FLOOD-WISE

CROSS BORDER RIVER BASIN MANAGEMENT

SUB-REPORT PHASE 1:

PRELIMINARY FLOOD RISK ASSESSMENT

Meuse Basin

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Wallonie

SPW Service public de Wallonie

provincie limburg

1. INTRODUCTION

1.1. WORK PLAN FOR THE MEUSE BASIN

At the Launch Conference of the FLOOD-WISE project April 2010 a work plan for the first half year was developed between the partners Service Public of Region Wallonia, the directorate Limburg of the Dutch Ministry of Waterways and Public Works (Rijkswaterstaat) and the province of Limburg. On July 8th the work plan was developed further between these partners. First step in the working process is the development of a project team and analysis of possible stakeholders (see 1.2). Next step is a short description of the Meuse river basin characteristics and an inventory of existing practices on flood mapping in the regions Wallonia and Limburg. Finally a comparison of methods is made which results in the identification of obstacles, knowledge gaps and good practices, which will form the basis for knowledge exchange. Since the Flood Risk Management Directive leaves much room to border states in the process of its implementation it was decided in the International Meuse Commission (IMC) by the border states of the Meuse River Basin to skip the first phase of the Flood Directive (FRMD), the Preliminary Flood Risk Assessment (PFRA). However, since other states in other river basins will make a PFRA, it is interesting for the FLOOD-WISE project to make a comparison of the actual and preferred methods. Moreover, in the Netherlands it is necessary to make a distinction between rivers with and without a significant flood risk. Although for the Meuse itself no assessment is needed, an assessment will be made for the Meuse tributaries, such as the river Rur (see sub-report Rur basin).

1.2. RIVER BASIN PROJECT TEAM

The FLOOD-WISE project team of the Meuse Basin consists of the Province of Limburg (partner 2), Rijkswaterstaat-Limburg (partner 3), and the Region Wallonia (partner 4), its activities are coordinated by the Province of Limburg. Relevant stakeholders are Water board Roer & Overmaas (WRO) (partner 5), Groupe Transversale Inundation (Wallonia), Waterdienst (Netherlands), lead partner of AMICE project (France) and Waterloopkundig Laboratorium (Flanders). The International Meuse Commission (IMC) is also seen as an important and broad group of stakeholders. The IMC reinforces the cooperation across the border. Its most important tasks are: coordinating the obligations of the European Water Framework Directive and the Flood Directive and providing advice and recommendations for improved flood prevention and risk management. Furthermore they provide advice and recommendations to parties for preventing and combating water pollution (warning and alarm system). In order to involve the IMC members, the project has been presented in the IMC working group Hydrology on 29-09-2010 and 24-02-2011 and in the plenary meeting of the IMC on 26-11-2010. The project brochure was spread among the members of the WG Hydrology. The IMC members have been asked to reflect on the future results.

The Province of Limburg is a regional public authority, responsible for spatial planning, environment, water management, welfare, economy and mobility. It is responsible for the regional implementation of the Water Framework Directive and the Flood Risk Management Directive.

The Public Service Wallonia (SPW) is a regional public authority. The Directorate General of Agriculture, Natural resources & Environment (DGARNE) is the managing authority for the implementation of the Water Framework Directive. It is also charged to implement for the Flood Risk Management Directive (collaboration with the Directorate General for Mobility and Waterways of the Public Service of Wallonia).

The Directorate Limburg of the Dutch Ministry of Waterways and Public Works (Rijkswaterstaat-Limburg) is a regional water authority, responsible for the operational management of the Meuse in The Netherlands.

2. EXISTING INFORMATION AT EACH SIDE OF THE BORDER

2.1. SHORT CHARACTERIZATION OF THE MEUSE CATCHMENT AREA

The river Meuse flows from its source in France (plateau de Langrès) via Belgium to its river mouth in the west of the Netherlands, where it empties into the North Sea. The Meuse river basin covers an area of approximately 34,500 km², including parts of France, Luxembourg, Belgium, Germany and the Netherlands with a population density of 250 per km² and about 9 million in total.

The French catchment area covers 10,750 km². It is elongated and narrow, with a low fall. In this section the porous soil absorbs much of the precipitation. In Belgium the Meuse flows from Chooz to the Dutch border village Eijsden. It encompasses most of the Belgian Ardennes and the Sambre region. It is a wide area of about 10,000 km². Because a large number of tributaries and streams fall steeply and because the soil is rocky, the rain is quick to reach the Meuse. Precipitation in the Ardennes region reaches the Dutch border within eight hours. In Belgium the Meuse catchment area also includes a small area of Flanders. The surface area in The Netherlands covers 12,250 km². The Dutch section of the Meuse flows from Eijsden in the province of Limburg to the North Sea. In Limburg the river flows through a relatively narrow valley. In the rest of the Dutch catchment area the river flows through an embanked relatively wide and largely flat area. The German section of the Meuse catchment area consists of the tributaries Rur, Schwalm and Niers.

The Meuse is a characteristic rain-fed river, which means that its discharge levels depend largely on the amount of precipitation. In addition the river has to deal with an extra supply of water from its tributaries when snow in the Ardennes melts. December, January and February are the most critical months with possible discharge levels up to four times as high as the summer average. The last flood managed by the Province of Limburg as well as by the Region Wallonia occurred in 2003. The last major floods with serious consequences occurred in 1926, 1993 and 1995 when large parts of land and urban areas were inundated in the Netherlands. These three floods represent the three highest discharge levels in the Netherlands. Although there were no – or only little – human casualties, economic costs for the Netherlands and the southern part of the Netherlands in particular were considerable.

In an area of land subsidence due to former mining activities, located in the eastern part of Flanders, the water level can reach seven meters. In the Netherlands two different situations are distinguished: with and without large dikes. In the province of Limburg, from Eijsden Up to Mook, there are no large dikes along the river. During floods the water extends in the valley (although nowadays there are embankments to protect urban

areas). Downstream of Mook (up to the sea), the land is protected by large dikes. A large part of the land is below sea level. If a flood occurs and the dike breaks, a large part of the land will be inundated.

2.2. BELGIUM, WALLONIA

2.2.1. MODELS AND AVAILABLE DATA

SPW – Groupe Transversal Inondations (GTI)

- Mapping of the flood hazard by overflowing rivers (2007)
- Mapping of the risk of damage due to flooding by overflowing rivers (2009)

SPW – Direction générale Agriculture, Ressources Naturelles, Environnement

- Digital Terrain Model
- Land Use Maps
- Topographic data of rivers beds and floodplains
- Project of LIDAR fly on the whole of Wallonia (Phase 1: Houille Basin)

SPW & Gembloux AgroBioTech – ERRUISSOL

The ERRUISSOL project (Erosion – RUISsellement - SOL), financed by the Public Service of Wallonia and directed by the University Faculty of Agronomic Sciences of Gembloux, aims to map the risk of erosion and runoff in Wallonia.

SPW – SETHY / AQUALIM / AQUACRUE

Networks for the monitoring of surface water level, rainfall and groundwater level throughout Wallonia. Warning system in case of flooding.

2.2.2. FLOOD RISK ASSESSMENT METHOD

The annexe 6.1 explain the methodology used to map the flood hazard and the flood risk (potential level of damage). In short, the flood hazard map shows the areas that are likely to be flooded, more or less extensively and frequently, as a consequence of the overflow of a waterway. It is based on a combination of the recurrence of flooding and submersion. Recurrence of a flood is linked to the return period of high water regimes, which implies statistical computing of a historical series of flow data or of a synthetic series drawn from precipitation measurements using a hydrological integrated model. When the data required for statistical computing are not available, recurrence can be determined through evaluation of the occurrence of flooding, on the basis of observations and surveys in the field. Three categories of recurrence are used based on the recurrence period of high water regimes: lower recurrence refers to flooding within a period of 50 to 100 years, medium recurrence for flooding within a period of 25 to 50 years and high recurrence for floods with a frequency of less than 25 years. The submersion of a flood is characterised mainly by its extent and depth. Hydraulic models that digitally reproduce minor and major beds of waterways are needed to determine this. When the data needed to use hydraulic methods are not available, submersion is characterised by its extent, by applying the "hydropedological" method, based on information taken from digital topographic and pedological maps, among others. Three categories of submersion are used corresponding to the depth of submersion: low submersion with the depths less then 0.3 m , medium submersion with a depth between 0.3 and 1.3 m, and high submersion with a depth over 1.3 m. The flood hazard (low, medium, high) is detected from combining the values of recurrence and submersion (see diagram below). In the event of frequent flooding with a high

submersion, the flood hazard will be high and, conversely, rare flooding with a low submersion will result in a low flood risk. Corrective factors can be inserted for specific conditions of the speed of the current or the duration of submersion, or when protective works are present.

The flood risk map shows the potential damage to vulnerable elements, i.e. elements sensitive to flooding, located in the areas subject to flood risk. This map was created by combining flood hazard and vulnerability. Vulnerability expresses the level of foreseeable consequences for the elements at risk. These elements refer to the people, property, resources, heritage, etc. that could be affected by any natural phenomenon and, in this case, flooding,. Vulnerability concerns existing elements as well as any future stakes (unimproved lots located in areas open to urban development). Quite obviously, pasture land is less vulnerable to flooding than an inhabited house or a collective infrastructure (school, home for the elderly, etc), which are very vulnerable elements. Identifying elements at stake, determining the degree of vulnerability (negligible, low, medium, high) and mapping these elements must be kept within the possibilities related to the available data.

2.2.3. LEVEL OF PROTECTION AGAINST FLOODS AND SAFETY STANDARDS

There is no official level of protection against flood in Wallonia. There are still reference values taken into account during the conception of the projects. For example the water levels used for the sizing of the Meuse control structures in Wallonia are the levels reached by the flood of 1929 (the higher levels registered). The flood hazard maps propose three level of flood hazard. Each one corresponding with a return period : high = 25yrs, medium = 50yrs, low = 100yrs and more). The return period of 25yrs is a legal reference determining the risk areas in the natural damage insurance law's frame. These areas of flood hazard tend to become a legal reference to refuse building or environmental projects but at the moment this is only included in a good practice framework.

2.3. NETHERLANDS, LIMBURG

2.3.1. MODELS AND AVAILABLE DATA

For the main stream of the river Meuse a 2D hydraulic model (WAQUA) exists. This model is used for producing flood risk maps for this river. Many flood maps and flood animations have already been made. Potential risks can be deduced from these flood risk maps. With this model diverse scenario's for future flooding in case of climate change have been calculated. There would certainly be no shortage of available data for the river Meuse in the Netherlands for a PFRA.

This is different for the tributaries of the river Meuse. Only for some of the tributaries in the province of Limburg hydraulic models exist. In the south of the province, 1D models and flood risk maps exist for the rivers Geul and Roer. There also exists a model for soil erosion and surface flow for small rivers, with which the flood risk in small streams can be estimated, but no real flood maps can be produced. In the north of the province, a groundwater and surface flow model ("IBRAHYM") exists for the whole area. With this model, simple flood maps have already been made for all rivers in the north of the province. A scenario for Climate change (+10%) has been taken into account.

2.3.2. FLOOD RISK ASSESSMENT METHODS

Formally, no flood risk assessment will be carried out. However, it will be necessary to decide which (parts of) tributaries will be taken fully (including flood risk maps) into account in the FRMP. This could be considered as an in-formal flood risk assessment. Where models exist, an analysis of potential damage and victims can

relatively easily be made. A possibility is to apply the German method for flood risk assessment as set up for the river Sieg and adapted by the national institution “LAWA”. This method is described in the report of the Flood-Wise pilot for the river Roer. The Dutch government is investigating whether this method is applicable.

If no models are available, historic and statistic data of river discharges can be used for this in-formal flood risk assessment.

For some very small rivers inevitably no flood risk maps will be made. However, for the whole area of Limburg there is a policy for protection against flooding from small streams and rivers: there are safety standards/protection levels for the whole area. As a consequence, a simple kind of flood risk assessments has been carried for the whole province, based on models, historic and/or statistic data, and expert judgement. Many measures have already been taken or will be taken to prevent small rivers from flooding. This policy could be described in the FRMP, but this has not yet been decided.

2.3.3. LEVEL OF PROTECTION AGAINST FLOODS AND SAFETY STANDARDS

For the River Meuse in the province of Limburg, the official protection level of the dikes is 1/250 year. Downstream of Limburg, the protection level is 1/1250 year. The protection level is higher downstream, since the Meuse flows in a largely flat area which is protected by large and long dikes are higher and longer, and (as a consequence) the inundation depth and inundation area are generally greater.

For the tributaries of the Meuse –from rivers to small streams- safety standards differ according to land use. Generally this standard is for built areas 1/100 yr, for agricultural areas except grassland 1/25 yr, and for grassland 1/10 yr. These standards have been fixed by the Province of Limburg on a map covering the whole of the province.

3. SIGNIFICANCE OF PRELIMINARY FLOOD RISK ASSESSMENT FOR THE REGION

3.1. INTERESTS AND POLICY FIELDS AT STAKE FOR FLOOD RISK MANAGEMENT

- Habitat: the population density and distribution; goods and people
- Economic activity: the density and distribution of economic activity
- Recreational Activities
- Infrastructure
- Heritage
- Ecology
- Agriculture
- Rural water management

3.2. THREATS AND CHALLENGES FOR THESE INTERESTS

- Impact of climate change on flood events
- Urbanization and surfaces waterproofing
- Land pressure
- Improving understanding of flood risk
- Protection of property and persons
- Preservation of industrial sites
- Minimization of human activities on the genesis of flooding
- Compensating for the phenomenon of waterproofing due to urbanization. Decrease and slow up the runoff on watersheds
- Secure of infrastructure
- Protection of heritage
- Maintain or improve the protection of natural protected sites
- Maintain and improve the infiltration capacity of rural areas
- Maintain and / or increase the capacity of rivers to play their role as an outlet
- Stabilize the stream (river banks and beds protection)
- Encourage natural habitats which provides stability
- Reducing vulnerability
- Provide and improve crisis management in case of flooding

3.3. ASSESSMENT OF METHODS FOR PRELIMINARY FLOOD RISK ASSESSMENT IN RELATION TO THE INTERESTS

The managers of the Meuse basin (except France) have decided to consider that the entire watershed have to be the object of mapping and management plans according to the implementation of the Directive 2007/60/EU; the stage of preliminary evaluation of flood risk within the meaning of the directive is thus avoided (except in France). This possibility is left to member states by the directive in Article 13 § 1 b.

4. COMPARISON ACROSS THE BORDER

4.1. EXAMPLES OF SUCCESSFUL CROSS BORDER COOPERATION IN MEUSE BASIN

International Meuse Commission (IMC) www.cipm-icbm.be

The International Commission for the Meuse (IMC) was created in 2002 by signing the Meuse Agreement (Gent). The objective of this agreement is to achieve a sustainable and comprehensive water basin district of the Meuse. The Agreement was signed by the Walloon Region, the Netherlands, France, Germany, the Flemish Region, the Brussels-Capital Region, Belgium and Luxembourg and entered into force on 1 December 2006. The IMC 's main tasks are:

- Coordination of the obligations of the European Water Framework Directive
- Coordination of the obligations of the EU Flood Risk Management Directive
- To provide advice and recommendations to the Parties for the prevention and fight against accidental pollution (warning and alarm)
- Mitigation of the effects of drought

Projet AMICE (INTERREG IV-B) www.amice-project.eu

Aim of the project is a coordinated strategy for the Adaptation of the Meuse to the Impacts of Climate Evolutions (AMICE) on floods and low-flows with the perspective of sustainable development in the Meuse international catchment area.

Projet P2IH (Projet INTERREG Inondations Houille) www.interreg-fwvl.eu/fr/projet-detail.php

The project wishes to implement a comprehensive cross border study of the entire Houille basin. This study will erase the border effect and improve the knowledge of the hydraulic and hydrology of the river, with as ultimate goal the realization of consistent development with a overall cost which will ensure greater efficiency for the two countries France and Wallonia.

Project AQUADRA (INTERREG IV-A) www.aquadra.eu

The project aims at the improvement if water quality and quantity problems in four sub-basins of the Meuse (the Geer, the Voer, the Berwinne and the Geulle) through an integrated approach for watershed integrating water management organized at the regional level. One of the main targets is to adjust existing instruments cross-border, such as 9 new gauging stations and replacement of 5 old stations, adjustment of computer models and the development of uniform flood maps.

4.2. CHALLENGES FOR CROSS BORDER COOPERATION

While not a major problem, the language barrier complicates cross-border cooperation. The French allows trade between France and Belgium (Wallonia), Dutch is used by Holland and Belgium (Flanders). The communication between Flanders and Wallonia should ideally be done easily in two languages, but in practice the situation is not so obvious. The translation of working documents is not required but the public documents should be available in all three languages (French, Dutch, German). Generally speaking, English may be used to put everyone on an equal level. No other cultural barrier is to put forward. Nothing that could be an impediment or an obstacle to cooperation across borders.

In terms of budget availability and accessibility of data and some techniques can be expensive, all stakeholders in the basin are on the same footing. All have sufficient resources (but certainly not unlimited) granted by the policy to meet the requirements of the Directive, proportionately of course.

We can highlight the fact that all members of the IMC are already well advanced in developing their methodology to determine flood zones and flood risk. These methodologies, however, differ on many points.

A challenge of cross-border cooperation would be to fix some issues that would still provide sufficient uniformity across the Meuse basin. For example :

- definition of the term "flood" and cause to be taken into account (overflow of rivers, rising groundwater, runoff, coastal waters, sewers (technological risk), dam failures, dikes, demerger (technology risk));
- adjustment or development of common scenarios: low, medium, high probabilities.

4.3. EXPECTED BENEFITS OF CROSS BORDER COOPERATION FOR PRELIMINARY FLOOD RISK ASSESSMENT

None for the preliminary assessment of flood risks. The Flood-Wise Project members for Meuse Basin are part of the International Commission of the Meuse (IMC). In the IMC, it was agreed by all member states (except France) to use the opportunity to escape the stage of preliminary flood risk assessment under Article 13 § 1 b of the Directive: the flood hazard maps and flood risk maps will be established on the entire basin of the Meuse (except for France).

However, redefinition of some generalities as the definition of "flood" or low, medium and heavy probabilities, should allow member states to converge on a more consistent methodology for mapping.

Possible transfer points: exchange of knowledge and good practices on flood risk assessment, flood mapping and cross-border cooperation between experts/partners from other river basins:

1. Plan Pluie method on flood risk assessment from Wallonia (SP-Wallonie)
2. Cross-border flood-mapping Common Meuse, border river between Limburg and Flanders (RWS)
3. LAWA method on flood risk assessment from Nordrhein-Westfalen (WVER)

During the partner meeting in Wlodawa Poland, 18-22 October 2010, it was decided to exchange and transfer good practices on flood risk assessment and flood risk mapping (and cross border cooperation) between the partners of the river basins of the Meuse, Western Bug and Sotla. To this end a partner exchange conference was organized on 15-17 March 2011 by the Province of Limburg and the Waterboard Roer and Overmaas.

5. CONCLUSIONS

5.1. POTENTIAL WAYS TO HARMONISE FLOOD RISK ASSESSMENT METHODS ACROSS THE BORDER WITH RESPECT TO THE REQUIREMENTS OF THE EU FLOOD RISK MANAGEMENT DIRECTIVE

Not applicable since the preliminary flood risk assessment stage has been avoided by all managers of the Meuse basin (except France).

5.2. SUGGESTIONS FOR THEMES TO BE DISCUSSED DURING THE NEXT PARTNER MEETING: DEMANDS (REMAINING QUESTIONS) AND OFFERS (GOOD PRACTICE)

Discuss a definition of "flood". Harmonization of the causes of flooding to take into account according to the Directive :

- Overflowing rivers
- rising groundwater
- runoff
- sewers (technology risk)
- coastal
- Dam failures, dikes, demerger (technology risk)

Fix ideas for low probability scenario, medium and high. The ideal thing would be to match the scenarios at the border.

5.3. RESULTS OF THE TRANSFER MEETING MAASTRICHT 15-17 MARCH 2011

During two morning sessions on 15 and 17 March the partners presented their good practices with respect to flood risk assessment and flood risk mapping to each other followed by discussion, followed by field visits on the same subject in the afternoon. On 16 March an excursion was organized for the Slovenian partners to learn about the cross-border water purification and the management of the Rur reservoirs (Slovenia is planning to revitalize their reservoir in the Sotla river).

Accent on March 15th was preliminary flood risk assessment by the so-called German LAWA method and flood risk mapping in the Meuse river basin. Accent on March 16th was the management of the Rur reservoirs in cross-border perspective. Accent on March 17th was preliminary flood risk assessment and mapping methods in the Walloon region as done for the Plan Pluie and preliminary flood risk assessment and mapping methods in the Western Bug basin.

The following good practices were identified and transferred:

- Flood risk assessment by the LAWA method in North Rhine Westphalia
- Flood risk mapping on the Common Meuse, The Netherlands-Belgium
- Water retention by gravel extraction and nature restoration in Common Meuse, The Netherlands-Belgium
- Plan Pluie, Walloon Region
- Flood assessment and flood mapping in Walloon Region
- Northern Eifel reservoir system
- Water quality management Upper Rur
- Flood hazard mapping on Rur in cross-border perspective
- Flood risk assessment and flood risk mapping in Pripyat river basin Belarus-Ukraine
- Flood risk assessment and mapping on Western Bug, by Belarus and by Ukraine

More information can be found in the report and the presentations and the FLOOD-WISE extranet: http://FLOODWISE.BETAWERK.EU/ELGG/PG/FMELINQ/VIEW/05%20PROJECT%20MEETINGS/ECH.MEET.MAASTRICHT/

6. ANNEXES

6.1. PLAN PLUIES'S METHODOLOGY – (FRENCH DOC + ENGLISH TRANSLATION)

6.2. *COMPARATIF DES MÉTHODES DE CARTOGRAPHIE DES RISQUES DE DOMMAGE DANS LE BASSIN DE LA MEUSE* – COMMISSION INTERNATIONALE DE LA MEUSE (FRENCH DOCUMENT)