

REPORT



SUB-REPORT PHASE 3: INVENTORY FLOOD RISK MANAGEMENT PLAN BUG BASIN

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1 INTRODUCTION

This sub-report is an inventory about the existing information and some proposals regarding flood risk management plan (FRMP) in the river basin of the Bug.

The experience of other FLOOD-WISE partners in preparation of FRMPs for pilot river basins has been used during preparation of the FRMP for Bug river pilot district including existing FRMPs for Rur, Meuse and Elbe river basins.

1.1 Work plan for the basin of the river Bug

Issues

- Inventory of flood risk management plans on all sides of the border (Poland, Belarus, Ukraine);
- Inventory of organizations involved in flood risk management;
- Discussion on experience with flood risk management plans and cross-border cooperation;
- Recommendations for (joint) flood risk management plans on both sides of the border.

Inventory of existing practices

- “Operational plan for protection against flood” (developed in 2003 and updated each year), Resolution of the Włodawa City Council on the Plan of Land Use in Włodawa City (2004) and “Regional plan of activities in emergency situations” (2011) were developed and accepted for the Włodawa district (Poland);
- Republican Program “Engineering Protection Measures from Flood for population and agriculture for 2005-2010” was accepted 23/03/2005 (Belarus);
- Ukrainian Regional Programs (6 programs).

Activities

- Discussion on preliminary working plan phase 3 (January 2012);
- Inventory studies on existing flood risk management plans and national regulations;
- Collection data and information exchange;
- Discussion on experience with flood risk planning and cross-border cooperation ;
- Development of the Inventory Flood Risk Management Plan for the Bug river pilot district

1.2 Members of the river basin pilot team Bug

The FLOOD-WISE project team of the Bug Basin includes:

1. Poland - District Office of Włodawa, Poland (partner 12): Wojciech Wilgocki, Anna Wygiera, Patrycja Gierasimczuk
2. Belarus – Central Research Institute for Complex Use of Water Resources (partner 13) : Vladimir Korneev, Aliaksandr Pakhomau, Kanstantsin Tsitou,
3. Ukraine - Volyn Regional Board of Water Management (Western Bug Basin Water Department, Lutsk, Ukraine): Oleksandr Sergushko and Andriy Melnychuk; National University of Water Management and Nature Resources Use, Ukraine (partner 11): Prof. Vasyl Guryn. Anna Girol.

Main institutes involved in cooperation in the frame of Project

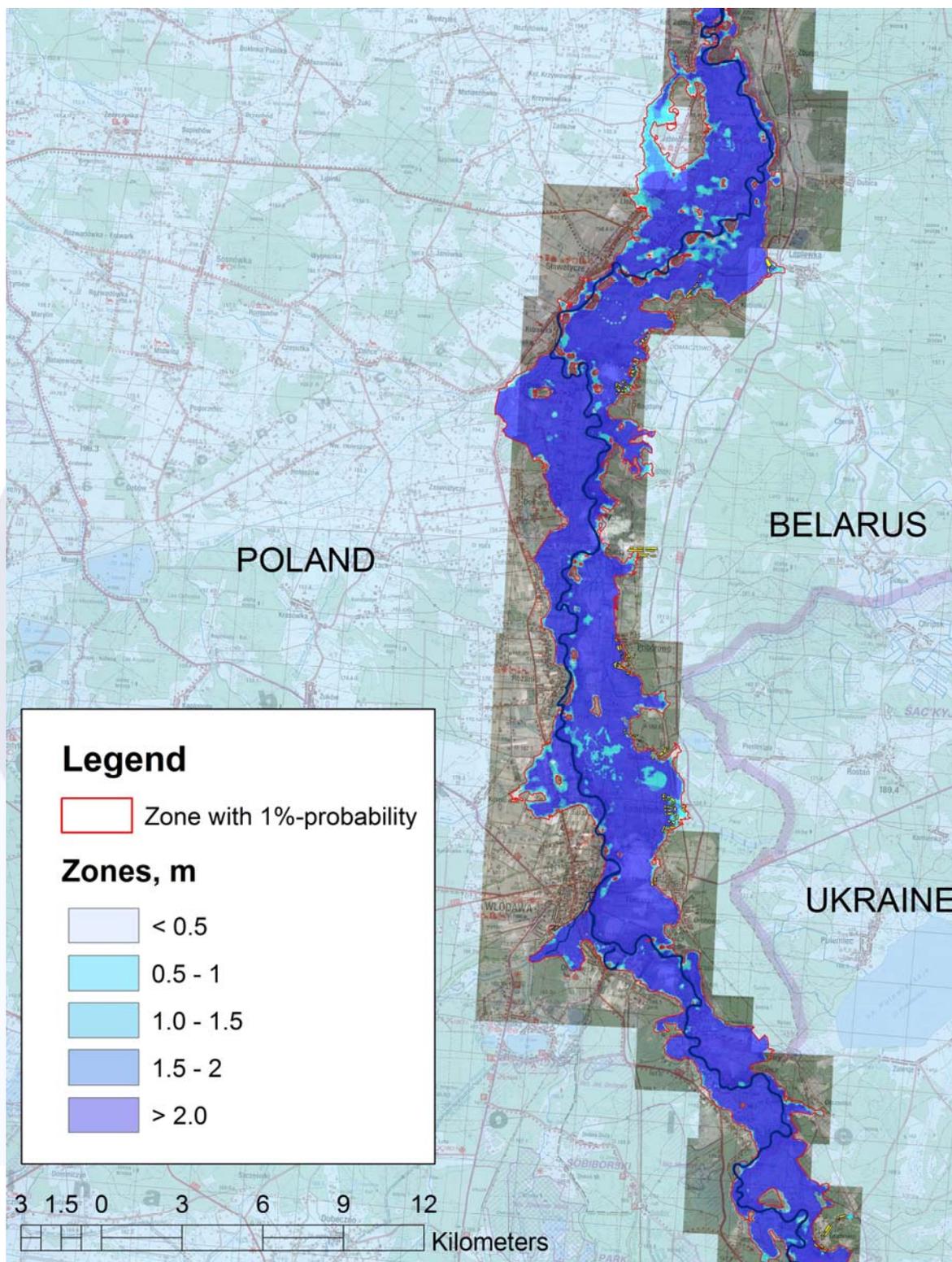
Poland:

- Board of the Lublin Basin Vistula and Bug Borders in Lublin;
- Institute of Meteorology and Water Management (Warsaw);
- Institute of Technology and Life Sciences (Falenty)

Belarus: Brest Regional Committee of Natural Resources and Environmental Protection was involved in the project activities as one of the main responsible organization for the local monitoring system in the Bug river basin and for the cooperation with Poland and Ukraine on the regional level including emergency situations.

Ukraine: Volyn Regional Water Resources Board / Western Bug Basin Water Department, Lutsk, Ukraine) was involved in the Project activities as responsible organization for the flood protection engineering measures in the Bug river basin.

Flood Risk Management Plan (FRMP) for the river Bug is mostly relates to the pilot district of the river “Domachevo (Belarus) – Wlodawa (Poland) – Grabovo (Ukraine)” (picture 1).



Picture 1 - Pilot district of the river Bug for the inventory of FLRP including combined FHM and FRM

Some houses on urban and rural territories, agriculture lands, hayfields, pastures and forests are affected by floods on the river Bug and on its tributaries in all Bug countries: Poland, Belarus and Ukraine.

Potential significant flood risk for the Bug River Pilot District exists for the some part of territory of the next settlement:

- Orchowek, Wlodawa, Dolgobrody, Suszno, Parosla, Sobibor (Poland);
- Domachevo, Borisy, Priborovo, Komarovka, Tomashovka (Belarus);
- Wilshanka, Grabovo (Ukraine).

Estimated number of inhabitances affected by flood on the pilot district “Domachevo (Belarus) – Wlodawa (Poland) – Grabovo (Ukraine)” is not more than 2000 persons including affected inhabitants on urban rural areas: Wlodawa (about 110 persons); Wilshanka (about 50 persons); Grabovo (about 50 persons). Other estimated number is forming mostly at the cost of Belarusian territory because there are no dikes from the Belarusian side on the Bug River Pilot District.

1.3 Poland

A management plan according to all aspects of the EU Flood Directive for the Bug River is not available in Poland yet.

There is not coordination in existing Polish plans for protection against flood with other EU- directives including EU flood directive, Water Framework Directive etc. in principle.

The EU Flood Directive is already in line with the existing Polish water policy and therefore it is expected that no substantial changes regarding the Polish policy are necessary.

1.4 Belarus

A management plan according to all aspects of the EU flood directive for the Bug River is not available in Belarus yet.

There is not any coordination in the existing Belarus Program Engineering Protection Measures from Flood for population and agriculture for 2005-2010 with other EU- directives including EU flood directive, Water Framework Directive etc.

Pilot implementation of the WFD and EU FD has begun in Belarus only. The new wording of Water Code of the Republic of Belarus will take into account EU –directives and experience in the field of transboundary river basins management.

The EU Flood Directive is already in line with the existing Belarus water policy but not in line with existing Belarus legislation. Therefore it is expected that some substantial changes regarding the Belarus legislation are necessary.

1.5 Ukraine

A management plan according to all aspects of the EU flood directive for the Bug River is not available in Ukraine yet.

There is not any coordination in the existing Ukrainian regional programs with other EU- directives including EU flood directive, Water Framework Directive etc.

Pilot implementation of the WFD and EU FD has begun in Ukraine only.

The EU Flood Directive is already in line with the existing Ukrainian water policy but not in line with existing Ukrainian legislation. Therefore it is expected that some substantial changes regarding the Ukraine legislation are necessary. Therefore the project of corrections to Water Code of Ukraine is prepared which is taking into account WFD and other European documents. This project is under discussion in the Verkhovna Rada of Ukraine.

1.6 Comparison of approach across the border

The countries of the Bug River Basin (Poland, Belarus and Ukraine) have their own programs on flood protection measures which mostly devotes to engineering dikes construction to protect some settlements from floods.

For river Bug the cross-border hazard and risk maps with compliance to EU FD were generated within FLOOD-WISE project and in the first time for the entire cross boarder river district. Therefore FRM plan is developing take into account of the EU FD.

This similarities and existing and agreed flood risk assessment and mapping methods bases on the high flow probabilities (1 time per 10 years, 1 time per 20 years; 1 time per 100 years) are using as joint cross border approach in the stage of Flood Risk Management Plan preparation.

Since existing programs and plans do not (yet) take into consideration transboundary impact of own measures and activities. Therefore cross border flood management plans should be developed.

The Flood Risk Prevention Measures for river Bug (Pilot Project area) mainly consists of the precautions that have to be taken before a flood disaster (Prevention, Protection and Preparedness). These set of precautionary measures are set according to existing national and regional programs and to results of the preparation of Flood Hazard and Flood Risk Maps in the frame of FLOOD-WISE project.

There are two types of the flood risk prevention measures for river Bug: namely structural measures and non-structural measures.

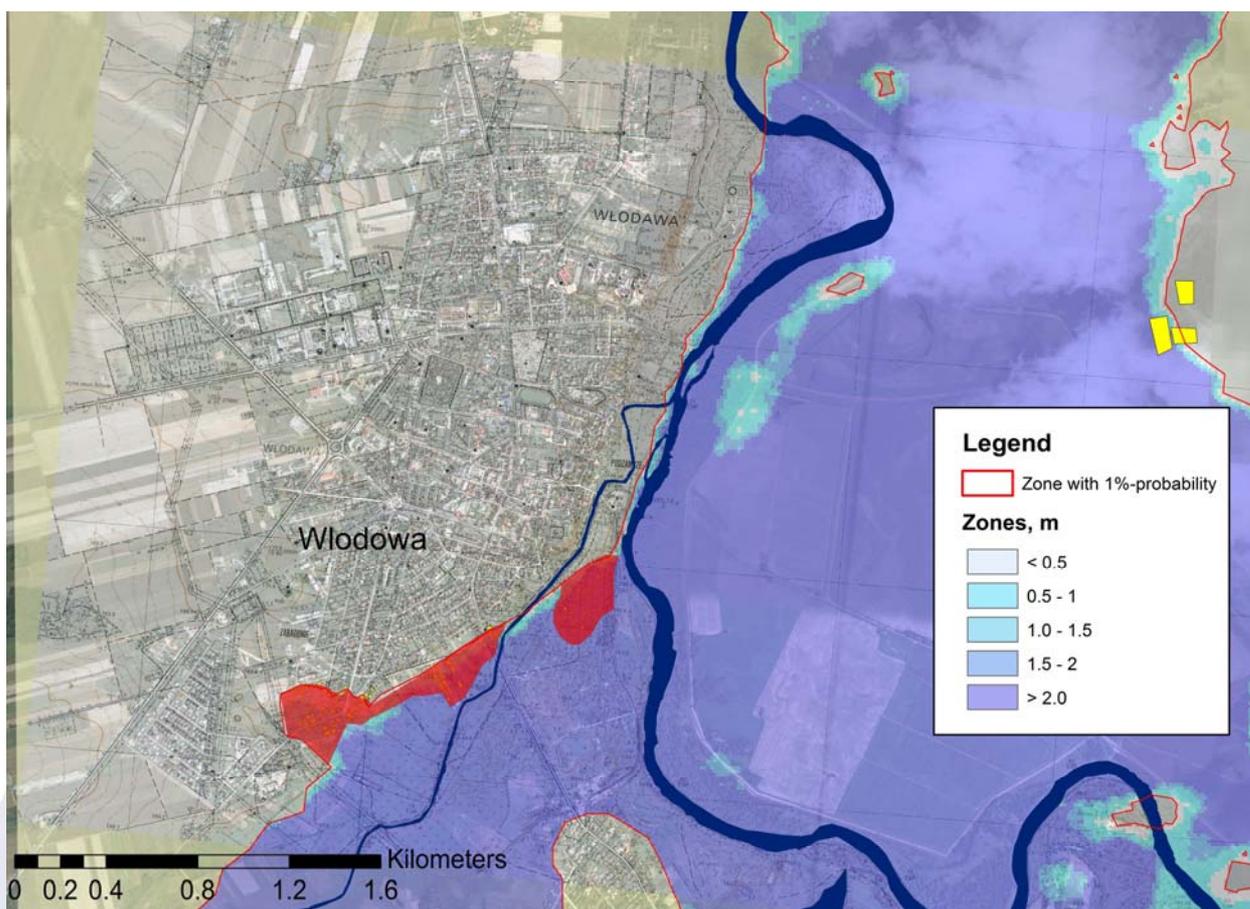
- a. Structural measures are those actions that require physical constructions like:
 - Existing dikes improvement for protection against floods and new dikes disposal for flooded urbanized and rural areas (for all Bug countries);
 - Bank protection (mostly related to Ukraine and Poland and will be relate to Belarus in the future also) – also because of river Bug is high meandered river with strong bank erosion: therefore river fairway and border-line is changing;
 - Watercourses cleaning (mostly related to Ukraine): clearing channels small rivers and large channels from silting of in the Bug basin.
- b. The non-structural measures are more or less legislative, organizational and awareness measures, and could be defined as secondary but supportive in terms of the flood mitigation efforts.

2 Existing information at each side of the border

2.1 Poland

Flood Risk Management Plan (FRMP) for the river Bug is mostly relates to the territory of Wlodawa town and its environs (see picture 2).

Estimated number of inhabitant affected by floods is about 110.



Picture 2 – Włodawa-Pilot-District of the river Bug for the inventory of FRMP including combined FHM and FRM

2.1.1 Organizations involved in flood risk management

According to the LAWA documents which will be the basis for the flood risk management plans for river Bug, the organizations involved in the different areas of action are listed in Table 1.

Table 1: Areas of action and competent authorities (formed according to LAWA-methodology)

Area of action	authorities
Precautionary land use	Włodawa City administration
Natural Water Retention	Lublin Regional Melioration and Water Resources Board
Technical Flood Protection	Lublin Regional Melioration and Water Resources Board
Precautionary Building	Local authorities, affected property owners, (professional bodies) of architects, engineers and trades, industry and commerce, local authorities, energy supply companies
Protection against Risks	Insurers, local authorities, riparian landowners (property owners).
Information (flood information / forecasting / warning)	Board of the Lublin Basin Vistula and Bug Borders in Lublin, Institute of Meteorology and Water Management (Warsaw)

Precautionary Behaviour (awareness-raising, preparedness)	Wlodawa district administration
Provision of Resources and Preparation of Hazard Prevention and Civil Protection (Contingency/Resource planning, exercises, training, Civil-military cooperation)	Wlodawa district administration
Flood Response	Wlodawa district administration Wlodawa district police board Wlodawa district staff of the State fire service Wlodawa district inspectorate on veterinary Wlodawa district supervision of building Lublin regional inspectorate on natural resources protection Wlodawa district sanitary-and-epidemiologic station District forestry boards Lublin Vistula and Bug board (RZGW) Lublin general management of state roads and motorways The Polish Red Cross in Lublin Wlodawa regional frontier troops Regional saving services on water The state authorities and services are involved in cases of extreme floods
Recovery	State authorities, local authorities

2.1.2 Cross-border committees

There are no cross-border committees or working group on regular base between Poland and Belarus. Some working group are functioning on irregular base between local authorities (administration), environmental protection structures, emergency boards and main stakeholders in frames of realization of the some specific agreements (i.e. "Agreement on cooperation and exchange of hydrometeorological information between the Department of Hydrometeorology of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus and the Institute of Hydrometeorology and Water Resources of Poland") and some projects of transboundary cooperation (i.e. INETRREG Project FLOOD-WISE).

Cooperation in the field of water resources management of the Western Bug Transboundary River Basin between Poland and Ukraine is carrying out in frames of Agreement between Governments of Poland and Ukraine in the field of water industry on transboundary waters from 10.10.1996.

Annual meetings of common fifth working groups and one commission are taking place on transboundary waters.

The representatives of 2 working groups are taking part In the FLOOD-WISE project in particular: on transboundary waters planning; flood-protection, water regulation and melioration.

There us special Agreement between Western Bug Basin Water Department (Lutsk, Ukraine) and Regional Water Board (Warsaw, Poland) also which is prolonging every 3 years.

2.1.3 Existing flood management plans and flood control concept

In the existing Operational plan for protection against flood developed in 2003 in Poland for the Bug River (Wlodawa district) the main focus lies on technical measures on safety against floods and on information of the disaster control forces. This regional plan is displaying also alarm levels in the Bug River for different river sites and procedure of notification in case of floods including response organizations, persons and planning.

The Resolution of the Włodawa City Council on the Plan of Land Use in Włodawa City (2004) is regulating land use in Włodawa City taking into account protection of the rivers Bug and Włodawka, existing and planning urban and rural infrastructure and industry, communication network, agriculture activities, recreation and tourism, cultural heritage etc.

The Regional plan of activities in emergency situations was developed for the Bug River (Włodawa district) in 2011. This plan includes risk assessment of emergency situation and procedure of response in case of any emergency situation. Most of measures of this plan refer to all emergency situation including floods, fires, air and water chemical and radioactive pollution etc. The detailed identification of types of floods caused by rain and snow melting can be a good example of flood risk assessment presented in this plan.

Flood Control Concept (FCC) already includes substantial content that will be required in the Floods Directive (except mapping) and it is an important basis for the implementation of the directive.

The FCC includes:

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

2.1.4 Existing and proposed objectives and measures per layer of the flood risk management cycle (prevention, protection, preparedness, emergency response, recovery), indicate possible cross border effects or investments

The existing and proposed objectives and measures are summarized from the Operational plan for protection against flood (developed in 2003 in Poland for the Bug River - Włodawa district) and from the Regional plan of activities in emergency situations and from results of flood modeling and mapping which were made for the pilot Bug river district in frame of FLOOD-WISE Project.

Prevention

Goals:

- The analysis of the reasons and possibilities of flood occurrence;
- Assessment of flood risks depending on reasons;
- Water resources management including flood risks decreasing.

Measures:

- Determination of inundation zones depending from the levels of floods;
- Development of water resources management plans of different levels (regional, state) with using river basin approach;
- (No) permission from Local Administration for new building activities in inundation zones of river Bug on distance to 500 m from river bank (no any activities to 30 m from bank, trees planting from 30 to 500 m from bank is allowed only);
- Optimization of land use (see picture 3).

- Communication and information about possible floods.

Emergency response

Goals:

- Adequate response depending from the level of flood;
- Reduction of flood damage and casualties during a flood.

Measures:

- Early notification;
- Dike monitoring during floods;
- Protection measures during floods;
- Acquaintance of all participants of measures with their tasks and action plan;
- Accurate differentiation of duties in case of floods ;
- Evacuation;
- Information of population with actions for decrease of flood consequences and flood damages;
- Communication and information about the flood
- The medical and humanitarian help to the population and life-savers.

Recovery

Goals:

- Recovery from flood damage after a flood.

Measures:

- Reconstruction measures and their financing

A cross border approach, a report about organizational structures and regulations for evacuation plans, emergency exercises etc. have not been implemented so far for the river Bug within an overall management plan.

2.2 Belarus

2.2.1 Organizations involved in flood risk management

According to the LAWA documents which will be the basis for the flood risk management plans for river Bug, the organizations involved in the different areas of action are listed in Table 1.

Table 2: Areas of action and competent authorities (formed according to LAWA-methodology)

Area of action	authorities
Precautionary land use	Brest regional administration
Natural Water Retention	Brest regional services of the Ministry of Agriculture (regional boards of melioration systems)
Technical Flood Protection	Regional services of the Ministry of Agriculture (regional boards of melioration systems), Brestvodokanal (Brest Water Company)
Precautionary Building	Project Institute (Polesyegiprovdhoz) and Dnepr-Bug water-way company "Dneprbugvodput" (Pinsk) – design of engineering protections projects; Central Research Institute for Complex Use of Water Resources (Minsk) – scientific background of the engineering measures in river basins and their impact on environment; Brest oblast committee of Natural Resources and Environmental Protection – ecological expertise of design projects

Protection against Risks	There no legislation and practical experience in the field of flood risk insurance and protection against flood risk in Belarus It is planned to forbid any new building (except hydrotechnical constructions) in water protected zones which are determining via flood plains with 100 years recurrence period
Information (flood information / forecasting / warning)	Brest Regional Department of Hydrometeorology; Brest regional services of the Ministry of Emergency; Brest Regional Administration; Brest oblast committee of Natural Resources and Environmental Protection; Brestvodokanal (Brest Water Company including WWTP); Regional services of the Ministry of Agriculture (regional boards of melioration systems); Regional sanitary services of the Ministry of Health
Precautionary Behaviour (awareness-raising, preparedness)	Brest regional services of the Ministry of Emergency; Central Research Institute for Complex Use of Water Resources (Minsk) – preparation of the flood hazard and flood risk maps; (bank protection, water management agencies and civil protection agencies) Dnepr-Bug water-way company “Dneprobudput” (Pinsk) – implementation of engineering protections projects.
Provision of Resources and Preparation of Hazard Prevention and Civil Protection (Contingency/Resource planning, exercises, training, Civil-military cooperation)	Brest regional services of the Ministry of Emergency; Brest Regional Administration, local authorities
Flood Response	Brest regional services of the Ministry of Emergency; Brest Regional Administration, local authorities Regional services of the Ministry of Agriculture (regional boards of melioration systems),
Recovery	State authorities, local authorities

2.2.2 Cross-border committees

There are no cross-border committees or working group on regular base between Belarus and Poland. Some working group are functioning on irregular base between Belarus and Poland local authorities (administration), environmental protection structures, emergency boards and main stakeholders in frames of realization of the some specific agreements (i.e. “Agreement on cooperation and exchange of hydrometeorological information between the Department of Hydrometeorology of the Ministry of Natural Resources and Environmental Protection of the Republic of Belarus and the Institute of Hydrometeorology and Water Resources of Poland”) and some projects of transboundary cooperation (i.e. INETRREG Project FLOOD-WISE).

Bilateral working group (Belarus – Ukraine) is functioning on implementation of Agreement between the Government of the Republic of Belarus and the Cabinet of Ministers of Ukraine on joint use and protection of transboundary water (came into effect July 13, 2002).

2.2.3 Existing flood risk plans

Republican Program of Engineering Protection Measures from Floods for population and agriculture for 2005-2010 was accepted 23/03/2005.

The main focus of this Program lies on technical measures on safety against floods for the main towns, villages, rural, industrial and agriculture lands in Polesye Region in Belarus (Pripyat River Basin) and for the Bug River Basin in partially only (only for the some territories).

Territories and settlements subject to floods of the pilot Bug River District (also identified in the frame of FLOOD-WISE Project) not covered by existing Belarusian Program of Engineering Protection Measures.

2.2.4 Existing and proposed objectives and measures per layer of the flood risk management cycle (prevention, protection, preparedness, emergency response, recovery), indicate possible cross border effects or investments

The existing and proposed objectives and measures are summarized from Belarus Program Engineering Protection Measures from Floods and from results of flood modeling and mapping which were made for the pilot Bug river district in frame of FLOOD-WISE Project.

Prevention

Goals:

- Prevention of the adverse consequence of flood damage to human life, health, environment, cultural heritage and economical activities;
- Reduction of flood risks by building restrictions in flood prone areas.

Measures:

- Spatial planning on regional level;
- To take into account inundation zones of river Bug with elevations about 1% of flood-probability in case of permission from Regional Administration for (building) activities in inundation zones.

Protection

Goals:

- Maximum possible decrease of flood damages

Measures:

- Dikes disposal for flooded urbanized and rural areas;
- 1% of probability safety level plus 1 m behind primary dikes along river Bug (only for flooded built areas);

Preparedness

Goals:

- Reduction of flood damage and casualties by actions taken before possible floods

Measures:

- Preparing Calamity plans for measures during floods, evacuation, communication;
- Dike monitoring before floods;
- Communication and information about possible floods.

Emergency response

Goals:

- Reduction of flood damage and casualties during a flood.

Measures:

- Dike monitoring during floods;
- Protection measures during floods;
- Evacuation;
- Communication and information about the flood.

Recovery

Goals:

- Recovery from flood damage after a flood.

Measures:

- Reconstruction measures and their financing.

2.3 Ukraine

2.3.1 Organizations involved in flood risk management

According to the LAWA documents which will be the basis for the flood risk management plans for river Bug, the organizations involved in the different areas of action are listed in Table 1.

Table 3: Areas of action and competent authorities (formed according to LAWA-methodology)

Area of action	Authorities
Precautionary land use	Volyn state regional administration
Natural Water Retention	Volyn Regional Water Resources Board / Western Bug Basin Water Department (Lutsk) of the State Agency of Water Resources of Ukraine of the Ministry of Environmental and Natural Resources of Ukraine
Technical Flood Protection	Volyn Regional Water Resources Board (Lutsk) of the State Agency of Water Resources of Ukraine
Precautionary Building	Volyn-Water-Project –Institute (Lutsk) Lvov-Hyprovodchoz- Institute (Lvov) Rovno-Hyprovodchoz (Rovno) Ukrvodproekt (Kiev) Volyn Regional Water Resources Board (Lutsk) – some small flood-protection measures
Protection against Risks	There no legislation and practical experience in the field of flood risk insurance and protection against flood risk in Ukraine. It is possible to have insurance for households in insurance companies privately and theoretically but it is unreal especially nearly to river bank It is allowed any new building in water protected zones (except river bank strip)
Information (flood information / forecasting / warning)	Volyn state regional administration Department of Emergencies of Volyn state regional administration Territorial Department of the Ministry of Emergencies of Ukraine in Volyn region Department of the technogenic safety in Volyn region Volyn Regional Centre of Hydrometeorology; Volyn Regional Water Resources Board
Precautionary Behaviour (awareness-raising, preparedness)	Department of Emergencies of Volyn state regional administration Volyn Regional Centre of Hydrometeorology, Volyn Regional Water Resources Board – preparation of the flood hazard and flood risk maps; Volyn Regional Water Resources Board - implementation of engineering protections projects.
Provision of Resources and Preparation of Hazard Prevention and Civil Protection (Contingency/Resource planning, exercises, training, Civil-military cooperation)	Volyn state regional administration, local authorities Department of Emergencies of Volyn state regional administration Territorial Department of the Ministry of Emergencies of Ukraine in Volyn region Department of the technogenic safety in Volyn region Volyn Regional Water Resources Board Volyn Regional roads management Department
Flood Response	Volyn state regional administration, local authorities Territorial Department of the Ministry of Emergencies of Ukraine in Volyn region Western Bug Basin Water Department
Recovery	State authorities, local authorities

2.3.2 Cross-border committees

Bilateral working group (Ukraine – Belarus) is functioning on implementation of Agreement between the Government of the Republic of Belarus and the Cabinet of Ministers of Ukraine on joint use and protection of transboundary water (came into effect July 13, 2002).

Cooperation in the field of water resources management of the Western Bug Transboundary River Basin between Ukraine and Poland is carrying out in frames of Agreement between Governments of Poland and Ukraine in the field of water industry on transboundary waters from 10.10.1996.

Annual meetings of common fifth working groups and one commission are taking place on transboundary

waters.

The representatives of 2 working groups are taking part in the FLOOD-WISE project in particular: on transboundary waters planning; flood-protection, water regulation and melioration.

There is a special Agreement between Western Bug Basin Water Department (Lutsk, Ukraine) and Regional Water Board (Warsaw, Poland) also which is prolonging every 3 years.

2.3.3 Existing flood risk plans

Existing flood protection measures for Bug river basin are presented in the following regional Ukrainian programs:

- Regional Ecological Program "Ecology 2011-2015 and forecast for 2020" (was accepted by the Volyn Regional Administration on 28.12.2010 №2/42);
- Regional Program of measures from flood in the Bug River Basin for Volyn Region for 2006-2010 and forecast for 2015 (was accepted by the Volyn Regional Administration on 23.08.2005);
- Regional Program of melioration systems recovery (was accepted on 13.05.2011 №4/7);
- Regional Program of water status assessment and watercourses cleaning (was accepted on 18.09.2009 № 32/39);
- Complex Program of flood protected measures for rural settlements and agriculture lands in Lviv region on 2006-2010 and forecast to 2015;
- Regional Complex Program of improvement of Ecological state of river basins in Lvov on 2007-2010 and forecast to 2015 (was accepted on 04.12.2007).

The main focus of these programs lies on technical measures on safety against floods mostly devoted to bank protection (picture 4) and watercourses cleaning (picture 5) and dikes disposal.

Many measures from these regional programs have not been realized because of funds limit or funds absence.



Picture 4 – Example of river Bug bank protection from Ukrainian side of river



Picture 5 – Example of Bug-bed cleaning from Ukrainian side of river

2.3.4 Existing and proposed objectives and measures per layer of the flood risk management cycle (prevention, protection, preparedness, emergency response, recovery), indicate possible cross border effects or investments

The existing and proposed objectives and measures are summarized from Ukrainian regional programs and from results of flood modeling and mapping which were made for the pilot Bug river district in frame of FLOOD-WISE Project.

Prevention

Goals:

- Prevention of the adverse consequence of flood damage to human life, health, environment, cultural heritage and economical activities;
- Reduction of flood risks by building restrictions in flood prone areas.

Measures:

- Spatial planning on regional level;

Protection

Goals:

- Maximum possible decrease of flood damages

Measures:

- Existing dikes improvement for protection against floods;
- New dikes disposal for flooded urbanized and rural areas;
- Watercourses cleaning;
- Bank protection;

Preparedness

Goals:

- Reduction of flood damage and casualties by actions taken before possible floods

Measures:

- Preparing Calamity plans for measures during floods, evacuation, communication;
- Dike monitoring before floods;
- Communication and information about possible floods;
- Creation and maintenance of emergency stocks of materials and equipment

Emergency response

Goals:

- Reduction of flood damage and casualties during a flood.

Measures:

- Invocation of emergency units
- Dike monitoring during floods;
- Protection measures during floods;
- Evacuation;
- Communication and information about the flood.

Recovery

Goals:

- Recovery from flood damage after a flood.

Measures:

- Reconstruction measures and their financing.

2.4 Comparison of existing information across the border

Similar approach in Poland, Belarus and Ukraine is using for preparation of the Flood Risk Management Plan for entire pilot river district in general in the frame of FLOOD-WISE Project.

There are similar approaches in Belarus and in Ukraine for the engineering construction against flood: levels of dikes should be not less than maximum levels of 1%-flood probability take into account all historical data about floods plus 1 meter.

In general most of objectives and measures on flood prevention, protection and mitigation in Bug river are the same or similar in all Bug countries.

3 Obstacles and benefits (good practices)

3.1 Obstacles to be overcome for harmonization of flood risk plans in the border region

Threats and challenges related to flood risk planning

- Transboundary nature of river Bug take into account border of EU and not EU countries also;
- Bank strip of the river Bug in Belarus and in Ukraine is closed territory because it is military zone of border (it can be considered as some obstacle and some benefit for flood risk planning at the same time);
- FRM can be published to inform the managing authorities, stakeholders and public;
- Cross border coordination, coordinate all managing authorities and stakeholders is problematic because of no cross border coordination trilateral committee or group yet;
- Absence of maps of the entire Bug River Basin including pilot and other districts with required scales and with good quality is the main obstacle for complex flood risk planning;
- Existing and planned measures in Bug countries do not (yet) take into consideration transboundary impact of own measures and activities essentially bank protection which is carried out unilaterally;
- How does the developed FRMP will be (can be) implement?

3.2 Expected benefits of (joint) cross border cooperation for flood risk planning

Objective and expected benefits of flood risk planning for the cross-border region:

- Improvement efficiently of early warning system;
- Diminish flood risks;
- Inform people about flood risks and measurement plans;
- Assess effects of measures cross border
- Improvement of the cross border information exchange and using common information platform (morphology, hydrology and hydraulics) for flood forecast;
- Decreasing of negative effects downstream;
- Find the best solution based on the entire river basin management approach for both sides of the river Bug (for both sides of the border).

4 Conclusions

4.1 Potential ways to harmonize flood risk planning methods across the border with respect to the requirements of the EU Flood Risk Management Directive

Cross border contacts and cross border information exchange in times of floods, focused on calamity management and early warning will be important and useful.

Strengthening of cross border contacts and the forming of an trilateral Bug River Basin Committee would be a good suggestion for increasing efficiency of Flood Risk Management in the Bug River Basin, including improvement of exchange of data, coordination of border measures, insight in each other problems and benefits, insight in the right partners who are responsible for the various goals and tasks.

4.2 Future possible activities to improvement of flood protection and mitigation in the Bug River Basin

4.2.1 Possible activities recommended

Steps (including LAWA documents recommendations also) are:

- Drawing conclusions from the preliminary flood risk assessment, risk and hazard maps, other documents such as flood action plans etc.;
- Identifying appropriate objectives:
 - early involvement of local agencies / relevant sectors;
- Target/actual comparison;
- **Identification of possible actions:**
 - **No measures that considerably increase the transboundary impact of flood risk in the Bug River Basin due to requirements of the Convention on Protection and Use of Transboundary Watercourses and International Lakes/Helsinki Convention because of all Bug countries ratified this Convention** (exceptions possible if all parties on the state level agreed: origin, affected and concerned due to ESPOO Convention classification of involved parties);
 - Objectives of flood risk management as well as of the environmental objectives set by EU Water Framework Directive;
 - Integrative measures (water management and soil, spatial planning, land use optimization and nature conservation);
 - Possible implementation of sustainable land use practices, improvement of water retention, as well as the controlled flooding of certain areas;
 - Possible Implementation of EU-experience for different safety levels along the river Bug, depending on land use including built areas (1:100), agriculture (1:25), grassland (1:10), Nature (including the floodplain near the river Bug) - no safety level;
 - Possible implementation of measures reducing possible negative impact of engineering activities (i.e. existing dikes improvement and new dikes disposal, watercourses cleaning and bank protection) on environment;
 - Hydrological Information exchange between countries of river Bug on regular basis and in on time regime in case of extreme flood;
 - To use EU-experience in part of funding for recovery after a flood and compensates measures;
 - **Development of the Bug River Basin Water Resources Management Plan for the entire river basin (Poland-Belarus-Ukraine);**
 - **Implementation of measures to further improvement of the water regime in river Bug (in combination with nature development and other goals) for regional development and adaptation to effects of climate change.**
- Summary and prioritization of measures, timeframe of implementation (up to 2021):
 - Effectiveness with regard to achieving the objectives;
 - Ability of implementation;
 - Economic efficiency (where assessable);
 - Synergy effects with other objectives (e.g. other directives);
- **Coordination with other directives:**
 - **Water Framework Directive;**
 - **Convention on Protection and Use of Transboundary Watercourses and International Lakes/Helsinki Convention;**
 - **Guidance on Water and Adaptation to Climate Change (UNECE, 2009);**
 - Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (The Aarhus Convention);
 - Directive on the assessment of the effects of certain public and private projects on the environment;

- Directive on control of major-accident hazards involving dangerous substances (Seveso II Directive);
- Directive on assessment of the effects of certain plans and programs on the environment.
- Monitoring of the implementation process;
- Strategic Environmental Assessment (SEA) with the participation of the public identifies, describes and evaluates the impacts of the proposed measures on:
 - 1. People/human health, animals and plants, and biological diversity;
 - 2. Soil, water, air, climate and landscape;
 - 3. Cultural and other physical assets;
 - 4. The interaction between these protected interests.

4.2.2 Recommendation for the Bug-countries governments from FLOOD-WISE Project

Integrate flood- and water quality issues cross borders

A river basin approach requires authorities to widen their view across borders. Floods and water quality issues in a cross border river basin should preferably be integrated cross border (as if without borders) for the whole river basin. The requirements of the river basin should be leading; more than national policies.

River basin authorities will strengthen integrated river basin management

To strengthen integrated river basin management, a river basin authority should be installed by mutual consent of the various countries in the river basin. The river basin authority should be provided with the minimum tools and means (staff, housing, legal tools and finances to provide the services needed).

Investments across borders may benefit flood safety

Sometimes upstream investment may reach more adequate results. The best possible solution is not always on your own territory. Cooperation and investments across borders are necessary to find the best solutions for flood risk management.

Avoid single sided measures

An integrated (holistic) river basin approach benefits the common interests in a river basin and will be more cost efficient, preventing single sided measures that have to be compensated later (leading to capital destruction and des-investments) and improving solidarity (one may neither hand over his problems to his neighbours nor to the future nor to another compartment)

Create space for rivers and adjust spatial planning policies

More space for the river results in reduced flood risk in human settlements in the flood prone area. Despite the fact that a lot of cities and villages are situated along rivers for historical reasons, new settlements should ideally be situated out of risk zones. It means that protection policy (for example by dikes) should be re-evaluated and spatial planning policies should be adjusted to restrict building in flood prone areas.

Strive for cost-recovery in flood risk management

Cost recovery is possible in cross-border cooperation by adopting principles like 'the polluter pays', 'the user pays' and 'beneficiaries pay'.

Cross border flood risk management can benefit from decentralized decision making

To overcome national policies to be an obstacle for effective cross-border flood risk management, decentralization of responsibilities could be a solution to effective decision-making.

Make sure that the public understand flood maps

When involving the public, use flood hazard and flood risk maps on a scale that people can understand, so they can recognize their own property. "Where is my backyard".

Enforcement of spatial planning restrictions in flood prone areas needs priority

The measures included in flood risk management plans should be legally binding for spatial planning and (urban and economic) development plans. If it is not possible to make legal arrangements, the measures should at least be used in spatial planning policies and (urban and economic) development plans.

4.2.3 Proposed possible future activities

- to strengthen of cross border contacts between Belarus and Poland, Belarus and Ukraine as well as between Poland and Ukraine;
- to propose exchange of meteorological, hydrological data and data about water quality (chemistry and hydrobiology) on regular basis (at least as once per year);
- to provide information and cross-border exchange of data in on-line regime in case of emergency situation e.g. of floods, accidental pollution etc.;
- to install of the trilateral Bug River Basin Committee (River Basin Commission) as a good platform for increasing efficiency of Flood Risk Management as well as water resources management in the Bug River Basin including different levels of cooperation (expert working groups and political);
- to propose international projects on more detail specification of the Flood Risk Maps and Flood Risk Management Plan for the entire transboundary river Bug district based on more detail cartographic information and common hydrological and hydraulic model;
- to propose international projects on the development of prototype of Early Warning System for the river Bug with installation of the Automatic Hydrometeorological Stations (AHS) on river Bug (as similar on Tisza river - Hungary/Romania/Ukraine) .