



FLOODGUARD

“Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area”

Project Overview

Περιλαμβάνεται περίληψη στην Ελληνική γλώσσα

The Project is co-funded by the European Regional Development Fund (ERDF) and by national funds of the countries participating in the Interreg V-A “Greece-Bulgaria 2014-2020” Cooperation Programme



The Project is co-funded by the European Regional Development Fund (ERDF) and by national funds of the countries participating in the Interreg V-A “Greece-Bulgaria 2014-2020” Cooperation Programme



Disclaimer: The views expressed in this publication do not necessarily reflect the views of the European Union, the participating countries, the Managing Authority and the Joint Secretariat of the Programme.

CONTENTS

FLOODGUARD at a Glance	2
Floodguard’s Main Overall Objective	8
Floodguard’s Principal Expected Results	10
Floodguard’s Main Outputs	12
Floodguard’s Benefit of Transboundary Cooperation	14
FLOODGUARD’s Dissemination Strategy Methodology.....	16
Project Beneficiary 1 (Lead Beneficiary)	17
Project Beneficiary 2 (PB2)	27
Project Beneficiary 3.....	37
Project Beneficiary 4.....	40
PROJECT BENEFICIARY 5	57
PROJECT BENEFICIARY 6	58
Project Beneficiary 7 (PB7)	74
Perspectives of FLOODGUARD Project	82
GREEK SUMMARY – ΠΕΡΙΛΗΨΗ ΣΤΑ ΕΛΛΗΝΙΚΑ.....	83

FLOODGUARD AT A GLANCE

PROGRAMME	<p>INTERREG GREECE BULGARIA 2014-2020</p> <p>Investment priority: Promoting investment to address specific risks, ensuring disaster resilience, and developing disaster management systems.</p> <p>Specific objective: To improve CB cooperation on flood risk management plans at river basin level.</p>
PROJECT NAME	<p>Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area</p> <p>FLOODGUARD</p>
DURATION	<p>01 April 2019 – 31 December 2023, 57 months</p>
BUDGET	<p>4.611.022,93 €</p>
PARTNERS	<p>7 institutional partners:</p> <ul style="list-style-type: none">- 5 partners from Bulgaria- 2 partners from Greece

Priority axis: A sustainable and climate adaptable cross-border area

Duration: Start: 01/04/2019 End: 31/12/2023

Main objective: to strengthen the capacity of authorities in the cross-border area to ensure effective, integrated joint coordination and responsiveness to flood risks in the Cross Border area.

Cooperation objective: improvement of CB cooperation on flood risk management plans at river basin level

Long term results: lower cost of floods

River basins: Mesta – Nestos, Struma – Strymon, Arda – Ardas and Maritsa – Evros

Population covered - appr. 1 750 000



BULGARIA

LB: *Fire Safety and Civil Protection Directorate General, Ministry of the Interior*

PB2: *East Aegean River Basin Directorate*

PB3: *West Aegean River Basin Directorate*

PB4: *National Institute of Meteorology and Hydrology*

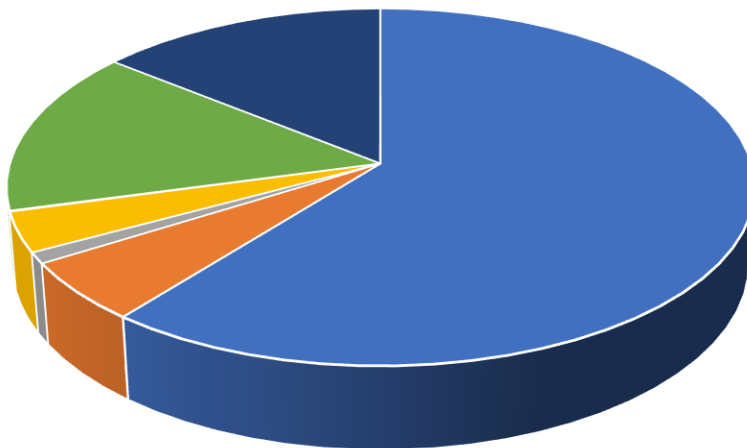
PB5: *District Administration of Blagoevgrad*

GREECE

PB6: *General Secretariat of Natural Environment and Water*

PB7: *Decentralized Administration of Macedonia - Thrace*

PROJECT BUDGET - 4 611 022,93 EUR



- Fire Safety and Civil Protection Directorate General, Ministry of Interior (LB)
- East Aegean River Basin Directorate Plovdiv (PB2)
- West Aegean River Basin Directorate (PB3)
- National Institute of Meteorology and Hydrology (PB4)
- District Administration Blagoevgrad (PB5)
- General Secretariat of Natural Environment and Water (PB6)
- Decentralized Administration of Macedonia - Thrace (PB7)

PROJECT WORKPACKAGES

Project management and coordination

Preparation and management activities

Communication and dissemination

Events, publications, information materials, website

Establishment of a Joint Working Group for prevention and reaction in cases of floods

JWG establishment, workshops, studies, strategic planning, pilot testing, technical equipment

Capacity building actions for flood risk mitigation and information exchange structures

- ✓ *Data collection, assessment, and analyses*
- ✓ *Supply of equipment and software*
- ✓ *Planning and standards*
- ✓ *Joint trainings*
- ✓ *Information tools and structures*

Construction of a joint training centre and pilot activities

- ✓ *Construction and equipment of a joint training center for the first responders*
- ✓ *Supply of equipment for a training ground*

Activities outside Program Area

- ✓ *Development of information tools and structures for flood risk mitigation*

FLOODGUARD'S MAIN OVERALL OBJECTIVE

The **Main Overall Objective** is to *strengthen the capacity of authorities to ensure effective, integrated joint coordination and responsiveness to flood risks in the Cross Border area.*

The project addresses different aspects of flood risk management to provide integrated results. The following sub-objectives have been defined:

- introducing a joint institutional approach for assessment, planning, prevention and fighting against floods.
- increasing the technical and administrative capacity of civil protection services for joint actions in the field of preparedness and response in cases of floods.
- introduction of effective information exchange structures and systems for flood risk assessment, mitigation, and management.

The **project objective** will have a direct contribution to the relevant specific objectives of the Programme – SO 2.1 “To improve CB cooperation on flood risk management plans at river basin level” under PA 2 “A Sustainable and Climate Adaptable Cross-Border area”. Its implementation will result in more effective joint actions and coordination activities against flood risks, in terms of:

- joint coordination of five flood risks management plans (FRMP) for international rivers - two in Bulgaria and three in Greece.

- coordination of joint interventions of civil protection services for flood risk management through strengthening their technical and administrative capacity, joint planning, standards and trainings.
- establishment of effective information exchange structures for flood risk management.
- establishment of a joint administrative structure for coordinated activities in the field of assessment and management of risks associated with floods.

FLOODGUARD'S PRINCIPAL EXPECTED RESULTS

The principal expected results are the strengthening of the capacity of the authorities in the CB area to prevent and limit damage caused by floods and the increase of the resilience to natural disasters in the CB area.

As a result of the CB cooperation, the project will contribute to an integrated joint management of flood incidents.

A tangible result, in the near-medium future, will be Countries' higher level of preparedness in dealing with floods risks. Further, CB cooperation will contribute to lower negative impact of floods (damages, losses, etc.) of floods.

The results will directly influence the end users (population), through provision of more effective and coordinated measures in cases of floods and reducing the damages, as follows:

- The scope of activities in the river basins of Mesta - Nestos and Struma - Strymon in Bulgaria covers appr. 6 458 km² with population of 332 668. It includes 9 regions with significant potential flood risks with population of 140 074 persons.
- The scope of activities in river basins of Arda - Ardas and Maritsa - Evros in Bulgaria covers 11 700 km² in the Programme area with population of 511 524, as well as 23 561 km² outside the Programme area with population of 1 686 888.
- The Programme area covers 14 regions with significant potential flood risk, with population of 252 149, and additional 17 regions with population of 200 817 outside the Programme area.

- The scope of activities in Greece covers the basins of Nestos, Evros and Strymon with total area of 14 377 km² and total population of 613 218 persons.

FLOODGUARD'S MAIN OUTPUTS

The objectives will be achieved through adequate project management (preparation, management, meetings, audits, reporting and impact assessment), as well as adequate information and dissemination activities (communication strategy, conferences and workshops, publications, information materials and project website).

The project main outputs will have long-term usage and maintenance, ensured by the project beneficiaries' status - stable public institutions with national financing of their functioning and assets.

The project outputs represent components of the national policies and strategies of the two counties in terms of flood risk management, which will ensure the long durability of project main outputs.

The outputs related to the Joint Working Group establishment and functioning will be ensured by the analytical and strategic documents and road map envisaged to be elaborated and adopted by each participating institution within the project.

The equipment for the JWG will be duly operated and maintained by PB 7, for usage of the JWG functioning within and after the project completion. This experience can be applied in other national institutions and sectors with potential of CB cooperation.

Delivery of special equipment and training software under WP 4 for Project Beneficiaries 1 (or Lead Beneficiary) and 7 will be used both within the envisaged joint training activities within the project, as well as after the project completion for training purposes and actions in cases of floods.

The developed Bilateral Standard Operational Procedures between first responders will be adopted by LB and PB 7 and

enforced in the long term in cases of floods. The joint trainings will also have a significant impact on exchange of know-how and coordination between the participation institutions.

The activities and tools for data collection, analyses, assessment, and information structures for risk management under WP 4 are crucial for improving the coordination of measures implemented by the two countries.

They add value to the existing systems and introduce innovative methods of monitoring, assessment, and mitigation of risks of floods. These outputs can be used as benchmarks for other countries and sectors in terms of adoption of latest technical achievements in the field of risk management.

The constructed and equipped training infrastructure by LB will be used in the long term jointly by the partners, with possibility for training of other partners and stakeholders in the long term, acting as first responders (i.e. Red Cross representatives, other countries' institutions, etc.)

FLOODGUARD'S BENEFIT OF TRANSBOUNDARY COOPERATION

The main benefit of Transboundary Cooperation, the common problems associated with flood risk management and addressed by the current project must be tackled at river basin level, which goes beyond national boundaries.

Flood disasters can spread across borders and their effective management is of cross border importance, which requires to increase resilience to natural disasters (floods) at cross-border level.

Fulfillment of Directive 2007/60/EC requirements on flood risk management plans prompts joint coordination at the level of the international river basin districts.

The Programme area includes three international river basins - Strymon-Struma, Nestos-Mesta, Ardas-Arda and Evros-Maritsa, which will all be covered by the joint and coordinated actions within the project.

The project implementation will contribute to an integrated joint management of flood incidents.

The project envisages coordination activities for implementation of national flood risk management plans, as well strengthening and aligning the capacity of public authorities to assess, prevent and intervene in case of flood risks. Thus, the project implementation will contribute to better management of flood risks as well as in capacity-building of stakeholders in immediately risk response actions.

The developed IT and communication structures for risk assessment, monitoring, and early warning systems, will contribute to a unified approach of institutions from both sides of the border.

The establishment of joint structures (**Joint Working Group**), joint trainings and alignment of national standards of partners will not only strengthen the partners' capacity, but also harmonize the national standards and enable the institutions from Greece and Bulgaria to cooperate more effectively in terms of assessment, prevention, intervention, and recovery from flood disasters.

FLOODGUARD'S DISSEMINATION STRATEGY METHODOLOGY

The Dissemination Strategy Methodology is based on the Stakeholders' theory, that is founded on the crucial role of stakeholders, who can have a positive or negative influence on a project.

A stakeholder is an individual, group or organization that is impacted by the outcome of a project and at the same time they influence the project itself.

They have an interest in the success of the project and can be within or outside the organization that is sponsoring the project.

Stakeholders' theory gives us the process by which we can organize, monitor, and improve the relationships with the stakeholders. This practice is commonly known as Stakeholder Management.

Stakeholders management steps



Through the Stakeholder Mapping & the Dissemination Strategy of Project Results & the Communication Actions the goals of stakeholders' management will be achieved and therefore the success of this project shall be ensured. FLOODGUARD Deliverables per Beneficiary

PROJECT BENEFICIARY 1 (LEAD BENEFICIARY)

FIRE SAFETY AND CIVIL PROTECTION DIRECTORATE GENERAL, MINISTRY OF THE INTERIOR

Lead Beneficiary (PB1) was responsible for the overall coordination, management and implementation of the project vis-à-vis the Managing Authority. In the frame of the above he was organizing the Joint Project Management Team meeting every six months, mostly online.



Furthermore, Lead Beneficiary accomplished the following:

- ✓ Supply of two Command operational off-road vehicles
- contract concluded
- the vehicles were delivered in the middle of July 2020



- ❖ Taking into consideration the legal powers to organize, coordinate and manage Blagoevgrad district disaster protection, one of the vehicles was provided to PB5.



✓ Supply of Rope rescue systems

- contract concluded
- implementation finished - the equipment was delivered and accepted.





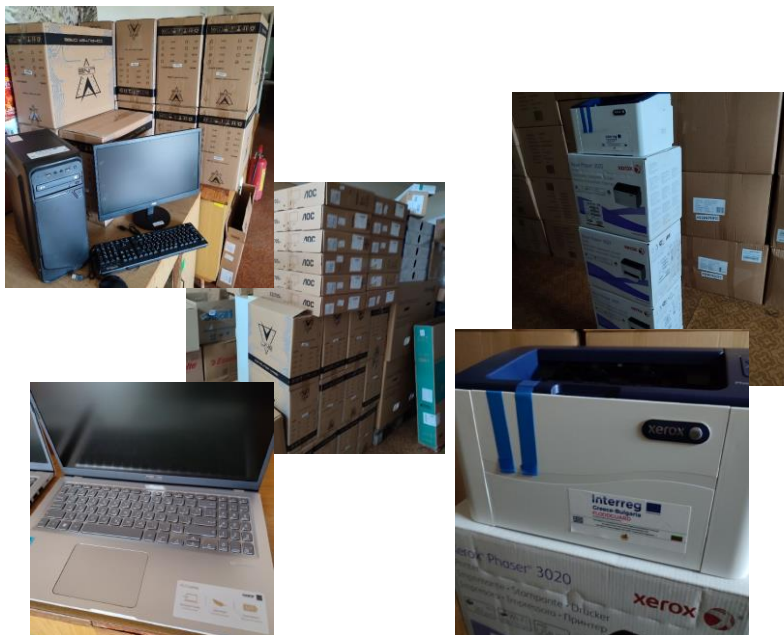
- ✓ Supply of equipment for establishing a training ground for a simulation of actions in case of floods



- contract concluded
 - implementation finished - the equipment was delivered and accepted.
 - ✓ Supply of equipment for Training center.
- Launched and fulfilled contracts for the delivery of:
- computer equipment

- printers and multifunction devices
- multimedia projectors
- audio-visual equipment
- communication equipment
- sleeping sets, pillows, etc.





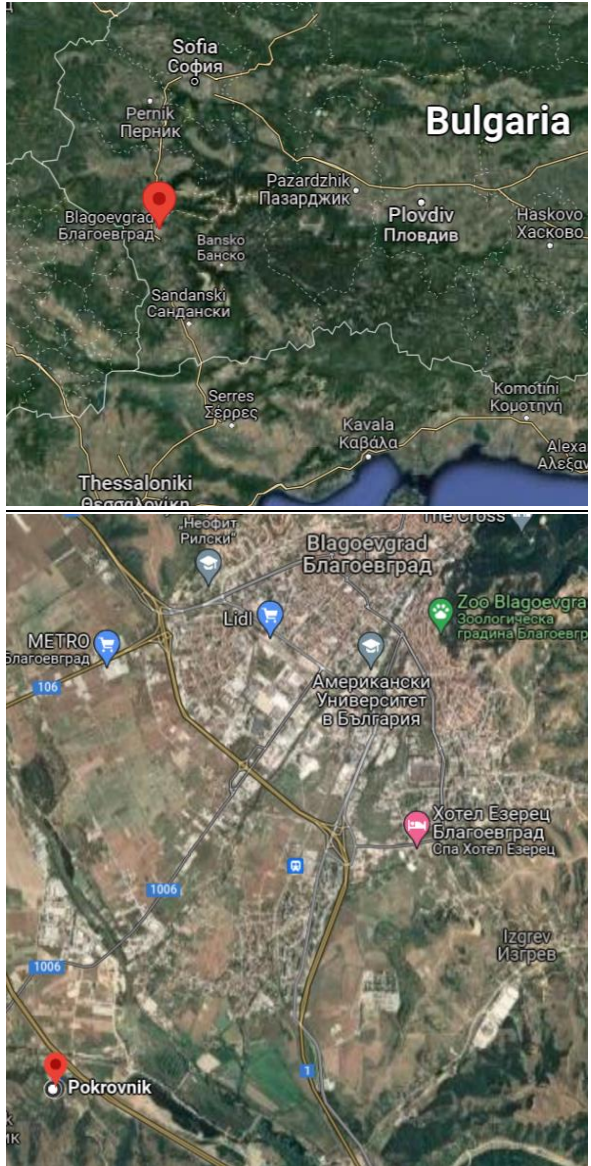
- ✓ Supply of Highly accessible vehicles, „Ratrac” type
 - contract concluded
 - the vehicles were delivered in 11.05.2022





✓ Construction of a Training Center in Blagoevgrad region

- Contract signed on 28.08.2021
- Elaborated and approved investment designs
- Received construction permission from Blagoevgrad Municipality
- Launched Construction works on 28 March 2022
- Deadline for completion of construction works – 22 January 2023
- Ongoing construction works (implemented 40%)





❖ Ongoing public procurements

- ✓ Delivery of software for simulation of prevention, preparedness, response and recovery activities in case of flood incidents
- ✓ Organization of events
- ✓ Delivery of furniture and other equipment

PROJECT BENEFICIARY 2 (PB2)

EAST AEGEAN BASIN DIRECTORATE

Water Management in Bulgaria is carried out at national level by the Ministry of Environment and Energy and at basin level by the Basin Directorates. The Basin Directorate in Plovdiv is a competent body for water management including flood risk management in the East Aegean River Basin District



Main River Basins Evros-Maritsa, Tundza, Ardas, Byala (r. Erythrotamos) – 35,230 sq Km (32% of the country)

Main Activities

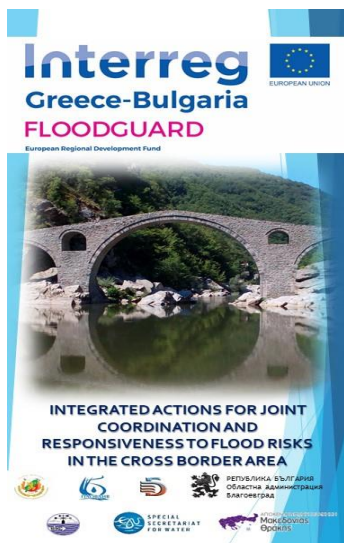
Work Package 2: Information and Publicity

Organization of regional workshops/meetings for public consultation of second cycle of Flood Risk Management Plan (FRMP) 2022-2027.

9 workshops in the Programme area



Promotional Material



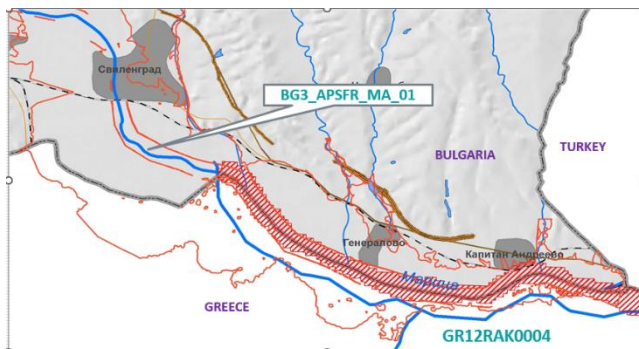
Work Package 3: Establishment of Joint Working Group

Participation in in the creation and functioning of the Joint Working Group for prevention and reaction to flood risks in the CB area

Work Package 4: Capacity Building for Flood Risk Mitigation and Information Exchange Structures

Comparison, Analysis and Integration of the Digital Elevation / Terrain Model

In the context of the implementation of the Floods Directive 2007/60/EC, Greece and Bulgaria had prepared the 1st cycle Flood Hazard Maps which revealed significantly different flood extents for the same scenario (i.e. return period $T=1000$ yrs). This is due to various factors, one of which is the used Digital Elevation/Terrain Model. Its accuracy is crucial for hydraulic modeling and the delineation of the flood extent.



To avoid the same problem in the future, a new DEM for the border territory was elaborated.

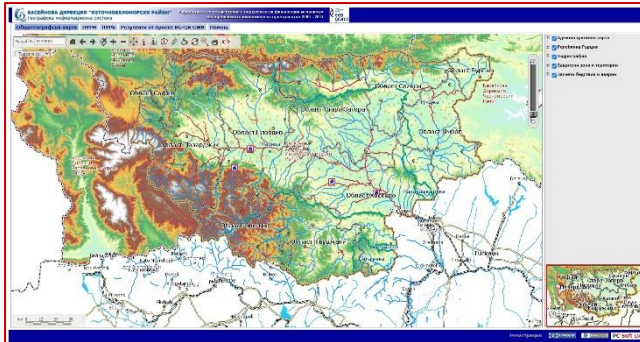


resulting to better hydraulic model and more precise delineation of the flood extend in the Flood Hazard Maps.



Update of Existing Geographic Information System with Additional Modules

During the FLOODGUARD project, instead of upgrading the existing GIS system, it was more expedient to develop new GIS system which completely includes and integrates all data and business logics.



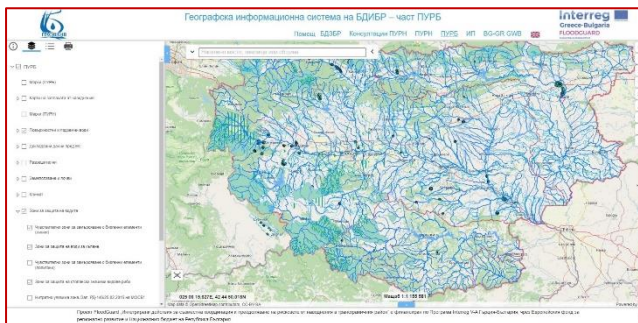
The scope was to be extended in order to: cover processes of gathering information from competent authorities, to develop and monitor implementation of stages of FRMP, collect and process incoming opinions and enhance transboundary coordination.

System Modules

- Administrative module
- Module *“Harmonization of data related to FD implementation; monitoring of stages of development of Second cycle of FRMP”*
- Module *“Progress of implementation of Program of Measures”*

- Search and download of spatial data, data import/export, data editing;
- Creation of dynamic queries, reports and analyses;
- Data editing via web application;
- Supporting of web forms;
- Supporting of collaborative online services

RBMP (RIVER BASIN MANAGEMENT PLAN)



The upgrade of the Geographic Information System of East Aegean River Basin Directorate with web-based interactive maps contributes substantially to increase the awareness of local communities on flood risk issues.

The interactive map visualizes a lot of data related to Flood Directive and Flood Risk Management Plans – the results of the Preliminary Flood Risk Assessments; Flood Hazard and Flood Risk maps showing flood extent and affected inhabitants and infrastructure in case of floods with different return periods - 20, 100 and 1000 years.

Maps for additional scenarios with 50 and 500 years return periods are available for Maritsa/ Evros at the border to

support transboundary coordination of flood risk management.

Link to EARBD's GIS

<https://gis.earbd.bg/ibbdr.webNew/?configUrl=https://gis.earbd.bg/ibbdr.webNew/BaseProject/Config/purn/config2.json#/>

PROJECT BENEFICIARY 3

WEST AEGEAN RIVER BASIN DIRECTORATE (WARBD)

The WARBD involves three river basins – Struma, Mesta and Dospat, with a total area on the territory of the Republic of Bulgaria of 8 545 km².

PB3 involved in Work Packages WP1 (Project Management), WP2 (Information and Publicity) and WP3 (Establishment of Joint Working Group). In particular, PB3 participated in the following activities:

- ✓ Participation in the creation and in the work of the Joint Working Group for prevention and response to floods in the transboundary area. Formulation of its role and functions. Preparation of information and participation in the workshops of the JWG.
- ✓ Conducting meetings and workshops in order to improve the joint coordination at each stage of the elaboration of FRMP 2022-2027 and seminars to increase awareness and preparedness for floods.
- ✓ Analysis of legislation in Bulgaria for prevention, preparedness and response. Analysis of the current situation.
- ✓ Elaboration of a draft strategy for interrelations between prevention and reaction for protection of floods for Bulgarian institutions.
- ✓ Testing of the Strategy.
- ✓ Development of a road map for the responsibilities, interrelationships and communications between the Bulgarian institutions.



PB3 organized 4 regional workshops in Blagoevgrad and Smolyan for discussion of the results of the analysis of identified problems in the Bulgarian legislation for prevention, preparedness and reaction, presentation of the project for a Strategy for interrelations between prevention and reaction for protection of floods for Bulgarian institutions, presentation of the road map for the responsibilities, interrelationships and communications between the Bulgarian institutions and its detailed studies and timetable.



The meetings were held in partnership with Sofia University and a special survey to all stakeholders unable to attend the meetings was sent.

Organization of regional meetings for Struma and Mesta river basins with the responsible institutions were also held as online events via virtual platforms, to discuss the encountered problems and in order to improve the coordination in the different stages of the elaboration of the Flood Risk Management Plan (FRMP) 2022-2027. The meetings were covering the Preliminary Flood Risk Assessment (PFRA) and the Flood hazard and flood risk maps.

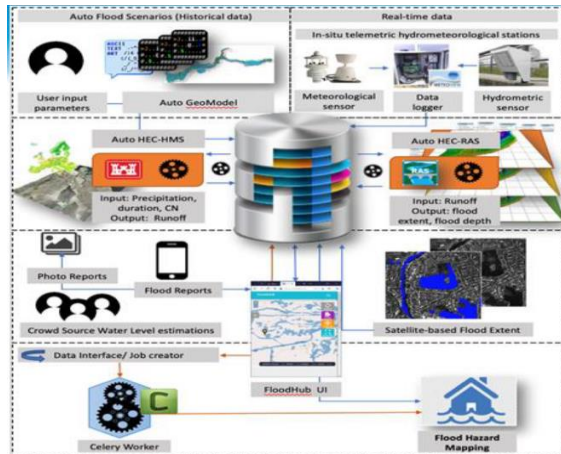
PROJECT BENEFICIARY 4

NATIONAL INSTITUTE OF METEOROLOGY AND HYDROLOGY

✓ **Comparison and assessment of methods and models of flood risk evaluation**

Greek and Bulgarian research on flood risk assessment and mitigation is analyzed in 60 published papers in 10 thematic sections.

- Remote sensing, satellite precipitation products, radar based forecasting
- Flood hazard mapping, risk assessment and management, decision support
- Flood forecasting systems
- Flood protection works, vulnerability assessment
- GIS and geo-information technologies
- Hydrology, hydraulics, river routing models of Maritsa \ Evros, and Arda \ Ardas basin
- Databases and inventories of floods
- Flash floods risk assessment, management and forecasting
- Social aspects of flood risk
- Dam management in relation of flood protection and climate change
- Transboundary rivers management under climate change
- Climate change aspects of river runoff, land use change aspects
- Emerging technologies in flood protection
- Sediments, water pollution in Evros and Arda



FloodHub: an integrated near-real-time flood monitoring system (Kontoes et al., 2000).

✓ **Report on existing hydrological technologies - technical preparation.**

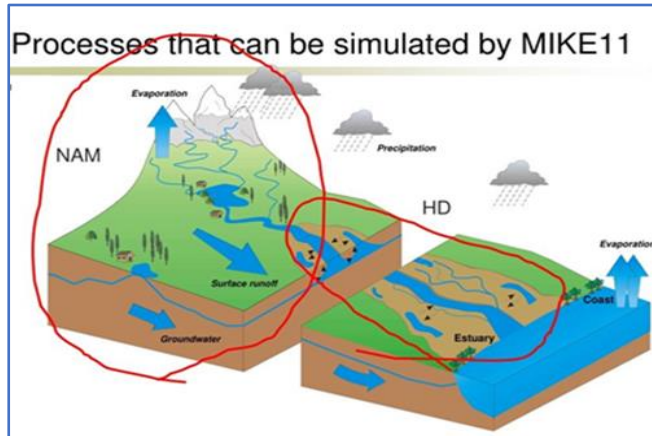
General notes about the need of hydrological measures, models and forecasting.

- Flood forecasting
- Operational forecast
- Comprehensive hydrological forecasting systems
- Types of numerical models for hydrological forecasting

Assessment of the existing bases for flood forecasting in Bulgaria

- Early warning system for the Maritsa River and Tundzha River watersheds <https://maritsa.meteo.bg>

- ARDAFORECAST Flood Early Warning System
- River basins in Northern Bulgaria and the Black Sea basin: Yantra, Ogosta, Rusenski Lom, Iskar, Aitoska River and Fakiyska River.



- ✓ **Analysis of available climate change data in connection with flood risk in south-east Europe with focus on Balkan peninsula.**

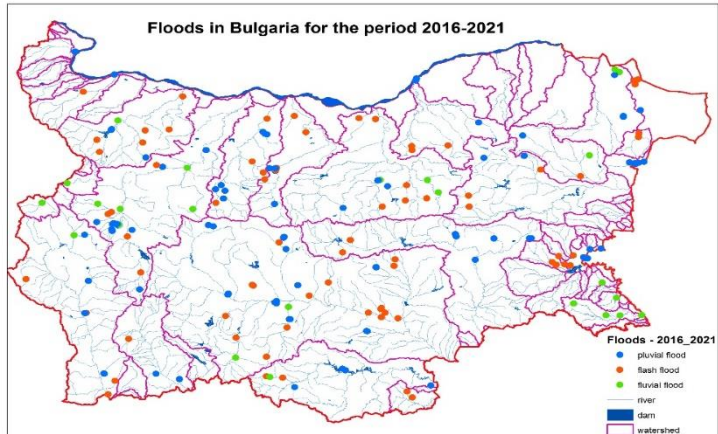
A GIS based methodology was applied to investigate the impact of climate change in precipitation and temperature on runoff. Historical flood events during the period 2016-2021 were analyzed. The type of flooding (fluvial, flash and pluvial), its causes, the amount and intensity of precipitation, recorded maximum water discharges and damage from the flood are analyzed too. On this base the impact of climate change on future flood frequency occurrence was evaluated. Assessment and analysis of the percentage change in the annual amount of precipitation, regardless of their type (convective and stratiform, rain, or snow).

- Assessment and analysis of the change in percentages of 6-hour rainfall over 15 mm.
- Assessment and analysis of the change in precipitation by catchments. In the country have been determined 1088 catchments and for each of them it was determined whether there are units of the model with an increase of 5% and 10% of the cases with 6 hours of precipitation over 15 mm.
- Synoptic, meteorological and hydrological information on floods in the country in the period 2016-2021 was collected

✓ **Capacity Building Actions for Flood Risk Mitigation and Information Exchange Structures**

In the period 2016-2020, 228 floods occurred in the country, of which 124 were pluvial floods, 79 flash floods and 25 fluvial floods.

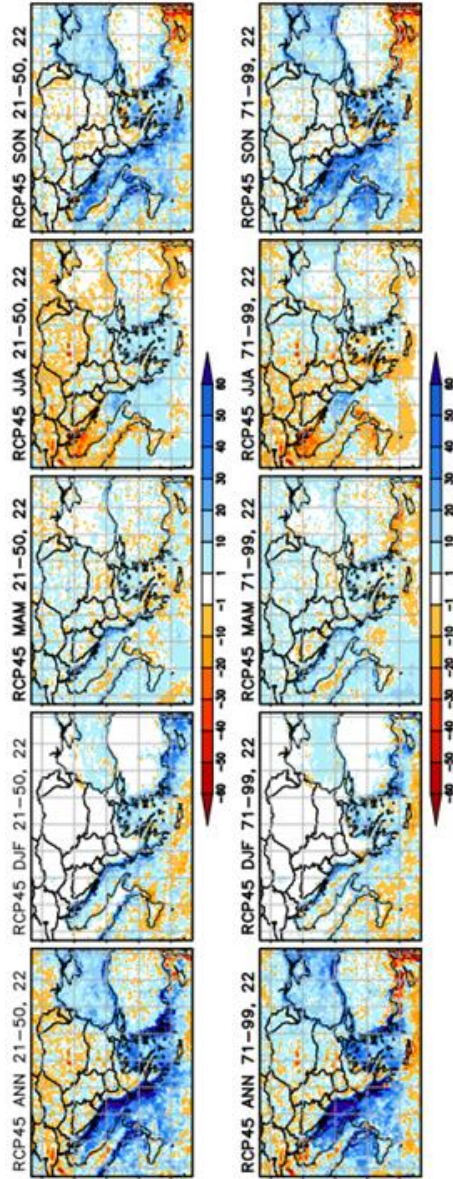
- In the Maritsa river catchment: 28 pluvial floods, 18 flash floods and 3 fluvial floods.
- In the Arda river catchment: 4 pluvial floods, 2 flash floods and 1 fluvial flood.
- In the Byala river catchment: 2 flash floods.



- ✓ Report on climate change impact assessment on flood risk

Climate simulations : precipitation thresholds

RCP4.5 and RCP8.5 greenhouse gas scenarios according to the new IPCC classification to value for the countries on the map.

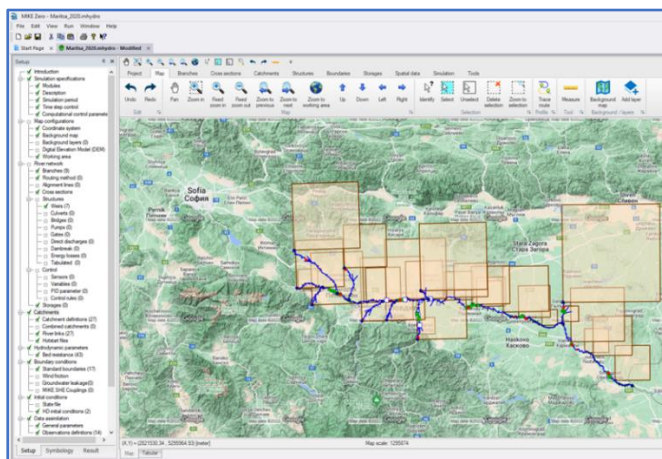


Analysis of available climate change data in connection with flood risk in south-east Europe with focus on Balkan peninsula

Simulated annual and seasonal change in the number of cases with 24-h convective precipitation above the fixed threshold 22 mm/24 h with the regional climate model RegCM4 for the periods 2021-2050 and 2071-2099 according to the RCP4.5 scenario compared to the reference period 1975-2004.

✓ **Software for the early warning system and equipment purchase**

For the purposes of the "FloodGuard" project a license for a software package for numerical modeling and forecasting of runoff and water levels in rivers was purchased.



The software MIKE HYDRO River is adapted to simulate the river flow of Maritsa River watershed until Svilengrad town. Water levels and discharges can be systematically set-up as

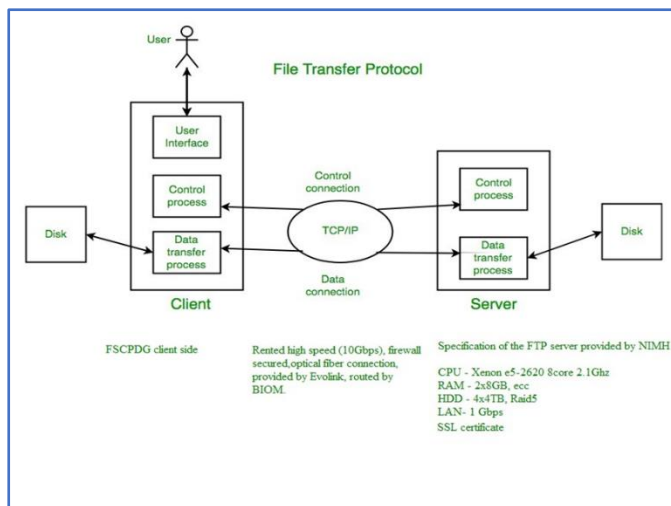
initial conditions and used as “hot-start” for the model. MIKE HYDRO River computes the analyzed simulation of water flow and produces forecasts for the main river “hot-points” and some Maritsa tributaries’ “hot-point” situated at towns near the river bed for 5 days ahead with 1 h step.

For the purposes of the "FloodGuard" project a server computer hardware was also purchased.



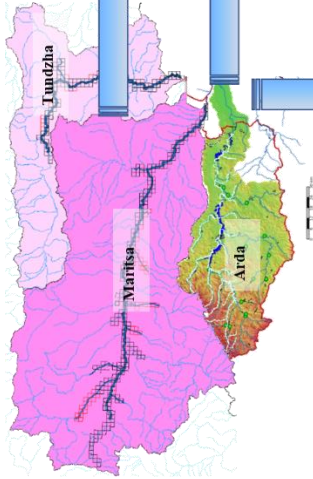
- ✓ Development of a technology line to the communication center of FSCPDG

An FTP (File Transfer Protocol) server was prepared with the following data flow: Data is received from the local area network (LAN) of NIMH – branch Plovdiv in text format. Data files contain days with effective warnings above warning level 0 (safe levels). For Maritsa River basin warning levels are sent in m above sea level (a.s.l.) while for Arda River basin warning levels are sent as m³/s as the two different forecasting systems use such metrics for their computations.



After reception data is available to be downloaded and used from Civil Protection Agency (Main Directorate "Fire Safety and Civil Protection" to the Ministry of Interior).

- ✓ Upgrade and development of flood forecasting systems for Maritsa and Arda River basins: general approach.
- Applications development at basin level: objective \deterministic\ riverflow simulations, flood forecast and water balance applications
- Upgrade of software models for 1: Maritsa River basin and 2: Arda River flood forecast systems



Maritsa River model

- Actual state: Mike11 – Floodwatch system on Maritsa and Tundzha Rivers
- Upgrade of the Mike 11 software to MIKE HYDRO River+MIKE Operations.

ARDAFORECAST project for Arda River basin

- <https://arda.hydro.bg/index.php?glaven=alertmap>
- SURFEX-TOP (7.3) with 3h for Arda river over 129 grid cells (8*8 km).
- Upgrade to :
 - SURFEX (8.1) DIF+MEB+RAPID routing <http://Rapid-hub.org>
 - Resolution upgrade – 1 h data step and 516 grid cells (4*4 km)

Set-up of NEW Model for Byala (Erithropotamus) River

Includes the basin until the reach of Erithropotamus River at the BG/GR border.
 Basin 594 km², mean runoff – 7.53 m³/s

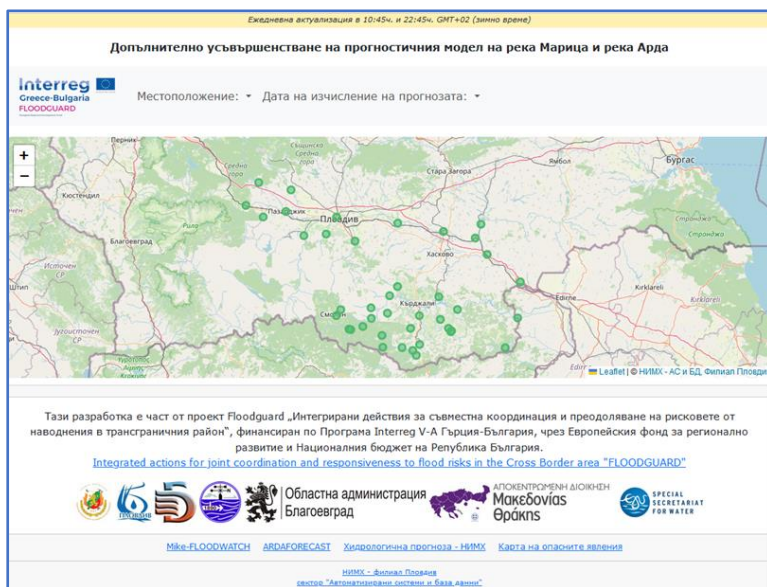
- Enhancement of model input fields spatial resolution: from 8km to 4km
- Enhancement of model time step \Arda river\: from 3 h to 1 h
- Use of satellite products for checking and validation of the precipitation input
- Validation of basin level annual water budget
- Applications development at local scale: snow equivalent and water balance applications
- Snow water equivalent \SWE\ simulation and validation at local scale for the better understanding of snow accumulation – snow melt process
- Simulation and validation of local scale annual energy and water budget
- Enhanced web publishing of real-time and forecasted river flow data series of main rivers.

- ✓ **Upgrade and development of flood forecasting systems for Maritsa and Arda River basins: tasks**
- ✓ **Upgrade and development of flood forecasting systems for Maritsa and Arda River basins: database**

A new database was built in order to implement the combined Maritsa-Arda-Byala River basins information on flood forecasting. Examples of meta-data tables and data series tables are shown.

series of simulated and forecasted streamflow discharge or water levels.

<https://plovdiv.meteo.bg/floodguard/>



The application allows to interactively visualize: hydrological forecast for 5 days ahead in 1 hour increments for 15 settlements in the basin of the rivers Maritsa and for 27 points/villages in the basin of the river Arda, as well as for the Bulgaria-Greece border. The internet visualization is built on the basis of existing internet systems for the Maritsa and Arda basins using data calculated from the new models developed within the FLOODGUARD project and the new Mike-HYDRO hydrological software.

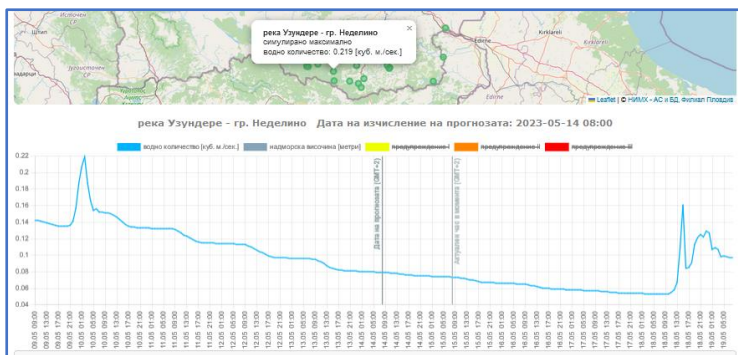
At the figure the forecasted levels [m] for Maritsa River at Svilengrad from 14-05-2023. Warning levels are switched off interactively is shown.



Vertical lines at the graphic show the last forecast's date/time and the actual date/time when the page is visualized

Specific key points:

- Forecast warnings for Maritsa basin are shown as water levels [m] (a.s.l) and are related to thresholds of water level compared to the elevation of surrounding terrain (usually dike)
 - yellow : 1.5 ± 0.5 m below dike level
 - orange : 1 ± 0.5 m below dike
 - red : 0.5 ± 0.5 m below dike

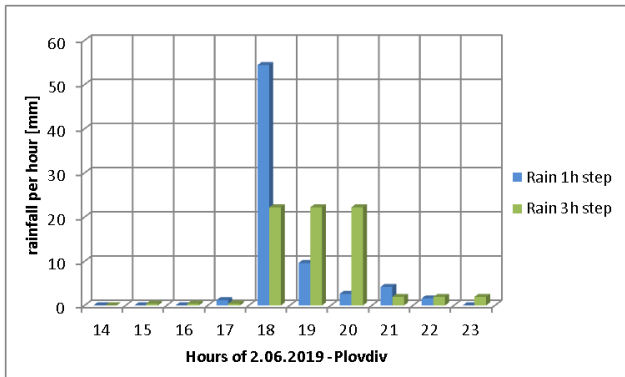


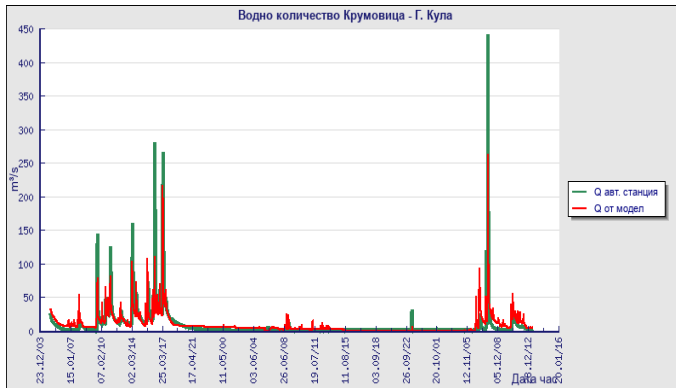
- Maritsa system uses assimilation that is not implemented for Arda basin.
- Forecast warning levels for Arda and Byala River basins are shown [m³/s] as discharge and are related to thresholds of water discharge compared to yearly maximum streamflow discharge levels: 50%, 5% and 1% probability of occurrence at the station/location (every 2 years, 20 years, 100 years).
- Switching off warning levels from the display permits to see water level/discharge scaled between the 10 day maximum and minimum.
- Simulated streamflow discharges of small catchments in Arda River basin without hydrological station and some new catchments included for FLOODGUARD project are still not calibrated, because of lack of measurements to compare and to calibrate.
- ✓ Upgrade and development of flood forecasting systems for Maritsa and Arda River basins: expected benefits

Maritsa Basin : DHI HYDRO-River + Mike Operations is a new generation river modeling package.

- Complete operational overview
- Forecasting and early warning
- Real-time system optimisation and control
- Automated processes and alerts
- Automated calibration

Arda and Byala basins: increased spatial resolution and diminished time step will enhance the detail in the simulations and of the forecasts. Thus the high gradient events like sudden showers specific for convective events will be better simulated. In consequence rapid floods will be simulated and forecasted with a higher precision.





2018 year 3 h comparison for Mediterranean catchment – model

PROJECT BENEFICIARY 5

DISTRICT ADMINISTRATION BLAGOEVGRAD

- ❖ Opening Press Conference (June 2019)
- ❖ Closing Pres Conference (to be set)



REPUBLIC OF BULGARIA
REGIONAL ADMINISTRATION
BLAGOEVGRAD



TO:
FLOODGUARD PROJECT PARTNERS

Subject: Invitation to a Press conference of the project: "Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area - Floodguard"

DEAR FLOODGUARD PROJECT PARTNERS,

It is a great honor for us to invite you to the Press conference of the project: "Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area" - Floodguard". The Press conference will take place on **12 June 2019** at 10:00 a.m. in No5 Conference hall, 1 "Georgi Izmirliiev" Sq., Blagoevgrad.

During the meeting, we will be able to share information about the main goals, the planned activities and expected results of the Floodguard project, and to discuss the next steps towards its successful implementation. Representatives of the Joint Secretariat of the Cooperation program "Greece-Bulgaria" 2014 – 2020 will also attend the press conference. Attached you can find the draft agenda of the press conference. Please inform us about the number and the names of the persons from your institutions that will attend the meeting with an email to k.krumova@bl.government.bg.

Looking forward to seeing you in Blagoevgrad.

Sincerely yours,

BISER MIHANOV
Regional Governor of Blagoevgrad region



 The Project is co-funded by the European Regional Development Fund and by national funds of the countries participating in the Interreg V-A "Greece-Bulgaria 2014-2020" Cooperation Programme. Project "Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area - Floodguard", Contract № B4.5b.01/01.04.2019 r.

PROJECT BENEFICIARY 6

GENERAL SECRETARIAT FOR NATURAL ENVIRONMENT AND WATER / MINISTRY OF ENVIRONMENT AND ENERGY

The main objectives of the General Secretariat for Natural Environment and Water (PB6) in the framework of the FloodGuard project was the following:

- **Elaboration of a joint communication strategy (WP2).**
- Establishment of the Joint Working Group for prevention and reaction in cases of floods Implementation of the 2007/60/EC Directive for the assessment and management of flood risks (WP3).
- Development of a fully automated and operational early warning system for floods (WP4).

The competencies of PB6 are the following:

- ❖ Planning and formulation of the policy for the protection and management of water resources
- ❖ Implementation of the 2007/60/EC Directive for the assessment and management of flood risks
- ❖ Implementation of the 2000/60/EC Directive for the establishment of a framework for Community action in the field of water policy
- ❖ Coordination of national, regional, local authorities and water related agencies

Member States are prompted to pursue cross border cooperation and coordination in River Basin Management Plans and Flood Risk Management Plans in international River Basin Districts.

- ✓ Elaboration of a joint communication strategy (WP2).
- ✓ Development of project website

✓ WP3: Establishment of a Joint Working Group (JWG)

The aims/objectives of the JWG are:

- the enhancement of efforts for cooperation and coordination between the two countries in the framework of the Floods Directive and the Joint Declaration
- the contribution to the next cycles of the Flood Risk Management Plans
- the contribution in the facilitation of information and data exchange between the two countries



1st JWG meeting

The JWG serves as a group of experts to assist in the implementation of the FLOODGUARD project itself and as a platform for exchange of best practices and knowledge in the field of Flood Risk Management between our countries.

The establishment of the JWG for prevention and reaction in cases of floods neither constitutes an additional group beyond the already existing ones according to the Joint Declaration between our countries (as adopted in Sofia, 27 July 2010 and as is in force by the 4th JD), nor, it will lead to duplication of activities or structures already functioning.



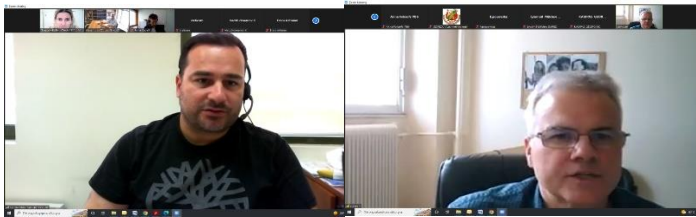
1st JWG meeting



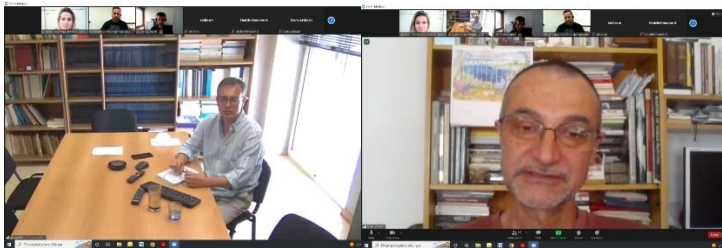
3rd JWG meeting



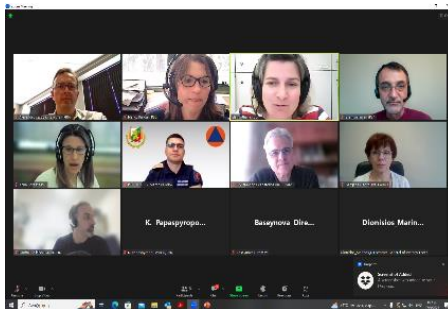
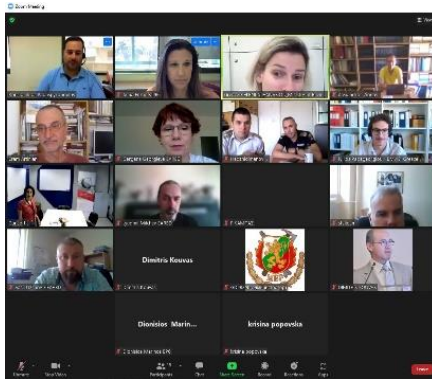
3rd JWG meeting



6th JWG meeting



6th JWG meeting



8th JWG meeting

- ✓ WP4: Development of a fully automated and operational early warning system in case of flood events.

The developed Floods Early Warning System (FEWS) is based on the logic and structure of the mostly utilized and modern schemes that exist in the European continent.

INTRODUCTION

Recent advancements in hydrometeorological modeling, remote sensing techniques, and information technology provide new opportunities to improve flood forecasting and early warning capabilities. Coupling hydrologic and hydraulic

models with quantitative precipitation forecasts can produce flood warnings at larger spatial and temporal scales compared to traditional systems. Integrating these capabilities into web-based decision support platforms can promote emergency preparedness by simplifying the analysis and visualization of data for stakeholders.

Under the FloodGUARD project, an integrated early warning system has been developed that strengthens disaster preparedness and climate adaptation for a region prone to catastrophic transboundary floods. The system combines hydrometeorological modeling, remote sensing data, and information technology tools into a unified operational forecasting platform (see. Figure 1).

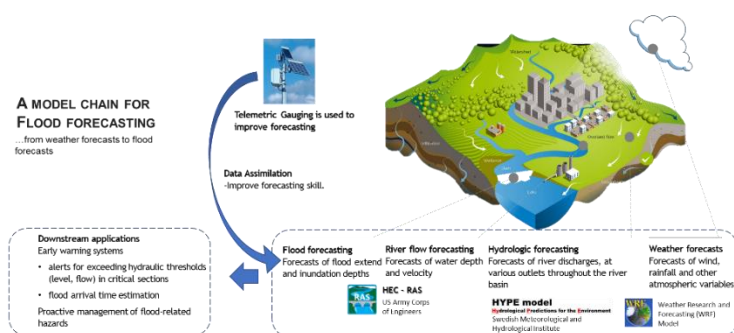


Figure 1: Flood Forecasting Early Warning System for Evros/Maritsa developed under the Floodguard project.

It promotes cooperative emergency management and coordinated response across the Greece-Bulgaria border. Beyond the direct project impacts, the technical architecture and processes provide a model that can be adapted to other transboundary basins worldwide. The focus on flexible design, interoperability, and automation facilitates adaptation and integration with external systems. The

project's scientific outputs contribute to the Sendai Framework objective of improving early warning infrastructure and systems. The operational platform aligns with the priority action to "substantially increase the availability of and access to multi-hazard early warning systems." The system enhances early warning capabilities by integrating science, technology, and institutions across the phases of risk knowledge, monitoring, analysis, and communication. It provides tailored support for emergency managers and stakeholders to take action to mitigate flood impacts. Improved forecasting quantifies the uncertainties and informs smart investments and policies.

WEATHER MODELING

The WRF model is a state-of-the-art atmospheric simulation system designed for research and operational forecasting. It features two dynamical cores - the Advanced Research WRF (ARW) and the Non-hydrostatic Mesoscale Model (NMM). The ARW core was used here.

Key advantages of WRF:

- Cutting edge NWP system used worldwide operationally and in research
- Flexible and computationally efficient software architecture
- Available at no cost with collaborative development and support
- Suitable for high resolution simulations, from tens of meters to thousands of kilometers
- Broad range of physics options for customization
- Large user community and extensive documentation

A two-way nested grid configuration was implemented: - Outer domain (d01): 15 km resolution over central/eastern Europe - Inner nest (d02): 5 km resolution over Evros basin - 40 vertical levels up to 50 hPa - Initial/boundary data: 0.25 degree GFS analysis fields.



Figure 2: Forecast domain configuration

The model is initialized twice daily at 00 UTC and 12 UTC for a 5 day forecast length. Meteorological variables are output at 1 hour intervals on the 5 km inner nest for hydrologic modeling.

The configured WRF system provides the necessary high-resolution meteorological forecasts to force the hydrologic model and flood forecasting system over the Evros basin. Automated scripts allow the entire forecast workflow to be executed operationally without user intervention. Verification demonstrated the model has skill consistent with

state-of-the-art NWP systems used in operational forecasting worldwide.

HYDROLOGICAL MODELING

A semi-distributed HEC-HMS hydrologic model was developed, delineating the Evros basin into 142 sub-basins. It applies SCS curve numbers and Muskingum routing, calibrated to daily flows at 11 stations. The model runs in forecast mode, initializing states with latest observations and forced by WRF rainfall.

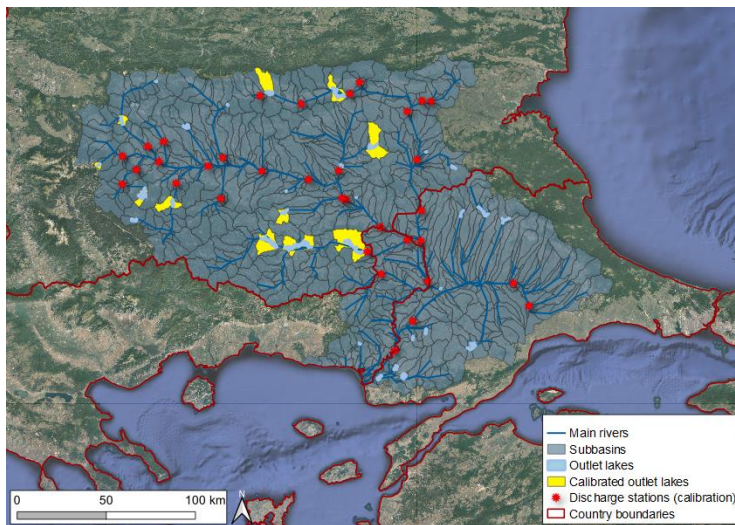


Figure 3: Sub-basins as defined in the Evros HYPE implementation. Main rivers, calibrated and non-calibrated outlet lakes and calibrated discharge stations are also shown

The hydrological model for the Evros river basin was developed using the HYPE (Hydrological Predictions for the Environment) code of the Swedish Meteorological and Hydrological Institute (SMHI). HYPE is a semi-distributed

lumped conceptual rainfall-runoff model designed for applications from catchment to continental scale. It simulates terrestrial water processes, including snowpack dynamics, evapotranspiration, soil moisture, groundwater and surface runoff. The model allows for high spatial resolution by clustering computationally independent hydrologic response units (HRUs) into sub-basins.

The key elements of the layout include: - Sub-basin delineation using local data and model needs - Hourly time step required to input the hydraulic model - Calibration using 2020-2022 runoff data from 31 stations - Reservoir modelling in 11 regulated ponds - Real-time update of 3 outflow stations - Operational forecasting system with meteorological forcing

The real-time update applies an autoregressive error model to correct modeled flows during the simulation using observed data. The update is currently applied to 3 stations and may be extended. The model is run twice daily on a Linux virtual machine using 00- and 12-hour weather forecasts. It outputs a 5-day hydrograph forecast.

HYDRAULIC MODELING

The HEC-RAS 2D hydrodynamic model developed by the U.S. Army Corps of Engineers (USACE) was selected to simulate flood flows and flood extents. HEC-RAS solves the shallow water equations to model one-dimensional and two-dimensional non-permanent hydraulic flow.

The hydraulic model covers the area of the Greek-Bulgarian-Turkish border surrounding the lower Evros River. The domain extends from upstream of Svilengrad downstream to the Aegean Sea delta. Floodplain topography was delineated using a high resolution digital elevation data, specifically produced for the Early Warning System needs, based on high

resolution satellite imagery, corrected by detailed ground surveys. A 2D-only approach was adopted.

Boundary conditions represent flow inputs to the model from hydrological predictions and downstream sea levels: - Evros/Maritsa inflow from Bulgaria - Inflow from Bulgaria and Turkey: Erythropatamos, Tundzha, Ergene, - Open boundary in the Aegean Sea, No-flow boundaries along the topographic elevations.

Flow results from the HEC-HYPE hydrological model provided unsteady-flow inflows to key tributaries and the upstream boundary of the Ebro River. The seaward boundary is represented using observed water levels. No-flow boundaries were placed at a sufficient distance from the area of interest. Previous flood events were used for calibration.

The model accurately captured the peak flows that are critical for flood forecasting and showed good agreement with the observed flood extent and timing. The calibrated modelling system provides advanced forecasting capability for flood risk management in the transboundary region of the Evros River.

OPERATIONAL PLATFORM

The integrated flood forecasting and early warning system utilizes a flexible, scalable software architecture built on open-source components. This enables customized workflows connecting the meteorological, hydrological, and hydraulic models while offering a dynamic user interface for data visualization, analysis and alert configuration.

The backend integrates several key components: - Relational database (PostgreSQL/PostGIS) - central repository for heterogeneous data - File storage - model inputs/outputs, geospatial data - Application server (GeoServer) - middleware

tier handling model execution, processing, alerts - Web server (Nginx) - hosts web applications and services - Message queue (RabbitMQ) - connects system components

Interactive web applications provide an intuitive user interface:

- Weather forecast visualization: time series and maps of precipitation, temperature and other common meteorological variables, covering the whole Evros/Maritsa basin.

- Hydrological forecasting: streamflow, covering the whole Evros/Maritsa basin.

- Flood inundation mapping: flood extent and flow depths for the fluvial flooding part of the Evros River, downstream the part where it meets the Greek-Bulgarian borders.

- Early warning configuration: customized alert thresholds and triggers

- Alert dashboard: real-time flood warnings and notifications

The user can leverage the interactive web apps to:

1. Check the 5-day weather forecast

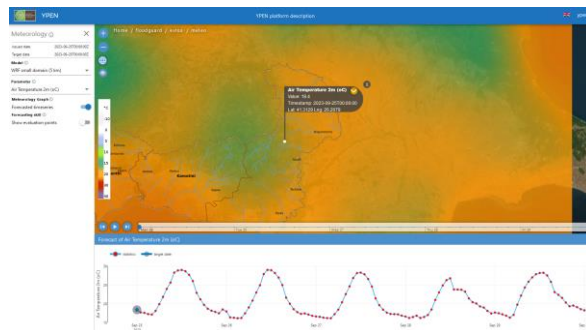


Figure 4: Snapshot of weather forecast within the platform

2. View corresponding streamflow hydrograph forecast

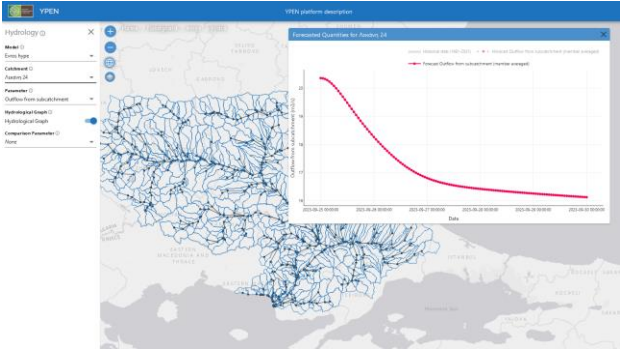


Figure 5: Snapshot of hydrological forecast within the platform

3. Analyze projected flood inundation map and flow depths

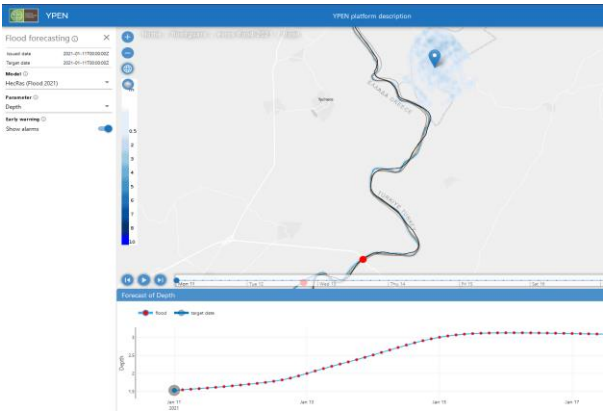


Figure 6: Snapshot of flood inundation within the platform

4. Receive automated alerts when flooding predicted at critical points

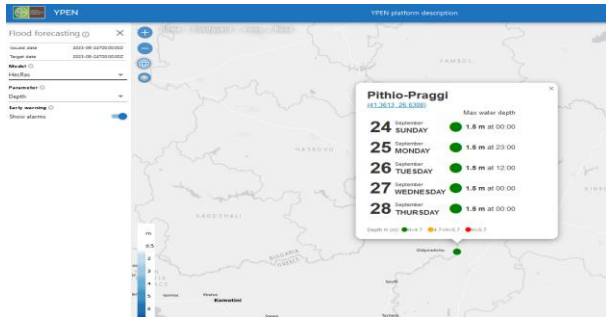


Figure 7: Snapshot of alerts within the platform

This integrated system provides advanced predictive capabilities and a real-time common operating picture for flood early warning and emergency response.

CONCLUDING REMARKS

The platform that has been developed effectively combines various open-source meteorological, hydrological, and hydraulic model data, integrating them seamlessly with interactive visualization and early warning capabilities. This integration has been made possible through the implementation of a flexible and interoperable architecture that utilizes open standards and APIs, ensuring both flexibility and scalability of the system. The successful implementation of this operational system has significantly contributed to enhancing joint preparedness and emergency response at the Greek-Bulgarian border. The modern architecture of this platform serves as a transferable blueprint for integrating scientific data into decision-making processes in transboundary watersheds across the globe. By adopting open standards and APIs, the platform ensures that it can be easily replicated and adapted to various geographical contexts. To maximize the utility and impact of the platform,

continuous operational testing and stakeholder engagement are being carried out. These efforts not only help identify any potential areas for improvement but also ensure that the platform meets the evolving needs of its users.

Moreover, the lessons learned from this project can be utilized to further enhance the capabilities of the models, improve user interfaces, and optimize the logistics infrastructure for early warning systems. By applying these lessons, the platform can continue to evolve and stay relevant in the face of changing requirements and advancements in technology. Ultimately, this project serves as an exemplary demonstration of how emerging technologies can be effectively leveraged to advance integrated flood monitoring and forecasting capabilities, benefiting communities and stakeholders in transboundary watersheds.

PROJECT BENEFICIARY 7 (PB7)

DECENTRALIZED ADMINISTRATION OF MACEDONIA THRACE

(Budget of PB7: 655.094,25 Euros)

The Decentralized Administration of Macedonia and Thrace participates in the Floodguard project with three Directorates:

- Water Directorate of East Macedonia and Thrace
- Water Directorate of Central Macedonia
- Directorate of Civil Protection

The FLOODGUARD project area in Greece covers the national part of the three international river basin districts, Evros/Maritsa, Nestos/Mesta and Strymon/Struma.

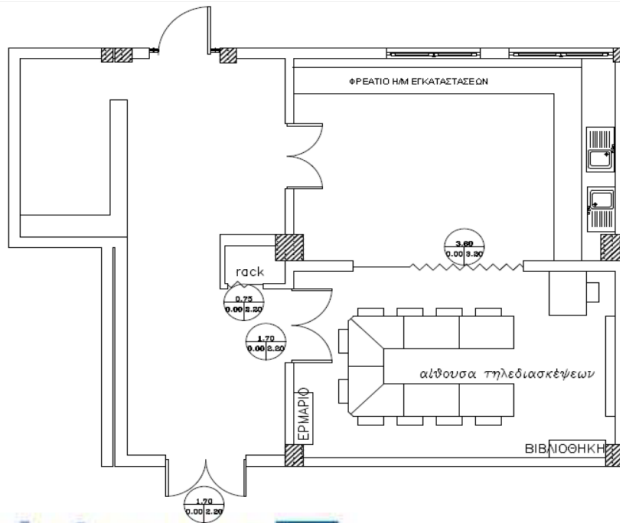
The administrative boundaries of the Programme area cover seven (7) Regional Entities in Greece which belong to the geographic area of responsibility of PB7.



Main Activities

Work Package 3: Establishment of Joint Working Group

- Construction and renovation work for the JWG Room in Kavala (Water Directorate of East Macedonia-Thrace premises)
- Communications: Transition to a fiber optic network
- Equipment for the creation of the Joint Working Group that includes IT hardware, Teleconference system, Audiovisual equipment, furniture etc.



Work Package 4: Capacity Building for Flood Risk Mitigation and Information Exchange Structures

- **Training**

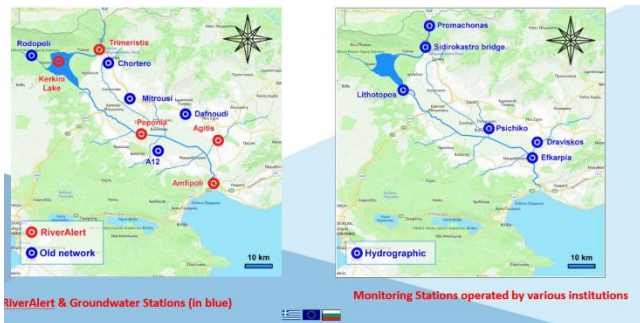
Creation of training material and organization six (6) training courses for the special training in floods for personnel of Civil Protection Directorates, Fire Departments, Police Departments, Prefectures, Municipalities, and member of Volunteer Teams

- **New PC equipment and vehicles (3)** to enhance the administrative capacity for action in the field of preparedness and response in case



of emergency.

- **Preliminary investigation and mapping** of the existing monitoring systems in the transboundary basins (Strymon, Nestos, Evros)



- **Monitoring Equipment – Core deliverable for PB7**
 - ✓ Update and upgrade of existing monitoring network

A typical river monitoring system installation (Strymon)



Main components of a Floodguard river monitoring station

Main components of a Floodguard river monitoring station

- Profile
- Water level h
- Local velocity v_x
- Calibration factor k in v_m/v_x
- Cross section $A(h)$
- Mean velocity v_m
- Discharge Q
- Other data open (optional) at the measurement site:
 - Continuous water level
 - Temperature
 - Water quality

RQ30

The Project is co-funded by the European Regional Development Fund and by national Funds of the countries participating in the Interreg V-A Greece-Bulgaria 2014-2020 Cooperation Programme.

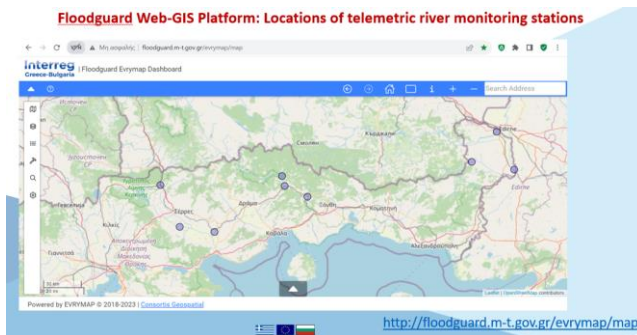
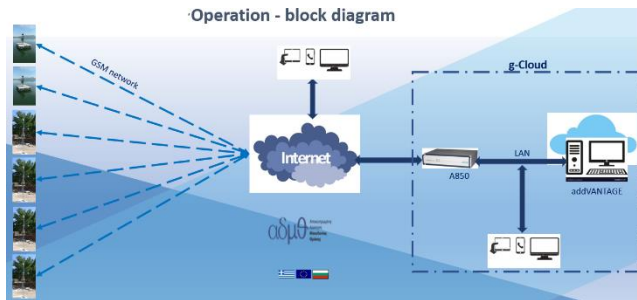
- ✓ New monitoring equipment for the monitoring of the river flow and water levels for the Evros river basin. This infrastructure is being used for the validation and operation of the early warning system.



River Water Basin	Location	Monitoring Parameters		
		Water Quality	Water Level	Discharge
Strymon / Struma	Trimeristis	*	*	*
	Aggitis		*	*
	Peponia		*	*
Nestos / Mesta	Paranesti		*	*
	Platanovrysi	*		
Evros / Maritsa	Stavrourpouli		*	*
	Ardas		*	*
	Erythropotamos		*	*
	Pythio		*	*

Water flow parameters	Water quality parameters
Water Level (m)	pH
Water flow velocity (m/s)	Water Temperature (°C)
Area (m ²) calculated	Water Conductivity (μS/cm)
Discharge (m ³ /s) calculated	Total Dissolved Solids TDS (mg/l)
	Dissolved Oxygen (mg/l)

- ✓ Integrated internet monitoring system of telemetric water monitoring data of transboundary basins of the rivers Evros, Nestos and Strymonas



Results

The benefit of the FLOODGUARD for the local communities is the development of effective information exchange structures and systems for flood risk assessment, mitigation and management in Northern Greece and in Southern Bulgaria around our common border.



At this stage data from the monitoring stations in Evros River Basin are feeding the Evros Early Warning System

All Floodguard stations must remain in operation after the end of the project. In order to keep the monitoring stations operative there is a strong need for adequate maintenance

Monitoring data collected can be useful for the establishment of an early warning system in Strymon River Basin.

PERSPECTIVES OF FLOODGUARD PROJECT

- ❖ Floodguard River Monitoring & National Water Monitoring Network
- ❖ River Monitoring & Early Warning Systems for other trans-boundary rivers in Macedonia – Thrace and other regions
- ❖ GR-BG Co-operation (data exchange etc.) and Flood Management Plan Co-ordination
- ❖ GR-BG Joint Flood Risk Management Plans (for trans-boundary basins)



Γενική Επισκόπηση

Το έργο FLOODGUARD μέσω των Εταίρων Δικαιούχων του (Partner Beneficiaries) αντιμετωπίζει την κοινή πρόκληση της διαχείρισης των κινδύνων πλημμύρας μέσω ολοκληρωμένων δράσεων για κοινό συντονισμό και ανταπόκριση στους κινδύνους πλημμύρας στην διασυνοριακή περιοχή. Η περιοχή είναι ευάλωτη στην κλιματική αλλαγή και τις αρνητικές επιπτώσεις της, και χρειάζεται επαρκή και συντονισμένη διασυνοριακή διαχείριση. Οι περιοχές που καλύπτονται από το έργο, (τμήματα των διεθνών λεκανών απορροής των διασυνοριακών ποταμών - Στρυμόνα-Στρύμα, Νέστος-Μεστά, Άρδας-Άρδα και Έβρος-Μαρίτσα εντός της Ελληνικής και Βουλγαρικής επικράτειας) καλούνται να αυξήσουν σημαντικά την προσαρμοστική τους ικανότητα στην κλιματική αλλαγή.

Η αποτελεσματική διαχείριση των κινδύνων πλημμύρας είναι μεγάλης σημασίας και επηρεάζει μεγάλο αριθμό πληθυσμού και μέγεθος έκτασης. Οι δράσεις του έργου FLOODGUARD προσανατολίζονται άμεσα στον κοινό συντονισμό πέντε σχεδίων διαχείρισης κινδύνων πλημμύρας (ΣΔΚΠ) για διεθνείς ποταμούς - δύο σχέδια για το βουλγαρικό έδαφος (ΣΔΚΠ των Περιοχών Λεκανών Απορροής Ποταμών αρμοδιότητας των Διευθύνσεων Υδάτων στις πόλεις Ploudiv και Blagoevgrad) και τρία σχέδια για την ελληνική επικράτεια (ΣΔΚΠ Λεκανών Απορροής Ποταμών των Υδατικών Διαμερισμάτων της Ανατολικής Μακεδονίας, Θράκης). Υδατικό Διαμέρισμα και ποταμός Έβρος).

Το έργο συμβάλει στον στόχο για βιώσιμη ανάπτυξη αυξάνοντας την ικανότητα της διασυνοριακής περιοχής στο να προσαρμοστεί στην κλιματική αλλαγή, μειώνοντας τους φυσικούς και ανθρωπογενείς

κινδύνους και ενισχύοντας τις ικανότητες ανταπόκρισης των τοπικών φορέων.

Η προσέγγιση του έργου για την αντιμετώπιση των κοινών προκλήσεων προβλέπει τη συμμετοχή αρχών με διαφορετικές αρμοδιότητες, προκειμένου να μεγιστοποιηθεί η αποτελεσματικότητα των δράσεων.

Περιλαμβάνει διάφορες πτυχές της διαχείρισης του κινδύνου πλημμύρας -, πρόληψη, ετοιμότητα και αντιμετώπιση. Το έργο προβλέπει διάφορες παρεμβάσεις στη ανάπτυξη δεξιοτήτων, εργαλεία ανταλλαγής πληροφοριών, πιλοτικά μέτρα και κοινές διοικητικές δομές. Θα λάβει υπόψη τις υπάρχουσες δομές, στρατηγικές, σχέδια, εργαλεία πληροφόρησης, διοικήσεις και θα αξιοποιήσει τα υπάρχοντα χαρακτηριστικά τους για να προσθέσει αξία στα υπάρχοντα συστήματα, προκειμένου να επιτευχθεί συνέργεια από συνδυασμένες προσπάθειες. Οι περισσότερες από τις προβλεπόμενες δράσεις σχεδιάζονται να παράγουν κοινά αποτελέσματα και να χρησιμοποιηθούν από τους ενδιαφερόμενους και στις δύο πλευρές των συνόρων - δηλαδή κοινή ομάδα εργασίας και στρατηγικές για περαιτέρω συντονισμό, εγκαταστάσεις εκπαίδευσης και κατάρτισης, συμβατά συστήματα πληροφοριών κ.λπ.

Ο κύριος στόχος του Floodguard

Ο κύριος στόχος του έργου αφορά την ενίσχυση της ικανότητας των αρχών να διασφαλίζουν αποτελεσματικό, ολοκληρωμένο κοινό συντονισμό και ανταπόκριση στους κινδύνους πλημμύρας στη διασυνοριακή περιοχή.

Το έργο εξετάζει διάφορες πτυχές της διαχείρισης του κινδύνου πλημμύρας προκειμένου να παρέχει ολοκληρωμένα αποτελέσματα, ενώ έχουν οριστεί οι ακόλουθοι επιμέρους στόχοι:

- εισαγωγή μιας κοινής θεσμικής προσέγγισης για την αξιολόγηση, τον σχεδιασμό, την πρόληψη και την καταπολέμηση των πλημμυρών.
- Αύξηση της τεχνικής και διοικητικής ικανότητας των υπηρεσιών πολιτικής προστασίας για κοινές δράσεις στον τομέα της ετοιμότητας και αντιμετώπισης σε περιπτώσεις πλημμύρας.
- εισαγωγή αποτελεσματικών δομών και συστημάτων ανταλλαγής πληροφοριών για την εκτίμηση, τον μετριασμό και τη διαχείριση του κινδύνου πλημμύρας.

Ο στόχος του έργου έχει άμεση συμβολή στους σχετικούς ειδικούς στόχους του Προγράμματος – SO 2.1 «Να βελτιωθεί η συνεργασία στη διασυνοριακή περιοχή σε σχέδια διαχείρισης κινδύνων πλημμύρας σε επίπεδο λεκάνης απορροής ποταμού» στο πλαίσιο της Προτεραιότητας 2 «Μια βιώσιμη και προσαρμοσίμη στο κλίμα διασυνοριακή περιοχή». Η εφαρμογή του θα έχει ως αποτέλεσμα πιο αποτελεσματικές κοινές δράσεις και δραστηριότητες συντονισμού κατά των κινδύνων πλημμύρας, όσον αφορά:

- από κοινού συντονισμός πέντε σχεδίων διαχείρισης κινδύνων πλημμύρας (FRMP - ΣΔΚΠ) για διεθνείς ποταμούς - δύο στη Βουλγαρία και τρία στην Ελλάδα.
- συντονισμός κοινών παρεμβάσεων των υπηρεσιών πολιτικής προστασίας για τη διαχείριση των κινδύνων πλημμύρας μέσω της ενίσχυσης της τεχνικής και διοικητικής τους ικανότητας, του κοινού σχεδιασμού, των προτύπων και της εκπαίδευσης.
- δημιουργία αποτελεσματικών δομών ανταλλαγής πληροφοριών για τη διαχείριση του κινδύνου πλημμύρας.
- δημιουργία κοινής διοικητικής δομής για συντονισμένες δραστηριότητες στον τομέα της αξιολόγησης και διαχείρισης των κινδύνων που συνδέονται με τις πλημμύρες.

Οι στόχοι για βελτιωμένη διοικητική ικανότητα επιτυγχάνονται με την παροχή εκπαιδευτικών εγκαταστάσεων και κοινών εκπαιδύσεων των πρώτων ανταποκριτών, την προμήθεια εξοπλισμού και εκπαιδευτικού λογισμικού, καθώς και την εκπόνηση διμερών προτύπων και επιχειρησιακών διαδικασιών για ενέργειες σε περιπτώσεις πλημμύρας.

Κοινή Ομάδα Εργασίας (JWG): Η εισαγωγή μιας κοινής θεσμικής προσέγγισης για τη διαχείριση των κινδύνων πλημμύρας επιτυγχάνεται μέσω της σύστασης μιας κοινής ομάδας εργασίας για την πρόληψη και την αντίδραση σε περιπτώσεις πλημμυρών με τη συμμετοχή όλων των εταίρων.

Τα αποτελέσματα που σχετίζονται με το JWG περιλαμβάνουν οργάνωση τακτικών συναντήσεων, μελέτες και αναλύσεις υφιστάμενων εγγράφων και νομοθεσίας και στις δύο χώρες και σύγκριση της τρέχουσας κατάστασης, εκπόνηση στρατηγικών εγγράφων και οδικών χαρτών, πιλοτικές δοκιμές και προμήθεια εξοπλισμού.

Η αύξηση της τεχνικής και διοικητικής ικανότητας των υπηρεσιών πολιτικής προστασίας και στις δύο χώρες για κοινές δράσεις στον τομέα της ετοιμότητας και αντιμετώπισης σε περιπτώσεις πλημμύρας θα επιτευχθεί με την προμήθεια εξειδικευμένου λογισμικού και εξοπλισμού, την ανάπτυξη εναρμονισμένων προτύπων και διαδικασιών, την κατασκευή εκπαιδευτικών εγκαταστάσεων και διοργάνωση κοινών εκπαιδύσεων.

Η εισαγωγή αποτελεσματικών δομών και συστημάτων ανταλλαγής πληροφοριών για την εκτίμηση, τον μετριασμό και τη διαχείριση του κινδύνου πλημμύρας θα επιτευχθεί μέσω διαφόρων παραδοτέων στο πλαίσιο του WP 4, συμπεριλαμβανομένης της συλλογής δεδομένων, αναλύσεων και εργαλείων αξιολόγησης (για PB 2, 4, 6 και 7), καθώς και ανάπτυξης πληροφοριακών εργαλείων και δομών για τον μετριασμό του κινδύνου πλημμύρας μέσω λειτουργιών GIS, συστημάτων έγκαιρης προειδοποίησης, γραμμών μεταφοράς, συστημάτων πρόβλεψης

πλημμυρών, ανάπτυξης κοινού περιφερειακού συστήματος διαχείρισης βάσεων δεδομένων - για τα PB 2, 4, 6 και 7.

Αναμενόμενα αποτελέσματα του Floodguard

Τα Αναμενόμενα Αποτελέσματα αφορούν την ενίσχυση της ικανότητας των αρχών στην διασυνοριακή περιοχή να αποτρέπουν και να περιορίζουν τις ζημιές που προκαλούνται από τις πλημμύρες, καθώς και την αύξηση της ανθεκτικότητας στις φυσικές καταστροφές και την εφαρμογή της Οδηγίας 2007/60/ΕΚ. Ως αποτέλεσμα της συνεργασίας, το έργο συμβάλει στην ολοκληρωμένη κοινή διαχείριση των πλημμυρικών φαινομένων. Ένα από το αποτέλεσμα μεσοπρόθεσμα θα είναι το υψηλότερο επίπεδο ετοιμότητας των χωρών για την αντιμετώπιση των κινδύνων πλημμύρας. Μακροπρόθεσμα, η συνεργασία θα συμβάλει σε χαμηλότερο κόστος (ζημιές) από πλημμύρες.

Τα αποτελέσματα θα επηρεάσουν άμεσα τους τελικούς χρήστες (πληθυσμό), μέσω της παροχής αποτελεσματικότερων και συντονισμένων μέτρων σε περιπτώσεις πλημμύρας και μείωσης των ζημιών, ως εξής:

- Το πεδίο δραστηριοτήτων στις λεκάνες απορροής Νέστου – Mesta και Στρυμόνα - Strumatη Βουλγαρία καλύπτει περ. 6 458 km² με πληθυσμό 332 668. Περιλαμβάνει 9 περιοχές με σημαντικούς πιθανούς κινδύνους πλημμύρας με πληθυσμό 140 074 ατόμων.
- Το εύρος δραστηριοτήτων στις λεκάνες απορροής ποταμών Άρδα - Ardas και Έβορου – Maritsa στη Βουλγαρία καλύπτει 11,7 χιλιάδες km² στην περιοχή του προγράμματος με πληθυσμό 511 524, καθώς και 23 561 km² εκτός της περιοχής του προγράμματος με πληθυσμό 1 686 888. Η περιοχή του Προγράμματος καλύπτει 14 περιοχές με σημαντικό δυνητικό κίνδυνο πλημμύρας, με πληθυσμό 252.149 κατοίκους, και επιπλέον 17 περιφέρειες με πληθυσμό 200.817 εκτός της

περιοχής του Προγράμματος (σύμφωνα με στοιχεία κατά το χρόνο υποβολής του έργου).

- Το εύρος των δραστηριοτήτων στην Ελλάδα καλύπτει τις λεκάνες Νέστου, Έβρου και Στρυμόνα με συνολική έκταση 14 377 km² και συνολικό πληθυσμό 613 218 άτομα.

Οι στόχοι και τα αποτελέσματα του έργου επιτυγχάνονται μέσω της κατάλληλης διαχείρισης του έργου (προετοιμασία, διαχείριση, συναντήσεις, έλεγχοι, αναφορά και εκτίμηση επιπτώσεων), καθώς και επαρκείς δραστηριότητες ενημέρωσης και διάδοσης (επικοινωνιακή στρατηγική, συνέδρια και εργαστήρια, δημοσιεύσεις, πληροφοριακό υλικό και ιστότοπος του έργου <https://floodguard-interreg.eu/>).

Οι κύριες εκροές του έργου θα έχουν μακροπρόθεσμη χρήση και συντήρηση, που διασφαλίζεται από το καθεστώς των δικαιούχων του έργου - σταθεροί δημόσιοι οργανισμοί με εθνική χρηματοδότηση της λειτουργίας και των περιουσιακών τους στοιχείων. Οι εκροές του έργου αντιπροσωπεύουν στην πραγματικότητα συστατικά στοιχεία των εθνικών πολιτικών και στρατηγικών των δύο χωρών όσον αφορά τη διαχείριση του κινδύνου πλημμύρας, η οποία θα εξασφαλίσει τη μακρά διάρκεια των κύριων εκροών του έργου.

Τα αποτελέσματα που σχετίζονται με τη σύσταση και τη λειτουργία της Κοινής Ομάδας Εργασίας θα εξασφαλιστούν από τα αναλυτικά και στρατηγικά έγγραφα και τον οδικό χάρτη που προβλέπεται να εκπονηθούν και να εγκριθούν από κάθε συμμετέχον όργανο στο πλαίσιο του έργου. Ο εξοπλισμός για το JWG θα λειτουργεί και θα συντηρείται δεόντως από το PB 7, για χρήση του JWG που λειτουργεί εντός και μετά την ολοκλήρωση του έργου. Αυτή η εμπειρία μπορεί να εφαρμοστεί σε άλλα εθνικά ιδρύματα και τομείς με δυνατότητα διασυνοριακής συνεργασίας.

Η παράδοση ειδικού εξοπλισμού και λογισμικού εκπαίδευσης στο πλαίσιο του WP 4 για το PB 1, 6 και 7 θα χρησιμοποιηθεί τόσο στο πλαίσιο

των προβλεπόμενων κοινών εκπαιδευτικών δραστηριοτήτων στο πλαίσιο του έργου, όσο και μετά την ολοκλήρωση του έργου για την εκπαίδευση που σκοπεύει και για ενέργειες σε περιπτώσεις πλημμύρας. Οι αναπτυγμένες Διμερείς Πρότυπες Επιχειρησιακές Διαδικασίες μεταξύ των πρώτων ανταποκριτών θα υιοθετηθούν από το PB 1 και το PB 7 και θα εφαρμοστούν μακροπρόθεσμα σε περιπτώσεις πλημμύρας. Οι κοινές εκπαιδεύσεις θα έχουν επίσης σημαντικό αντίκτυπο στην ανταλλαγή τεχνογνωσίας και στον συντονισμό μεταξύ των ιδρυμάτων συμμετοχής.

Οι δραστηριότητες και τα εργαλεία για τη συλλογή δεδομένων, τις αναλύσεις, την αξιολόγηση και τις δομές πληροφοριών για τη διαχείριση κινδύνων στο πλαίσιο του WP 4 είναι ζωτικής σημασίας για τη βελτίωση του συντονισμού των μέτρων που εφαρμόζουν οι δύο χώρες.

Η εκπαιδευτική υποδομή θα χρησιμοποιηθεί μακροπρόθεσμα από κοινού από τους εταίρους, με δυνατότητα εκπαίδευσης άλλων εταιρών και ενδιαφερομένων μακροπρόθεσμα, ενεργώντας ως πρώτοι ανταποκριτές (δηλαδή εκπρόσωποι του Ερυθρού Σταυρού, ιδρύματα άλλων χωρών, και τα λοιπά.)

Οφέλη για τη Διασυνοριακή Περιοχή

Το κύριο όφελος της Διακρατικής Συνεργασίας αφορά τα κοινά προβλήματα που σχετίζονται με τη διαχείριση του κινδύνου πλημμύρας και αντιμετωπίζονται από το τρέχον έργο πρέπει να αντιμετωπιστούν σε επίπεδο λεκάνης απορροής ποταμού, το οποίο υπερβαίνει τα εθνικά σύνορα. Οι καταστροφές από πλημμύρες μπορούν να επεκταθούν διασυνοριακά και η αποτελεσματική διαχείρισή τους είναι διασυνοριακής σημασίας, γεγονός που απαιτεί αύξηση της ανθεκτικότητας σε φυσικές καταστροφές (πλημμύρες) σε διασυνοριακό επίπεδο. Η εκπλήρωση των απαιτήσεων της Οδηγίας 2007/60/ΕΚ σχετικά με τα σχέδια διαχείρισης κινδύνων πλημμύρας απαιτεί κοινό συντονισμό σε επίπεδο διεθνών περιοχών λεκάνης απορροής ποταμού. Η περιοχή του Προγράμματος περιλαμβάνει τρεις διεθνείς λεκάνες απορροής

ποταμών - Στρυμόνα-Struma, Νέστος-Mesta, Άρδας-Άρδα και Έβρος-Μαρίτσα, οι οποίες θα καλυφθούν όλες από τις κοινές και συντονισμένες δράσεις στο πλαίσιο του έργου. Η υλοποίηση του έργου θα συμβάλει στην ολοκληρωμένη από κοινού διαχείριση των περιστατικών πλημμύρας.

Το έργο προβλέπει συντονιστικές δραστηριότητες για την εφαρμογή εθνικών σχεδίων διαχείρισης κινδύνων πλημμύρας, καθώς και ενίσχυση και ευθυγράμμιση της ικανότητας των δημόσιων αρχών να αξιολογούν, να αποτρέπουν και να παρεμβαίνουν σε περίπτωση κινδύνων πλημμύρας. Έτσι, η υλοποίηση του έργου θα συμβάλει στην καλύτερη διαχείριση των κινδύνων πλημμύρας καθώς και στην ανάπτυξη ικανοτήτων των ενδιαφερομένων σε δράσεις άμεσης αντιμετώπισης κινδύνων. Οι ανεπτυγμένες δομές πληροφορικής και επικοινωνίας για συστήματα αξιολόγησης κινδύνου, παρακολούθησης και έγκαιρης προειδοποίησης, θα συμβάλουν σε μια ενιαία προσέγγιση των ιδρυμάτων και από τις δύο πλευρές των συνόρων. Η δημιουργία κοινών δομών (Κοινή Ομάδα Εργασίας), κοινές εκπαιδεύσεις και ευθυγράμμιση των εθνικών προτύπων των εταίρων όχι μόνο θα ενισχύσει την ικανότητα των εταίρων, αλλά και θα εναρμονίσει τα εθνικά πρότυπα και θα επιτρέψει στα ιδρύματα από την Ελλάδα και τη Βουλγαρία να συνεργαστούν πιο αποτελεσματικά όσον αφορά την αξιολόγηση, πρόληψη, παρέμβαση και αποκατάσταση από καταστροφές από πλημμύρες.



FLOODGUARD

“Integrated actions for joint coordination and responsiveness to flood risks in the Cross Border area”

Website:



Facebook:



LinkedIn



The Project is co-funded by the European Regional Development Fund (ERDF) and by national funds of the countries participating in the Interreg V-A “Greece-Bulgaria 2014-2020” Cooperation Programme

