



**Joint Operational Programme
Romania-Ukraine-Republic of Moldova 2007-2013**

**Prevention and protection against floods in the upper
Siret and Prut River Basins, through the implementation
of a modern monitoring system with automatic stations**

EAST AVERT MIS ETC 966



LAYMAN REPORT



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MINISTRY OF ENVIRONMENT



Romania-Ukraine-Republic of Moldova
CROSS BORDER COOPERATION

A project implemented by
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The EAST AVERT MIS ETC 966 large scale project is one of the Danube Region project's with visible and concrete results for better cooperation among neighbor countries, and, moreover, among a member State and non-EU countries, for management of emergency situations generated by natural hazards.

Prevention of flood hazards caused by transboundary Rivers is a global issue to be addressed on cross-border level. It is generally well known that these events have a negative impact on natural landscapes and biodiversity, but also result in loss of life and damage to economic activities. Flood prevention is therefore of particular importance.

Many regions throughout the Danube Region are particularly subject to high flood risks, as was illustrated by the disastrous events in 2006, 2008 and 2010. During last decades all the Danube Region countries expressed their common intention to strengthen cooperation in different sectors of life.

Starting in June 2008, as a political initiative of Romania and Austria, promoted by a joint letter addressed to the President of the European Commission, European Union Strategy for Danube Region (EUSDR) creates a frame for this further collaboration. The Ministerial Declaration adopted by the Danube countries in the framework of their cooperation on water management states that "flood prevention and protection are not short term tasks but permanent tasks of the highest priority". The Declaration commits the signatories to "develop one single international Flood Risk Management Plan based on the ICPDR Action Programme for Sustainable Flood Protection". This work is ongoing and Flood Action Plans are already adopted for the 17 sub-basins, including Eastern Romanian border basins. Moreover, at the EU level, Floods Directive 2007/60/EC provides a legal framework for a coordinated approach to assessing and managing flood risks.

EAST AVERT MIS ETC 966 Project initiative represented for Romania, Ukraine and Republic of Moldova one of the best opportunity for transboundary collaboration in responding to natural catastrophes such as massive floods.

Funded by the Joint Operational Programme Romania - Ukraine - Republic of Moldova 2003 - 2014, EAST AVERT MIS ETC 966 is one of the Flagship Projects both for ICPDR Action Programme for Sustainable Flood Protection, as well as for the EUSDR Action Plan for coordination of the Priority Area 5 "Management of environmental risk".

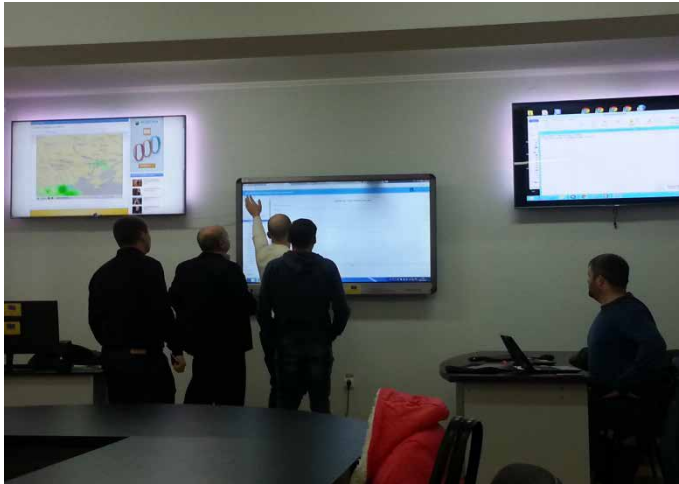
The EAST AVERT Project brought into attention both short term planning measures by modernizing the Early Warning System (3 large cities and many localities along the two river basins will get a better flood protection warning system), as well as long term flood risk management by flood hazard & flood risk mapping, improvement of the bilateral water management agreements between Romania and Ukraine and Republic of Moldavia, a common policy to be applied in the border area and Flood Directive implementation will be assured in the trans-boundary river basin from the Eastern border of Romania.

Moreover, as main result of project implementation, is enhancing the technical and functional parameters of the Hydro-technical Complex "Stânca-Costești" for prevent future flood hazards in the cross-border region.

Overall objective:

Protection of the border areas in the upper Siret and Prut River Basins against the flood risk, other natural dangerous hazards of water cycle and accidental pollutions and reducing the environmental, economic and social vulnerability of targeted localities from the border region against flood risk.

Specific objectives:

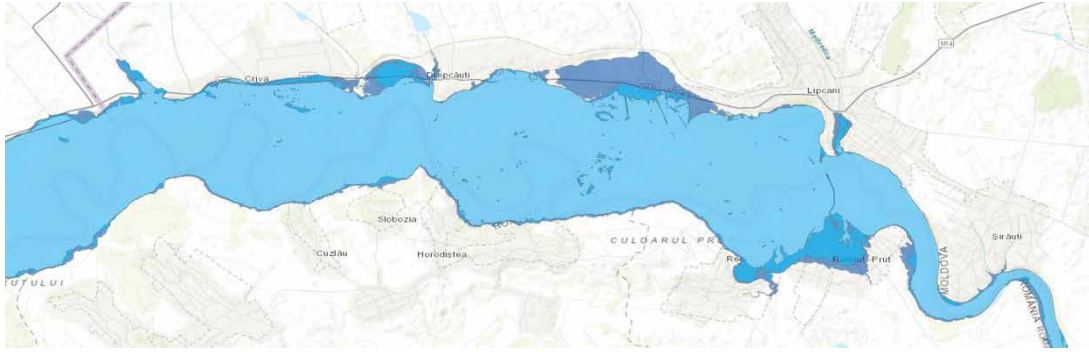


Ensuring of a high quantitative monitoring level of the Siret and Prut River Basins, including the main hydraulic infrastructures as Stanca Costesti Dam and Reservoir for prevention and protection against floods and accidental pollution events.

Reducing the environmental, economic and social vulnerability of targeted localities from the border region between the Republic of Moldova and Romania against flood risk by enhancing the functional capacities of the Hydro-technical Complex “Stânca-Costești”.



Elaboration of the maps representing the flooded areas during the historical flood events in the Siret and Prut River Basins, of the hazard and vulnerability maps at a adequate scale (using the high-resolution satellite images) and of the risk maps for Siret and Prut River Basin.



Providing of the River Basin Plan for the protection against ice-floods, hydrological drought, accidents occurred at the hydro-technical constructions and accidental pollutions for the Siret and Prut River Basins.

Improving the warning system by a better common forecasting procedures and modelling.

Increasing the reaction capacity by a better data and forecasts dissemination, public information about flood hazard and risk and a common exercise, testing the hydrological information system.

All these above mentioned objectives increase population resilience and conduct to a better protection of the cultural, historical and natural protected areas, of the patrimony in the border areas of Prut and Siret River Basins.



The main results are:

- (1) a modern integrated monitoring and warning system to protect localities and population living in the border areas of Prut and Siret River Basins;
- (2) an integrated approach to prevent and protect localities and population against floods, by a strategic land development planning taking into consideration the flood hazard and vulnerability/ risk maps;
- (3) improvement of the management of floods, accidental pollutions and quality of the water resources in case of emergency situations in these River Basins;
- (4) elaboration of a Common Action Plan against ice-floods, hydrological drought, accidents occurred at the hydro-technical constructions, through the cooperation of the responsible stakeholders on the territory of Romania, Ukraine and Republic of Moldova;
- (5) ensuring better protection of the cultural, historical and natural protected areas patrimony within these River Basins;
- (6) improvement of the bilateral agreements in the field of water management (for data exchange, warning and coordination of the preventive activities);
- (7) better information of local communities, local authorities & public on the issues regarding the protection against floods and also on the vulnerable areas, based on the hazard and risk maps elaborated for both Prut and Siret River Basins in the areas with transboundary impact.

The main outputs are:

- (1) Increasing the data availability by installing 32 monitoring automate stations (30 in Ukraine - 29 for Partner 6 and 1 for Partner 7, 2 in Romania - Partner 2):

Locations for Ukraine:

- | | |
|---|---|
| 1. Chernivtsi - Chernivtsi, Chernivtsi region | 16. Cheremosh - Usteriky, Ivano-Frankivsk region |
| 2. Chorniava - Liubkivtsi, Ivano-Frankivsk region | 17. Cheremosh - Kutu, Ivano-Frankivsk region |
| 3. Pytula - Putyla, Chernivtsi region | 18. Malyi Siret - Verhni Petrivtsi, Chernivtsi region |
| 4. Prut - Tarasivtsi, Chernivtsi region | 19. Pistenka - Prokurava, Ivano-Frankivsk region |
| 5. Siret - Storozhynets, Chernivtsi region | 20. Chorni Cheremosh - Zelene, Ivano-Frankivsk region |
| 6. Siret - Cherepkivtsi, Chernivtsi region | 21. Bilyi Cheremosh - Holoshyna, Ivano-Frankivsk region |
| 7. Prut - Vorohyta, Ivano-Frankivsk region | 22. Mihidra - Stara Zhadova, Chernivtsi region |
| 8. Prut - Yaremche, Ivano-Frankivsk region | 23. Sovytsia - Kitsman, Chernivtsi region |
| 9. Prut - Kolomyia, Ivano-Frankivsk region | 24. Suchava - Seliatyn, Chernivtsi region |
| 10. Zhonka - Yaremche, Ivano-Frankivsk region | 25. Siret - Dolishniy Shepit, Chernivtsi region |
| 11. Kamianka - Dora, Ivano-Frankivsk region | 26. Derelui - Valia Kuzmina, Chernivtsi region |
| 12. Iltsa - Iltsi, Ivano-Frankivsk region | 27. Derelui - Ostrytsia, Chernivtsi region |
| 13. Chorni Cheremosh - Verhovyna, Ivano-Frankivsk region | 28. Rybnytsia - Dzhuriv, Ivano-Frankivsk region |
| 14. Veretyn - Verhniy Yaseniv, Ivano-Frankivsk region | 29. Prut - Sniatyn, Ivano-Frankivsk region |
| 15. Bilyi Cheremosh - Yablunysia, Ivano-Frankivsk region (P7) | 30. Prut - Pozhyzhevska station, Ivano-Frankivsk region |

Locations for Romania: Ripiceni and Stanca-Costesti dam

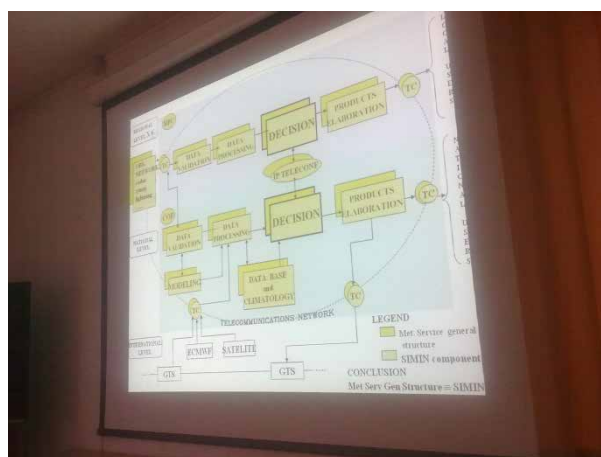
- (2) Dispatches equipment:
- for 8 county dispatches in Romania (responsible Partner 2: Iași, Botoșani, Vaslui, Galați, Stâncă-Costești dam; responsible Partner 3: Bacău, Piatra Neamț, Suceava)
 - for 1 national dispatch in Romania - Bucuresti (Lead Partner - Ministry of Environment headquarter)
 - 3 county dispatches in Ukraine (responsible Partner 6: Ivano-Frankivsk, Chernivtsi (P6 headquarter); responsible Partner 7: Chernivtsi (P7 headquarter).
 - 1 county dispatch in Republic of Moldova at the dam location (responsible Partner 5: Costesti dam)
- (3) Forecasting centres:
- in Romania 3 centers: Iași (P2 headquarter), Bacau (P3 headquarter, Bucuresti (P4 headquarter)
 - in Ukraine 2 centers: Chernivtsi (P6 headquarter, P7 headquarter)
 - in Republic of Moldova 1 center: Chișinău (P5 headquarter).
- (4) A flood forecasting methodology and forecasting model will be used at the basin level, getting an increased reaction time for flood protection measures, downstream Ukrainian border, on the Romanian and Republic of Moldavia territory, getting a better protection for localities in the border areas.
- (5) Increased capacity of flood attenuation by a better monitoring system at the Stâncă Costești Dam and safety exploitation of the hydrological complex.
- (6) Increased capacity of the personnel trained for automatic stations calibration, maintenance and data processing by using ArcGIS and specialized EC Inspire software for mapping information.
- (7) Historical floods mapping for the Preliminary Flood Risk Assessment, and Atlas of flood hazard and risk maps, for a better flood protection measures integration and EU policy implementation (Flood Directive 2007/60/EC) in the border area.

Project activity Nr. 1: Design of the hydrological information, forecasting and early warning system for reducing the environmental, economic and social vulnerability

1.1. Establishment of project implementation basis through special questionnaires and data bases, national and trilateral workshops, site visits, seminars, wide discussions, international presentations and leaflets publishing revealing the common project’s platform and detailed action plan for the following project activities for a wider professional and public support

Under this activity, we planned and established the project implementation basis through special questionnaires and data bases, national and trilateral workshops, site visits, seminars, wide discussions, international presentations and leaflets publishing revealing the common project’s platform and detailed action plan for the project activities for a wider professional and public support.

LP - together with PP4 - were jointly organized 2 site visits, one in Somes Basin for DESWAT system presentation and one in Bucharest, at the Romanian National Institute of Hydrology and Water Management and National Administration of Meteorology, to get inputs and providing descriptions of the SIMIN and DESWAT projects for meteorological and hydrological informational (HIS) and forecast (HFS) system, as well as for the early warning system (EWS).



During the project proposal elaboration, DESWAT system was implemented only in Somes Basin, this is why a visit in Somes basin was foreseen within the EASTAVERT project. Actually, DESWAT system is also implemented in Prut and Siret Basin.

In these conditions, during the Management Meeting from Iasi, 29 January 2014, a field trip was organized to a DESWAT automatic hydrometric station and to the Prut Basin Hydrological Forecast Centre (part of Prut Water Basin Administration),



where took place several technical presentations and discussions.



During period 25-30.08.2014 has been organised the visit in Somes-Tisa Hydrografic basin, in order to realize an experience exchange between Romanian and Ukrainian experts regarding monitoring systems with automatic station used in hydrological prognosis.

Visit in Somes-Tisa basin was coupled with the visit organized by PP6 in Upper Tisa basin within Ukrainian territory.



First 2 full working days (26 and 27 august) were spent in Romania; were visited headquarter of River Basin Management Authority (in Cluj) and some automatic stations in Cluj and on the Iza River. Romanian experts from RBA Somes-Tisa presented RBA activities, dispatch organization and the forecast system used. There were present Ukrainian experts from PP6, PP7 and PP8 and also was present a Moldavian expert from PP5.

On 28 August all experts passed the border in Ukraine and travel to Uzghorod, and a meeting at the Tisza River Basin Water Resources Directorate was organized. Until arriving at Uzghorod an automatic station on Tisa River was visited by all delegates. During meeting at the Tisza River BWRD were discussed aspects related to the international integrated prognosis system and flood management used in common by Ukraine and Hungary on the border. It was also presented the entire system of automatic stations implemented in Upper Tisza River basin and was discussed aspects related to the system maintenance necessities (very important for the functioning of the system after projects' finished) and took place a small working meeting between the project partners, having as purpose discussion on GIS system used for hydrological prognosis and GIS synchronization of the data between project partners.

During project implementation period, in various meetings, technical discussions addressed different specific topics of interest for project, as:

- The feasibility of achieving jointly bathymetric measurements
- The existing GIS data needed in the project
- New GIS data needed in the project and discussion on the tender specification
- Inventory of hydrologic / hydraulic data and studies
- Discussion on the technical report preparation.

On 07-08 April 2014 during the meeting organized by PP5 in Republic of Moldova, at Chisinau - Start-up Stakeholders Conference and Project Management Meeting, one of the meetings scope was to get inputs for HIS and EWS design and needs for Republic of Moldova.



The 2nd Conference of the project was held in Chernivtsi (03-06 August 2015) and focused on “Promoting Integrated Management for Water Policy and Flood Risk Prevention and Early Warning System in the upper Siret and Prut River Basins cross-border area”. During conference experts presented information about “Data and methods for flood risk mapping”, “The status of the common geodatabase”, „Design of EASTAVERT floods early warning system”, or „Floods Directive requirements and specifications”.

3rd Conference of the project took place in 11-12 of November 2015 in Kishinev, presenting “Flood Risk Prevention and Early Warning System in the upper Siret and Prut River Basins cross-border area” to Moldavian stakeholders.



Many other workshops and seminars presenting project' results, for discuss and get stakeholders inputs, were organized in Romania, but also in Ukraine and Republic of Moldova.

1.2. Feasibility and EIA Studies elaboration and the technical design projects preparation for all automatic stations locations, according to the characteristics of the Siret and Prut upper River Basins and for Stâncă Costești Dam, as the largest flood protection infrastructure on the Prut River

PP2 ABA Prut provided Stâncă Costești Complex Hydrotechnical System Feasibility Study.

PP2 ABA Prut and PP5 “Apele Moldovei” Agency provided EIA study and the Environmental Permits for works at the dam and in its surrounding areas. Taking into account that the Reservoir Stâncă Costești is a SPA area, the protected species perturbation claimed for public consultation procedures for FS approval.

Ukrainian partner PP6-Dnister-Prut Water Directorate provided the feasibility study for installing the hydrological monitoring system network for Siret and Prut basins upstream Romania.

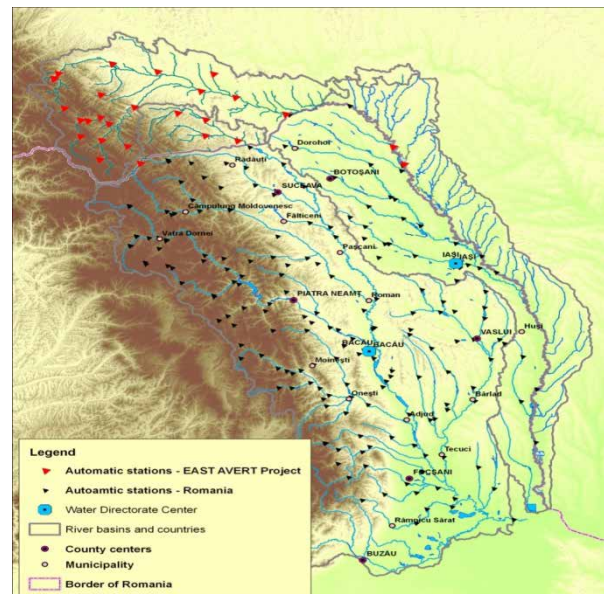
PP6 provided the Environmental Permits for stations’ installation constructions, including for the case of additional works in certain cross sections of the rivers Siret and Prut and their main tributaries.

PP8 - EcoResources Center was responsible and provided Ukrainian EIA Study.

Altogether one single project Feasibility Study was integrated for the Ukrainian, Moldavian and Romanian contributions.

The integrated Feasibility Study comprises costs for the Dispatches communication, data reception and data processing/validation, including the equipment and software licenses and designing costs for the forecasting centers.

LP-Ministry of Environment, Romania, gave permanently assistance for the detailed design for HIS and EWS and for Feasibility Studies elaboration.



The outputs of this activity are:

- (i) the Feasibility Study and Environmental Impact Assessment, as well as
- (ii) a detailed design for stations installation, and fixing the damaged areas of the dam and mobile equipment.

Results of this activity:

- 2 Feasibility Studies provided (PP2 & PP5 for Stâncă Costești dam and PP6 for the Ukrainian HIS)
- 2 EIA Studies Romania-Moldavia and Ukraine.

Project activity 2: Modernization of the hydrological information (HIS), forecasting and early warning system (EWS) in Prut and Siret Basins for flood prevention

➤ The purchase of the (30) automatic hydrometric stations and their assembling in the Siret and Prut upper River Basins

To reduce the risk of floods and increase the resilience of the population from the border area, on the Ukrainian side were made investment in works and installation of automatic stations, alert stations and endowment of 2 Dispatch Centers for emergency situations.



In frame of large-scale project EAST AVERT MIS ETC 966 Partner 6-Dnister-Prut Water Directorate constructed 30 automatic stations with next sets of equipment:

5 - complete set (level gauge, precipitation gauge, hydrometric cable cross);

12 - hydro-meteorological (level gauge, precipitation gauge),

5 - hydrological (level gauge),

8 - meteorological (precipitation gauge).

Automated stations are equipped with alarm system with remote monitoring and control of objects of observation (for restricted access).



To reduce the hydraulic load on hydro-technical structures, 770 m of bank strengthening were constructed by the method of arranging gabion boxes.

To protect the automated station on the river Malyyi Siret in the village Verhni Petrivtsi there was built bank strengthening with a total length of 204 m.



Bank strengthening examples

➤ **The purchase of equipment**

We purchased modern equipment for:

- 8 local dispatches (PP3-Siret Water Basin Directorate) in Romania,

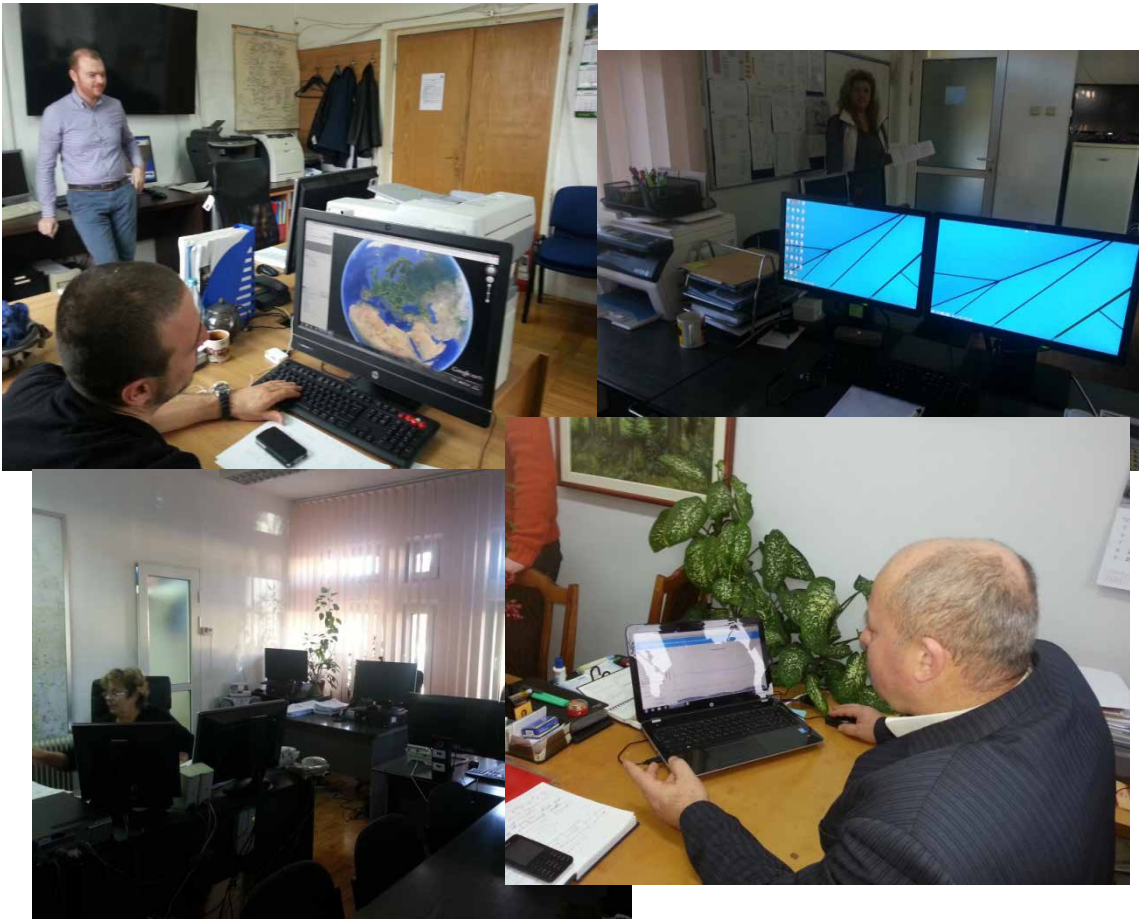


Also, for continuous monitoring of the current situation, prompt response and management decision making in cases of emergencies associated with harmful effects of water, a dispatching and forecasting center in Chernivtsi, a dispatch center in Ivano-Frankivsk and 1 Dispatch in Republic of Moldova (Kishinev) have been created.



Dispatch center in Chernivtsi

- 9 hydrometeorological data collection centers



- Regional Computational Centers and 1 national Center for forecasting modelling



- field measurements equipment

Were purchased Partner 7 - Chernivtsi Regional Meteorological Center) the equipment for the performance of hydrometric and geodetic works on the creation of a forecasting model (GPS system, tacheometer), hydrological (profilometer), forwarding (boat, special cloths, tents, etc.) equipment, software (ArcGis).



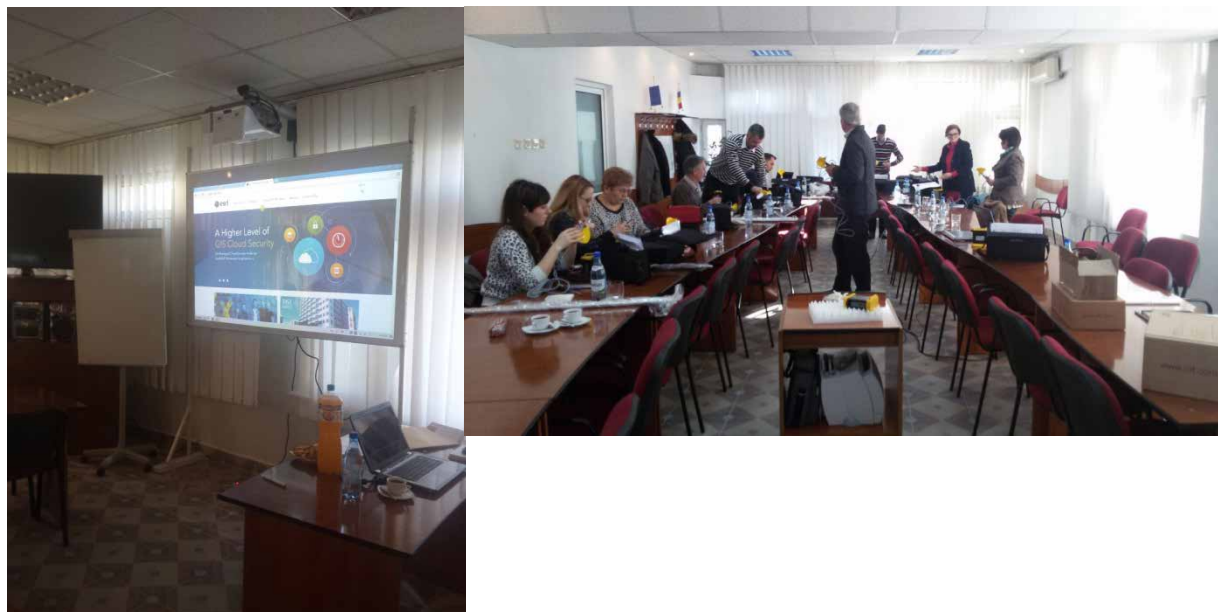
Project Partner 6 Dnister-Prut BDWR bought mobile hydro chemical laboratory. The main task of laboratory is operative reaction on facts of accidental pollution of surface waters on Transboundary Rivers of Chernivtsi region. Laboratory is staffed with devices and means, which allow on terrain in autonomous regime, perform next measurements of surface, underground, reverse (waste and drainage) and drinking waters.



Devices, which are used for measuring main indicators of water in mobile laboratory:

1. Spectrophotometer Hach-Lange DR 3900.
2. Multi-parameter portative digital multi-meter WTW Multi 3430 SET G.
3. Portative analyzer of turbidity Hach Lange TSS Portable.
4. Laboratory thermoblock WTW CR 3200 VIS.

All partners' specialists were trained for the use of equipment, soft application and for the marking of historical floods bands by PP4-INHGA experts, together with ESRI experts (subcontracted by LP-ME).

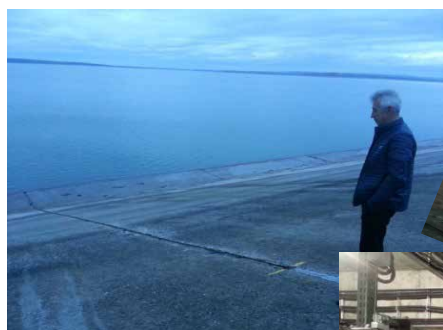


➤ The purchase of equipment & works for installation for Stâncea-Costești dam and reservoir

One of the main activities of the project was to consolidate and increase the functionality of the Stâncea-Costești Dam, through works at dam itself and equipment investments, both on the Romanian side and on the Moldovan side.

PP2-Prut Water Basin Directorate, PP5-Moldavian Waters purchased the automatic hydrometric stations for Stâncea-Costești.

At Stâncea-Costești a dispatch center equipped with advanced technique was set up to analyze the dam level information, analyze the information received from upstream automated stations.



The dam is equipped with a multitude of level transducers that will provide real-time data about the status of the dam. The processing and transmission of data is done by a central server unit with specialized software.

In present, the water level is monitored at 69 measurement points as follows:

- 57 drillings located in the dam area, where hydrostatic level sensors have been installed;
- 2 measuring points in the dam gallery, where pressure transducers have been installed.

The 9 programmable machines are connected to an optical fiber data network and communicate permanently with the two redundant servers installed at the Dispatch Center at the Friendship House.

The computer system installed at the dispatcher includes redundant servers, personal computers with the role of “client”, printers.

The SCADA program installed on the two servers allows the following functions:

- “real-time” display of the absolute water level at each of the 69 measurement points;
- Saving these figures every 5 minutes;
- Creating a report for every data frame every 24 hours;
- Saving these reports on each of the servers;
- Alarm situations displaying - for example: incorrect measurements of a sensor, a frame door opening, etc.
- Displaying and changing of specific data to each measuring point: Absolute height of the measuring point, water depth of the hydrostatic sensor, sensor range, water column height and, of course, absolute water level at each measuring point;
- Displaying the evolution graphs of the absolute water level at each measuring point;
- Creating reports for the requested time periods;
- Authorize access (by password) to the measured data and the change of specific data to each measurement point.

➤ **Reducing the social, economic and environmental vulnerability in case of floods by increasing the functional capacity of the Stânca-Costești hydro-technical complex (through extensive works of consolidation and technical endowment of the dam).**

Were performed:

- Rehabilitation of the main dam and old quarry;
- Rehabilitation of the information system and the tracking of the construction behavior.
- Consolidation works of the slopes. The riverbank consolidation works include itself:
 - ✓ reducing the slope and riverbank consolidation of two sectors of the reefs above the 93.5m elevation; sealing joints between plates;
 - ✓ Clogging the gaps beneath the bank consolidation plates.



The slope consolidation works were made of monolith reinforced concrete with a

In order to protect the slope of the existing consolidation against the damage of rock fragments during the slope reduction, a temporary edifice against the drops on the berm was built.

The construction of the edifice consisted of vertically installing two rows of foundation blocks and support struts made of metal constructions.



Joins rehabilitation and closure of the voids beneath the riverbank reinforcement plates were performed. Because expansion joints between the tiles across the length the consolidation of banks, made of tarred boards, in most of them became unsuitable due to the impact of temperature and action of the water waves, within the project the joints cleaned joints were filled to the bottom with bitumen mattresses, top with bitumen-rubber mixture.

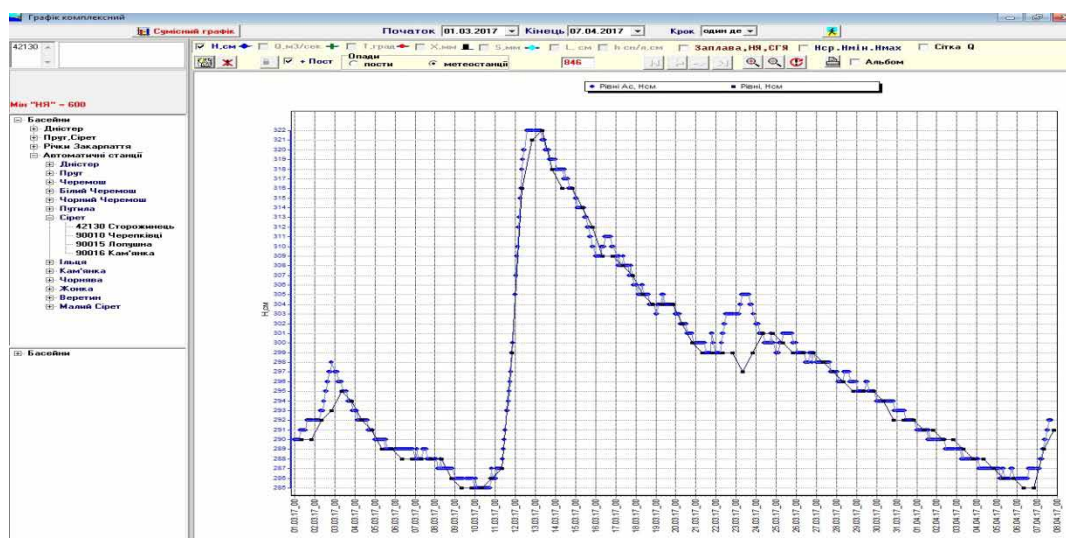
The filling of the gaps under consolidation has been executed over the entire length of consolidation, that is, up to the berm, in the area threatened by the greatest action of the waves of water. According to the project, gaps with cement and sand mortar were filled with holes drilled from both sides of the joints.

- The calibration of the stations and the validation of data resulted from the measurements

Partners' specialists participated to trainings for automatic stations calibration. The training was held in the period 20-21 April 2016 in Iasi.

The main topic of the training referred to the automatic stations installed in Ukraine, Republic of Moldova and Romania in the project. The discussions were about their functioning, calibration and maintenance.

Moreover, during installment of automatic stations, Ukrainian personnel from the project partners were trained to develop the stations calibration too. The calibration of the new installed automate stations and the validation of data was performed in comparison with manual observations.



Graph for comparison of results of automatic and manual observations on water levels on gauging station Storozhynets.

- Training of 20 specialists in processing and communication of primary data, and in designed dispatch and cartographical applications

In June 2016 was organized by LP training for GIS software utilization, in Bucharest, at ESRI headquarters.

The training was organized in 2 modules: beginner level (14-17 June) and intermediary level (20-24 June).

Personnel from the project partners participated to both modules, with about 3 persons by module. The persons who were trained are involved in forecast, flood protection and management plans activities.

- Data processing and data communication - designing the trilateral informational system for water and emergency situations management

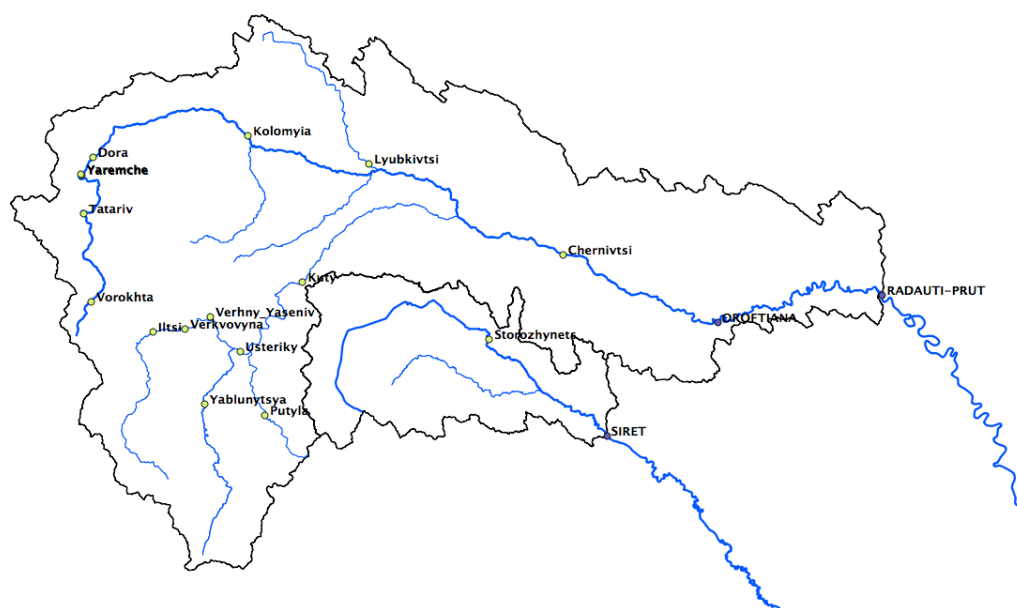
During project development technical experts of partners discussed and agreed the “Planning for Common data collection in modernized Dispatch and Forecast Centers”, where were detailed the needs and the characteristics of the system to be created, regarding the data collection.

➤ The modernization of the information and hydrological forecast system

One of the main tasks of experts within the project was the development and implementation of a modern automated system of permanent forecasting of water levels and water flow discharges for Ukrainian parts of the Prut and Siret Rivers Basins.

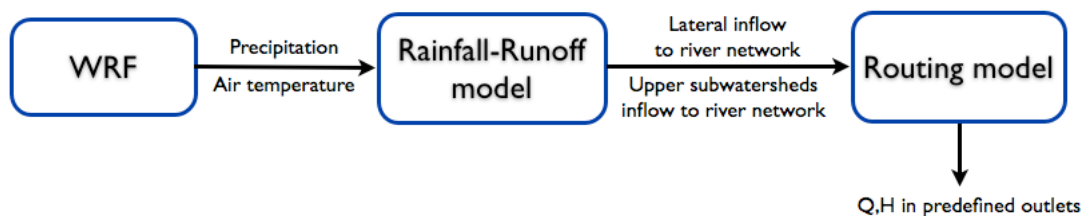
This refers to:

- ❖ Development of software system for modeling water levels and water flow discharges in the basins of the Prut and Siret. Hydrological forecasting system realized provide forecast of water levels and discharges in the outlets of existing Ukrainian and nearest to border line Romanian hydrological gauging stations (Radauti, Oroftiana, Siret) with lead time corresponding to weather forecast.



Development and calibration of hydrological models required historical hydrometeorological data. Consequently were used data covering period 2003-2010 for: sub-daily water levels, sub-daily discharges, 12h and 6h precipitations, minimal and maximal daily temperature, daily wind speed, daily relative humidity, and daily sunshine hours.

System is based on the chain of models that includes numerical weather prediction model (NWP), rainfall-runoff model and river hydrodynamic model.

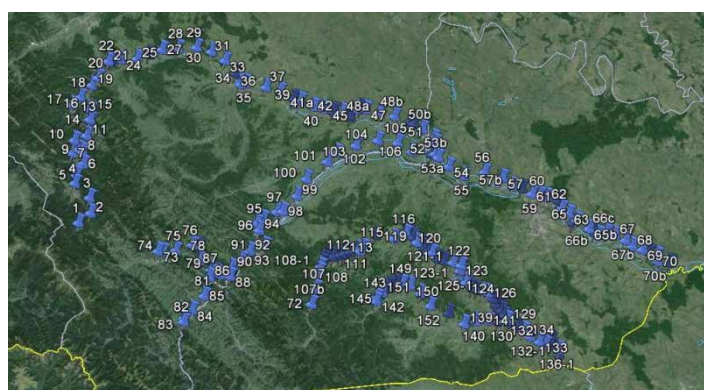


Software was installed on PCs of operational hydrologists in Chernivtsi Hydrometeorological Center and visualization of forecasting meteorological model WRF on the Screen plasma is available in dispatching office (ex. in Chernivtsi Regional Centre on Hydrometeorology).



❖ Execution & realization of measurement of cross sections and geodesic surveying of riverbeds and floodplains of rivers of Upper Prut and Siret basins Measurement of the cross-sections of riverbeds and flood plains were made in the following sections:

- river Prut: town Vorokhta - village Dora;
- river Prut: village Delyatyn - village Tovmachyk;
- river Prut: village Sheparivtsi - town Zabolotiv;
- river Prut: town Zabolotiv - town Sniatyn;
- river Prut: town Sniatyn - village Boyany;
- river Prut: village Boyany - village Marshyntsi;
- river Chornyi Cheremosh: Verkhovyna - river mouth (village Usteriky);
- river Bilyi Cheremosh: village Yablunitsa - river mouth (village Usteriky);
- river Cheremosh: village Usteriky - village Tyudiv;
- river Cheremosh: village Tyudiv - river mouth (village Chortoriya);
- river Malyi Siret: village Verhni Petrivtsi - river mouth (village Suceveni);
- river Malyi Siret: village Banyliv Pidhirnyy - village Verhni Petrivtsi;
- river Siret: village Dolishniy Shepit - town Storozhynets;
- river Siret: town Storozhynets - village Novyy Vovchynets.



- ❖ Preparation of climate information for a long-term period from meteorological stations located in Prut and Siret basins;
- ❖ Preparation of the base of term meteorological characteristics for the period 2003-2010 years in order to use them in the development of modern hydrological model of permanent forecasting of the flow.

Project activity 3: Preparing the Flood Directive (2007/60/EC) reporting for the Preliminary Flood Risk Assessment and Flood Hazard and Risk Mapping along the Prut Floodplain and in Siret Basin, upstream Romania

As shown in Flood Directive, effective flood prevention and mitigation requires cooperation between neighboring countries. This is in line with international principles of flood risk management, which can be achieved only if the parties located in a transnational river basin (EU Member States and non-Member States) cooperate. Siret and Prut are two of the Romanian trans-border basins.

- The identification of the historical flooded areas and mapping of historical flood events and determining the prevention measures for the identified flood risk areas

Project partners' experts participated to the research of documentation on the description of extreme events in specific studies and historical documents and to collect the information on vulnerability and historical floods. They discussed and established a list of indicators (data) to be collected in the flooded area along Siret and Prut rivers. The resulting flood inventory was used to establish the historical affected zones and prioritize the required measures and investments for flood protection.

Collecting essential information on historical floods (especially extents and consequences) improved the understanding of extreme events and flood management. This information was considered mandatory in flood risk preparedness and planning of protection measures, considering that the floods happening today tend to follow the same routes as similar ancient flows.

All participating institutions were involved, but in different tasks. Partner's experts, together with more experienced Romanian specialists defined a unitary methodology in order to realize the mapping of historical floods for the Siret and Prut River Basins, in conformity with the EC technical papers and results of different EC projects.

Workshops and technical working meeting organized within the project aimed at the realization and consolidation of a common database, as well as a common methodology for hazard and risk maps elaboration.

Through various meetings with stakeholders (organized in Romania in Iasi and Suceava, in Republic of Moldova in Kishinev and in Ukraine in the framework of Storozhinets District Council, of Novoselitsa and Kitsman districts, in Vyzhnytsia , Putyla, Kosiv and Verhovyna districts, in Chernivtsi city with representatives of local authorities, emergency services).



Chernivtsi , 03.02.2016

It was demonstrated that stakeholders feedback allow accelerate actualization of data, received from different actors involved into process of hazards detection & modeling.

Working meeting of the EAST AVERT project in Vyzhnytsya on 24.09.2015



Working meeting of the target groups of the EAST AVERT project in Storozhynets on 04.11.2016

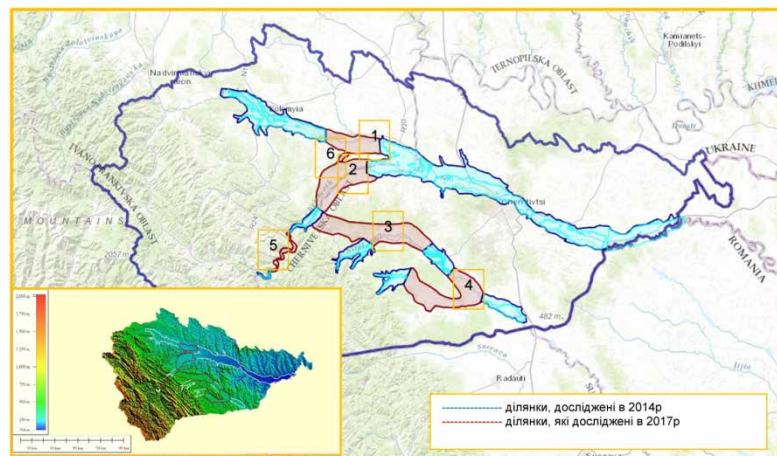
➤ Flood hazard mapping and the vulnerability/risk mapping using an adequate DTM and the high-resolution spatial data

Within the project were carried out modeling and realization of hazard and risk maps, based on historical flood data from the 3 countries.

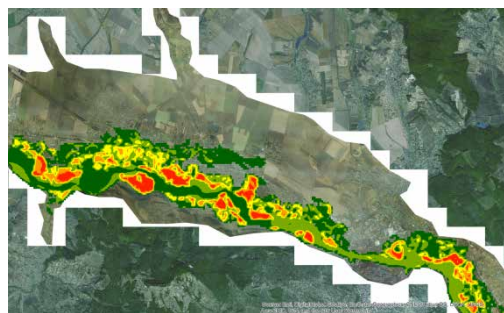
The flood hazard map is the document that represents the expansion of potentially floodable areas of major river beds (including depths) for floods the maximum flow of which is characterized by the following probabilities of exceedance: 0.1% (low probability of overtaking), 1 % (average overtaking probability) and 10% (high probability of overrun). The purpose of the hazard map: decision support, drafting flood management plans, population awareness and other general purposes. However, the map does not provide the degree of precision needed to design some constructions, especially industrial ones, roads, treatment/purification plants, etc.

An important component of the project was the zoning of the territory for the risks of flooding from historical highs, which resulted in the identification of the 18 most flood-hazardous areas in Ukraine.

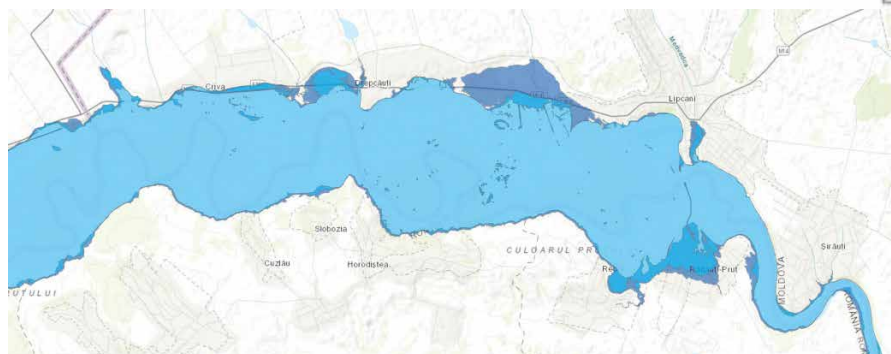
Zoning of the territory for the risks of flooding in Ukraine



The effort of the technical experts in this regard finally aimed at the development of the **Atlas of flood risk and hazard maps for the border area in the upper rivers of the Prut and Siret Rivers**, the elaboration of the EU Floods Report (simulations) and the realization of a Common Action Plan for flood protection in the border regions.



Assessment of risks and losses



At the end, project experts' activities concluded in:

- ❖ a common methodology for PFRA and hazard and risk mapping,
- ❖ common GIS software application (available software licenses and adequate hard for further development)
- ❖ a common action plan for flood protection in the border regions, acting as a integrated community, under well known, exercised rules.

The main out-puts of this third project activities was:

- ❖ Flood Protection Plan for Siret and Prut River Basins, integrated at the border areas;
- ❖ Flood hazard and risk maps on the main rivers (Siret, Prut and first order tributaries);
- ❖ Public debates in the cities presenting flood risk mapping and stakeholders meeting for maps content;
- ❖ Exercise for HIS testing and Flood Protection Plan for each river basin.

The main advantage of these activities is that Romania, as Member State of EU, creates the background for delivering the Prut and Siret basins preliminary integrated analysis, hazard and risk mapping reports on the RO-UA-MD border area to European Commission, which will be used by ICPDR for preparing the integrated products at the Danube Basin level.

Project activity 4: Collaboration for improving the framework of the bilateral Agreements in case of floods

On 17-19 June 2014 took place in Chernivtsi, Ukraine, a bilateral meeting of the Working Group for Siret and Prut rivers problems, based on the Agreement between Romanian and Ukrainian Governments, regarding the cooperation for transboundary water management. During the bilateral meeting, the two partners (Partner 3 - ABA Siret, RO and Partner 6 - Dniester-Prut Basin Department of water resources, UA) had an informal discussion on the proposal of "PROTOCOL FOR DATA EXCHANGE, based on the bilateral Agreement between Romanian and Ukrainian Governments, regarding the cooperation for transboundary water management, with the purpose of EAST AVERT (MIS ETC 966) Project implementation".

On 8-11 December 2014 took place a bilateral meeting of the Working Group for Siret and Prut rivers problems, based on the Agreement between Romanian and Ukrainian Governments, regarding the cooperation for transboundary water management. The bilateral meeting between the partners of the project meaning PP3, PP6 and PP7 took place on 11 December 2014 in Chernivtsi, Ukraine, PP6 headquarter. During the bilateral meeting, the three partners had informal discussion on the hydrological informational plan (data communication, data processing, information and warning) for Ukraine-Romania.

On 8-11.12.2015, in Bucharest, representatives of 2,3,4,6,7 had a meeting concerning the exchange of hydrometeorological data. There were discussion on development of a proposal for including a new annex to the Regulations of the exchange of meteorological and hydrological data taking into account the points, parameters, frequency of data transmission from automatic stations, which will be installed within the EAST AVERT project, and hydrological forecasts created by the new common forecasting system.



In Chernivtsi, Ukraine, 25-26 May 2016 bilateral meeting of the Working Group for Siret and Prut rivers problems, based on the Agreement between Romanian and Ukrainian Governments, regarding the cooperation for transboundary water management, were discussions about the automatic stations measurement, installed in Chernivtsi and Storojineț, and about the possibility to use data provided by the stations in order to reduce the time between level transmissions during flood periods.

As jointly efforts of project partners' experts, and with the support of Lead Partner - Ministry of Environment - Romania, on Chernivtsi, Ukraine, 22-24 November 2016 bilateral meeting of the Working Group for Siret and Prut rivers problems, based on the Agreement between Romanian and Ukrainian Governments, regarding the cooperation for transboundary water management, was agreed to be accepted the proposal of inclusion of two supplementary annexes, 9a and 9b, to the Hydrological exchange data Regulation, concerning automatic stations data exchange, and art.10 of Flood protection Regulation. This amendment to the RO-UA bilateral agreement in force will be endorsed in the near future by a Government Decision.

A similar proposal was discussed and will be promote for Romania - Rep. of Moldova cooperation regarding Stanca Costesti dam exploitation Regulation framework.

Project Partners stated that finally, all project activities lead to improvement of bilateral cooperation, due to the improvement of data communication, data processing, information and warnings exchange in the day-to-day activity. They agreed & commit to develop their cooperation and collaboration, under the umbrella of bilateral agreements requirements, beyond the project timeframe.



Bucharest, 2016, Project Steering Committee meeting

Project activity 5: Transparency

Project publicity and informational products include:

- Publishing and disseminating of booklets and posters;
- Creation of notices and articles for mass-media;
- Press conferences;
- Creation of the placard;
- Creation and updating of the WEB page/websites dedicated to the project, within the own web-site. Dissemination of the project results at local and national level - on the entire duration of the project development.
- Awareness actions through mass-media;
- Organization of 3 project conferences, one in each country (Romania - 2014 in Iasi, Ukraine - August 2015 in Chernivtsi and Rep. of Moldova - November 2015 in Kishinev), a final workshop in Bucharest (2016), a 2 Stakeholders Conferences (initial and final) in Kishinev, where the project results and the opportunities of expansion in other river basins were displayed.



Final Workshop for results dissemination and presentation the maps content EAST AVERT Project in Bucharest on 11-12.10.2016



Final Stakeholders Conference organized within EAST AVERT project in Kishinev 17-18.11.2016

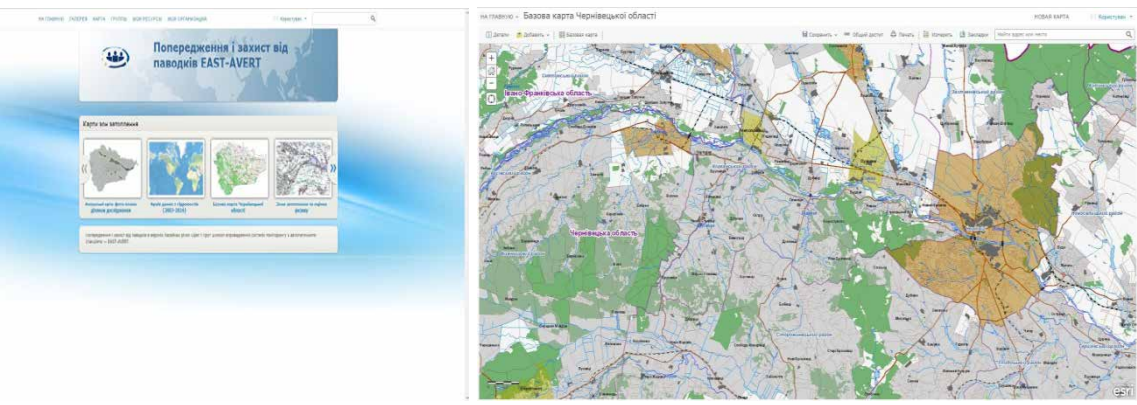
Project outputs & results were been discussed and presented during meetings with stakeholders, both in Romania (Iasi and Suceava), as well as in Rep. Moldova (Chisinau) and Ukraine (in the Chernivtsi region and Ivano-Frankivsk region).

Increasing the reaction capacity by a better data and forecasts dissemination and information about flood hazard and risk to general public was realized through



various publications as, leaflets, brochures, articles in newspapers & journals, TV clips a.s.o.

Results of the project are described on official web-site <http://east-avert.org/> and on general web-resource ArcGIS Portal with multi-level access structure.



Visualization of web-resource GIS Portal

The achievements and results of the project demonstrated the good understanding and collaboration of the specialists from the three countries, and last but not least, they made proposals for the improvement of the bilateral agreements on the data exchange and the management of the emergency situations caused by the floods.

The project was considered a Flagship Project for Priority Area 5 - “Environmental Risks” within the European Union Strategy for the Danube Region, being considered as an example of good collaboration between EU and non-EU Member States, the results of the project being presented at the Danube Strategy Annual Conferences of 2016 (Bratislava, Czech Republic) and 2017 (Budapest, Hungary).

- Project contributes to preventing the cross-border environment pollution and to a certain extent will improve the unfavorable ecologic situation in the region.
- Flood protection will be increased by better monitoring, warning and alarming systems in the border area, for Prut and Siret River Basins.
- Policy makers should consider the resulted hazard & risk maps for upper Siret and Prut River Basins in planning & land development, in agriculture and industry activities for increasing the prosperity and resilience of citizens, for protecting the natural patrimony and heritage from this border area.

Benefits

Final beneficiaries &/or target groups: 1) the water authorities (Water Basins Authorities) from Romania, Ukraine and Republic of Moldova; 2) representatives of environmental protection institutions (local and regional Environmental Protection Agencies, Non-Governmental Organizations); 3) the political authorities, from the Ministry of Environment and Climate Change and the Ministry of Health, from Romania and Ukraine and Ministry of Environment of Republic of Moldova, which are implicated in the flood risk management, prevention of natural or manmade disasters, real time information dissemination; 4) the stakeholders and water users (city halls, prefecture county council) placed in cross border area that will be informed about the flood monitoring and flood risk management systems) from:

- Romanian territory:
 - counties (for Siret River): Suceava, Iasi, Neamt, Bacau;
 - counties (for Prut River): Botosani, Iasi, Vaslui, Galati.
- Ukraine territory: Ivano-Frankivsc & Chernivtsi regions
- the Republic of Moldova territory: Briceni, Edineti, Riscani departments



EAST AVERT MIS ETC 966 MILESTONE FOR THE FUTURE: project partners commit to collaborate, share experience and develop new projects in the field of environmental protection!



The European Union is made up of 28 Member States who have decided to gradually link together their know-how, resources and destinies. Together, during a period of enlargement of 50 years, they have built a zone of stability, democracy and sustainable development whilst maintaining cultural diversity, tolerance and individual freedoms.

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Lead Partner:
Ministry of Environment
Romania

Partner 2:
Prut-Bârlad Water Basin Administration
Romania

Partner 3:
Siret Water Basin Administration
Romania

Partner 4:
National Institute of Hydrology and Water Management
Romania

Partner 5:
“Apele Moldovei” Agency
Republic of Moldova

Partner 6:
Dniester-Prut Basin Department of Water Resources
Ukraine

Partner 7:
Chernivtsi Regional Centre on Hydrometeorology
Ukraine

Partner 8:
State Scientific and Technical Centre for inter-sectorial and regional problems of the Environmental Safety and Resources Conservation “EcoResource”
Ukraine

Project implemented by Ministry of Environment - Romania

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