation at sub-basin level. Between the border states prevention and mitigation measures are regarded as most important.

#### 3.4.1 Existing regulations and policies in the region

##### International

- ICPER Flood Action Plan of 2003 with Audits of 2006 and 2008
- German Federal Water Act [WHG]
- Czech Water Act

##### National

Free State of Saxony	Brandenburg
Federal Water Act [WHG]	Federal Water Act [WHG]
Saxon Water Law [SächsWG]	Brandenburg Water Act [Bbg WG] Act about fire protection, the assistance and the catastrophe protection service of the state of Brandenburg [BbgBKG]
Ordinance of the Ministry of Environment and Agriculture for the flood information and alert service [HWNNAV]	Ordinance about the formation of a warn and alarm service for the protection against water hazards and for the communication of flood reports [HWMDV] Ordinance for the determination of flood prone waters and water bodies Ordinance about the formation of regional control points for fire protection, assistance and catastrophe protection in Brandenburg [RLSV]
Administration regulation of the Ministry of Environment and Agriculture for the flood information and alert service [VwV HWMO]	Administration regulation of the Ministry of Environment, Agriculture and Spatial Regulation about information and alert services for flood prone waters in Brandenburg [VwV HWMO] Administration regulation of the Ministry of Interior on the Act about fire protection, the assistance and the catastrophe protection service of the state of Brandenburg [VwV BKG]
State development plan [Landesentwicklungsplan]	Treaty on common state planning of Berlin and Brandenburg Brandenburg Act on state planning [BbgLPIG] State development programme 2007 [LEPro 2007] State development plan Berlin – Brandenburg [LEP B-B]
Regional plan [Regionalplan]	Integrated Regional Plan Lausitz-Spreewald (with additional detail plans)
Rules of the water brigade [Wasserwehrsatzung]	Regional and municipal disaster management plans of the district Elbe-Elster and the town of Mühlberg/Elbe
ICPER Flood Action Plan of 2003 with Audits of 2006 and 2008	ICPER Flood Action Plan of 2003 with Audits of 2006 and 2008
Flood Control Concepts (HWSK)	Hydronumeric prioritisation of alternatives for the reconstruction of the flood protection constructions up- and downstream of Mühlberg/Elbe

Table 3: List of regulations concerning flood risk management in Saxony and Brandenburg

#### 3.4.2 Existing objectives and measures

In articles 7 – 10 the Floods Directive demands of the FRMPs the fulfilling of the following objectives:

- [developed] on the basis of the maps

- coordinated at the level of the river basin district or unit of management
- establish appropriate objectives
- include measures for achieving the objectives
- include the components set out in Part A of the Annex.
- take into account relevant aspects such as costs and benefits, flood extent and flood conveyance routes and areas which have the potential to retain flood water, the environmental objectives of Article 4 of Directive 2000/60/EC, soil and water management, spatial planning, land use, nature conservation, navigation and port infrastructure
- address all aspects of flood risk management
- may also include the promotion of sustainable land use practices, improvement of water retention as well as the controlled flooding of certain areas
- ensure one single FRMP or a set of coordinated FRMPs
- coordinate the application of this Directive and that of Directive 2000/60/EC
- make available to the public
- encourage active involvement of interested parties

In the development of the FRMP “Elbe near Mühlberg” currently under way most of these objectives can be transposed with measures (Table 4).

Objectives of FD art. 7 – 10	Transposition	Remark
based on the maps	+	
coordinated at the level of the river basin district or unit of management	+	
establishing appropriate objectives	+	
including measures for achieving the objectives	+	
including the components set out in Part A of the Annex.	(+)	Part A. I. is included whereas part A. II. has to be postponed: WFD is not reliably transposed at the Federal Waterway Elbe in Germany
costs and benefits,	+	
flood extent and flood conveyance routes	+	
areas which have the potential to retain flood water	+	
the environmental objectives of Article 4 of Directive 2000/60/EC,	?	WFD is not reliably transposed at the Federal Waterway Elbe in Germany
soil and water management,	?	Soil, especially sediment, depends on the management of the Federal Waterway Elbe. Because of depth erosion there is not really a problem of sediments but of drought on over-banks.
spatial planning	+	
land use	+	

Objectives of FD art. 7 – 10	Transposition	Remark
nature conservation	+	
navigation; port infrastructure	(+)	Due to the administrative structure the FRMP of a state for sub basin can not address the navigation or port infrastructure on a Federal Waterway.
address all aspects of flood risk management	+	
promotion of sustainable land use practices	(+)	Addressed in the FRMP only for the overbank areas.
improvement of water retention	+	
controlled flooding of certain areas	+	
ensure one single FRMP or a set of coordinated FRMPs	+	
coordinate the application of this Directive and that of Directive 2000/60/EC	-	WFD is not reliably transposed at the Federal Waterway Elbe in Germany
make available to the public	+	PFRA and maps are available, FRMP will be
encourage active involvement of interested parties	+	stakeholders are involved

Table 4: Transposition of FD's objectives in the FRMP "Elbe near Mühlberg"

In Brandenburg and Saxony existing objectives and measures are geared to the LAWA recommendations. In Annex 3 the existing objectives and measures per layer of the FRMP cycle in the Elbe River Basin in Germany are summarized.

### 3.5 Comparison of approach across the border

In Germany the development of the FRMP is the task of the federal states. The responsibilities lie at the Ministries of Environment and their inferior institutions. In the Czech Republic the responsibility is regulated within the Ministry of the Environment.

In Brandenburg and Saxony concepts for the FRMP already exist. The development of a method and concept for the FRMP in the Czech Elbe river basin is still ongoing.

## 4 Obstacles and benefits

### 4.1 Obstacles to be overcome for harmonization of flood risk plans in border regions

National and federal rules hamper the development of common standards between border states and thereby the cross-border implementation of the FD.

The recommendations of the LAWA and the decisions made in the ICPER and the River Basin Association Elbe led to a harmonisation of methodologies. Because of this major obstacles are not expected. Minor obstacles could arise out of regional and local objectives leading to not-agreeable measures which nonetheless are greatly supported locally.

Without the harmonisational preparations of international or basin-wide organisations a variety of obstacles may arise.

Obstacles in the implementation of the FD arise at the level of the sub-basin due to the unharmonized development of the different programmes and plans for WFD and FD, if national and regional administration is involved. At the pilot-area Elbe both Saxony and Brandenburg developed together with the other German riparian states the national management plan for the Elbe and the programme of measures. Furthermore at the international level the ICPER developed an international management plan for the Elbe which forms the umbrella for the national plans and programmes. Both the international and the national documents show that the implementation is at risk of not fulfilling the objectives

until the end of 2015. This is especially the situation with water quantity management (where flood can be pooled) since both the international and the national level prioritize passability, nutrients and morphology. This prioritisation leads to a lack of objectives for water quantity management so a coordinated implementation of WFD and FD is not possible in the 1st cycle.

An additional obstacle arises from the national division of the responsibilities for the administration of federal waterways and other watercourses. The different states are responsible for the waters within their territory and due to their responsibility reported their competent authority. But since federal waterways are administrated by the federal administration which is not under the ruling of the states governments additional potential for friction arises. This is especially the case where water quantity is concerned.

## 4.2 Expected benefits of cross border cooperation for flood risk planning

The FD demands the abandonment of measures which significantly increase flood risks upstream or downstream of other countries in the same river basin or sub-basin (Art. 7 no. 4). It asks not for the inclusion of measures realised in other territories in the same river basin or sub-basin. By establishing a common hydronumeric model it should be possible to optimize measures towards a maximum benefit for both states. Thus the demands of FD Art. 7 no. 3 par. 2 will be fulfilled.

The cross-border cooperation or information demanded by FD Art. 8 (1) should be realised automatically by a cross-border FRMP.

Organisational measures of a cross-border FRMP could take into account the possibilities of all partners. Thus it may be possible to optimise the efforts in a region because a special necessity may be satisfied in the neighbouring administrative unit.

Cross-border flood risk planning makes the planning process more effective: since all partners work in the same river basin all encounter the same needs for data. Cooperation leads to equal accessibility of data and eases the exchange of already created information.

## 5 Conclusions

### 5.1 Potential ways to harmonise flood risk planning methods

- find common approaches to minimize flood risks
- discuss and find common objectives, methods, models and an agreed framework for measures
- adjust methods and structures for the FRMP
- meet regularly at working level
- improve data exchange

### 5.2 Suggestions for themes to be discussed during the next partner meeting: demands (remaining questions) and offers (good practice)

#### 5.2.1 Demands

- implementation of the Floods Directive in other European countries
- effectuation of the FRMP in European countries (e.g. legal status, responsible organisation, financing etc.)
- how to ensure public accessibility of FRMP
- coordination of the implementation of FD and WFD
- economical support of the search for appropriate objectives and measures (cost-benefit-analysis, multi-criteria-assessment etc.)

#### 5.2.2 Offers

- Flood generation areas (identification of areas where there is extreme drainage after heavy precipitation)
- development of appropriate objectives and measures

## Annex 1: Work plan 3 Elbe: period 04/2011 – 09/2011

### Joint cross border flood risk map Joint cross border inventory on flood risk management planning

Identifying issues:

- 1) Development and collection of data relevant for flood hazard and risk mapping
- 2) Development of a joint layout of the maps
- 3) Draft of the maps, concertation of their content with the stakeholders, printing
- 4) Inventory on policies, strategies and general objectives in the region
- 5) Joint appropriate objectives in the region

*Planning: April - July 2011*

*Output:*

- a) Work Plan 3 (period 04 – 9/2011)
- b) Data sets ready for mapping
- c) Joint layout of FHM and FRM
- d) Plausibility-checked hydro numeric model for Brandenburg
- e) Inventory for FRMP
- f) Appropriate objectives for the pilot area

*Activities:*

Contracting with External Experts (April/Mai 2011):

- 1) Binding of contractor and start of hydro numeric modelling in Brandenburg
- 2) Contractors for FHM, FRM and FRMPs in Saxony
- 3) Contractors for Coordination in Saxony and Project Management in Brandenburg

Development of coordinating and method-defining documents:

- 1) Overview of data sets to be used in mapping
- 2) Rules for combination of hydro numeric models from both states

6<sup>th</sup> Regional River Basin Meeting (Mai 2011):

- 1) FHM, FRM:
  - a. Data availability in Saxony and Brandenburg; data formats
  - b. Joint layout
  - c. Contracting on mapping, hydro numeric modelling and coordination/management
- 2) FRM: Inventory on policies, strategies and general objectives in the region

Cooperation with CZ:

- 1) Inventory of flood risk mapping in CZ for Sub Report FHM/FRM
- 2) a study about differences resulting of use of HQ<sub>500</sub> vs. HQ<sub>200</sub> as an extreme event is planned

Meeting on political commitment (May/June 2011):

- 1) Introduction of Flood Risk Management
- 2) Overview of results of PFRA and perspective of mapping
- 3) Results of the inventory on policies, strategies and general objectives
- 4) Definition of political objectives for the planning process and the transfer of the results to the public

7<sup>th</sup> Regional River Basin Meeting (June 2011):

- 1) State of work by contractors

- 2) Rules for combination of hydro numeric models
  - a. Brandenburg – Saxony (joint model)
  - b. joint model – model of BfG (Federal Institute for Hydrology)
- 3) Preparation stakeholder meeting

3<sup>rd</sup> Stakeholder Meeting (end of June 2011):

- 1) Status of the project
- 2) FHM, FRM:
  - a. Introduction to mapping process
  - b. Introduction to and discussion of joint layout
- 3) FRM:
  - a. Introduction to Flood Risk Management Plans
  - b. Appropriate objectives:
    - introduction and approval of inventory results
    - development of joint appropriate objectives

Transfer Activities:

- 1) FHM/FRM: Information of other partners about experiences made in mapping
- 2) Offer to other partners to introduce to the software developed in Brandenburg and Saxony for mapping and hazard management

*Planning: July / August 2011*

*Output: Draft FHM/FRM*

*Activities:*

- Plausibility check in Brandenburg
- Drafting of FHM/FRM
- transfer activities (exchange/intervision team/training)

8<sup>th</sup> Regional River Basin Meeting (July/August 2011):

- 1) Result of hydro numeric modelling in Brandenburg; comparison to Saxon model and BfG model
- 2) Result of plausibility check in Brandenburg
- 3) Feasibility of the joint layout and start of finalising the FHM/FRM
- 4) Reporting on mapping

*Planning: September 2011*

*Output:*

- a) Final FHM/FRM
- b) Reports on mapping
- c) Final Sub Report FHM/FRM
- d) Inventory Report FRMP

*Activities:*

- Finalising FHM/FRM, printing
- Development of Saxon, Brandenburg and joint Reports on Maps as part of the FRMP
- Writing of Sub report on FHM/FRM
- Preparation of PPM 4 in Cluj

Transfer Activities:

- 3) FHM/FRM:

- a. Transfer of mapping experiences to other partners
  - b. Documentation of experiences recommend as good practices
  - c. Draft of recommendations on mapping
- 4) FRMP:
- a. Introduction of inventory on objectives
  - b. Introduction of political commitment process
  - c. Introduction of appropriate objectives in the region

## Annex 2: Structure of the FRMP “Elbe near Mühlberg”

### 1 Introduction

- 1.1 Flood Risk Management
  - 1.1.1 Risk
  - 1.1.2 Integrated flood risk management
- 1.2 Scope of the FRMP
  - 1.1.1 River basin unit
  - 1.1.2 Catchment areas
- 1.2 Responsible authorities

### 2 Preliminary flood risk assessment

- 2.1 Introduction to the river basin
  - 2.1.1 Location and boundary
  - 2.1.2 Landscape and areas of nature
  - 2.1.3 Geology and pedology
  - 2.1.4 Land use
  - 2.1.5 Climatic conditions
- 2.2 Description of significant flood events in the past
- 2.3 Description of the method used for PFRA
- 2.4 Usage of the method used for PFRA
- 2.5 Map of areas with potentially significant risk

### 3 Flood hazard maps and flood risk maps

- 3.1 Flood hazard maps
  - 3.1.1 Method
  - 3.1.2 Maps
  - 3.1.3 Conclusions
- 3.2 Flood risk maps
  - 3.2.1 Method
  - 3.2.2 Maps
  - 3.2.3 Conclusions

### 4 Objectives of flood risk management

- 4.1 Fields of action
- 4.2 Determination of appropriate aims
- 4.3 Description of the status quo and comparison of status quo and aims
  - 4.3.1 Area precaution
  - 4.3.2 Natural water retention
  - 4.3.3 Technical flood protection
  - 4.3.4 Building precaution

- 4.3.5 Risk precaution
- 4.3.6 Information precaution
- 4.3.7 Behaviour precaution
- 4.3.8 Preparation of hazard defence and disaster control

## 5 Measures of flood risk management

- 5.1 Selection of measures
  - 5.1.1 Area precaution
  - 5.1.2 Natural water retention
  - 5.1.3 Technical flood protection
  - 5.1.4 Information precaution
  - 5.1.5 Behaviour precaution
  - 5.1.6 Preparation of hazard defence and disaster control
- 5.2 Validation of measures
- 5.3 Priorisation and realisation of the measures

## 6 Strategic environmental assessment and public information

- 6.1 Description of assessment of effects as referred to Directive 2001/42/EC
- 6.2 Description of procedure of public information and consultation

## 7 Coordination

- 7.1 Coordination within the sub-catchment areas
- 7.2 Cross-border coordination (upstream / downstream riparian states)
- 7.3 Coordination with WFD and NATURA 2000

## 8 Conclusions

### Annex 3: Objectives and measures concerning FRMP for the Elbe River in Germany referred to LAWA

Layer FRMC	Area of action	Objectives	Measures
Prevention	<b>Precautionary land use</b> <ul style="list-style-type: none"> <li>Regional planning</li> </ul>	<ul style="list-style-type: none"> <li>Identify floodplains and flood-prone areas</li> <li>Designate areas as priority and reserve areas</li> <li>Designate areas for planned retention basins</li> </ul>	<ul style="list-style-type: none"> <li>Designate remaining areas as priority or reserve areas in regional plans</li> </ul>
	<ul style="list-style-type: none"> <li>Area development planning</li> </ul>	<ul style="list-style-type: none"> <li>Identify areas at flood risk</li> <li>Ascertain areas for expansion and protection measures</li> <li>Identify alternative areas without flood risk</li> </ul>	<ul style="list-style-type: none"> <li>Adapt or amend local development plans and regulations under building law</li> </ul>
	<ul style="list-style-type: none"> <li>Designation of flood plains</li> </ul>	<ul style="list-style-type: none"> <li>Designation of flood plains with land use restrictions</li> </ul>	<ul style="list-style-type: none"> <li>Designate or update floodplains</li> <li>Develop land use restrictions</li> </ul>
	<ul style="list-style-type: none"> <li>Adapted land use</li> </ul>	<ul style="list-style-type: none"> <li>Flood adapted land use in settlements and on agricultural and forestry land</li> </ul>	<ul style="list-style-type: none"> <li>Remove or mitigate deficits</li> <li>Provide advice to farmers and foresters</li> <li>Adopt provisions in water and building law</li> </ul>

Layer FRMC	Area of action	Objectives	Measures
Prevention	<b>Precautionary building</b>	<ul style="list-style-type: none"> <li>Flood adapted planning, construction and renovation</li> <li>Flood proof storage of water hazardous substances</li> <li>Architectural, engineering and artisanal service</li> </ul>	<ul style="list-style-type: none"> <li>Flood adapted planning, construction and renovation of public buildings and infrastructure</li> <li>Raising awareness, information, advice programmes</li> <li>Conversion from oil to gas heating</li> <li>Training programmes</li> </ul>
	<b>Natural water retention</b>	<ul style="list-style-type: none"> <li>increase natural retention</li> <li>recovery of lost floodplains and retention areas</li> </ul>	<ul style="list-style-type: none"> <li>Site-appropriate agriculture and forestry</li> <li>Restoration of water bodies</li> <li>Recovery of floodplains</li> <li>Rainwater infiltration and use</li> </ul>
Protection	<b>Technical Flood Protection</b>	<ul style="list-style-type: none"> <li>Reduce flood discharge to target level</li> <li>Flood protection</li> <li>Safeguard/improve discharge capacity</li> </ul>	<ul style="list-style-type: none"> <li>Construction of systems for the retention of flood water (continuation, acceleration, expansion)</li> <li>Excavation in alluvial zones</li> <li>Floodgates, impounding dams</li> <li>Dikes, flood protection walls, dams</li> <li>Keeping clear flood discharge cross sections</li> </ul>
	<ul style="list-style-type: none"> <li>Physical protection of buildings</li> </ul>	<ul style="list-style-type: none"> <li>Flood protection for individual properties and sites at flood risk</li> </ul>	<ul style="list-style-type: none"> <li>Measures for physical protection</li> <li>Raising awareness, information, advice programmes</li> </ul>
Preparedness	<b>Information</b>	<ul style="list-style-type: none"> <li>Timely information and forecasts on flood, water levels</li> <li>Issue warning as early as possible</li> </ul>	<ul style="list-style-type: none"> <li>Set up or improve flood information and forecast service</li> <li>Establish/improve local warning systems</li> </ul>
	<b>Hazard prevention and civil protection</b>	<ul style="list-style-type: none"> <li>Detailed contingency planning</li> <li>Resource planning</li> <li>Targeted preparation and instruction to minimize damage, targeted measures to prepare affected communities</li> <li>Deploy competent rescue workers</li> <li>Provide resources and rescue workers</li> </ul>	<ul style="list-style-type: none"> <li>Updating contingency plan</li> <li>Organization of resources</li> <li>Trainings/practice exercises</li> <li>training programmes and regular training</li> <li>civil military cooperation</li> </ul>
	<b>Precautionary behaviour</b> (Public awareness and preparedness)	<ul style="list-style-type: none"> <li>Raising awareness of flood risk</li> <li>Preparation for flood events</li> </ul>	<ul style="list-style-type: none"> <li>publication of hazard and risk maps</li> <li>information via the media, publication of information materials</li> <li>raising awareness, advice</li> <li>Practice exercises for flood events</li> </ul>
	<b>Protection against risk</b>	<ul style="list-style-type: none"> <li>Financial protection</li> </ul>	<ul style="list-style-type: none"> <li>Raising awareness, information, advice</li> <li>Insurance</li> </ul>
Emergency Response	<b>Flood response</b>	<ul style="list-style-type: none"> <li>Further improve flood aftercare</li> </ul>	<ul style="list-style-type: none"> <li>Aftercare planning</li> <li>Review and evaluation of flood events</li> <li>Identification of responsibilities and tools</li> <li>Development and publication of manuals</li> </ul>
Recovery	<b>Recovery</b>	<ul style="list-style-type: none"> <li>Further improve flood preparedness</li> </ul>	<ul style="list-style-type: none"> <li>Review and evaluation of flood events</li> <li>Identification of responsibilities and tools</li> <li>Development and publication of manuals</li> </ul>