Flood Protection Expert Group

Sub-Basin Level Flood Action Programme

BULGARIAN TRIBUTARIES

REPUBLIC OF BULGARIA
MINISTRY OF ENVIRONMENT AND WATER

DANUBE RIVER BASIN DIRECTORATE

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1 Introduction

The adoption in 1999 of the Strategy for Integrated Water Management marked the beginning of the reforms in the water sector in Bulgaria in line with the WFD and other obligations undertaken under international instruments. Several other programs such as: Strategy for the Integrated Water Management in the Republic of Bulgaria – institutional aspects, National Strategy for Management and Development of the Water Sector until 2015, and the Operational Programme Environment 2007 - 2013 (OPE) complete the picture of ongoing efforts towards compliance and enforcement of EU legislation.
Now the legal framework for environmental management of water resources and ecosystems in Bulgaria comprises a system of decrees, laws, ordinances and regulations on different administrative levels.
In addition, a process of drafting the National Strategy for the Environment 2010-2018 and its Action Plan is in progress.

The transposition of the EU Flood Directive into national legislation is at its final stage.

Floods are basin wide phenomena which do not respect borders and often create common problems between regions and countries. It is widely recognized that effective prevention of and intervention against floods requires cross-border cooperation. Therefore, the EU Flood Directive aims at creating one single flood risk management plan for each River basin, thus promoting coordination and collaboration between authorities across borders.
The Action Programme for Sustainable Flood Protection in the Danube River Basin (ICPDR, 2004) also foresees preparation of the action plans for the sub-basins, which should serve as essential tools to support cooperation and harmonization between the countries in the field of flood risk management.

This Document is prepared in response to the ICPDR Flood Action Programme following the content described in chapter 5.2 of the Programme and it summarises the key actions towards preparation of the flood risk management plans.

2 Characterisation of Current Situation

2.1. Review and assessment of the current situation

2.1.1 Natural conditions

This Document includes all Danube tributaries whose River's networks are formed on Bulgarian territory. The main Danube tributaries in Bulgaria collect their water from the northern slopes of the Balkan Mountains , with the exception of the upstream part of the Iskar River and Danube Dobrudja Rivers in the Eastern part of the basin.

The Bulgarian Water Law defines the delineation of the Bulgarian part of the Danube River Basin on the basis of catchments areas of the main Bulgarian tributaries of the Danube River. Based on this description six major sub-basins could be defined as follows (shown on Figure 1):

- Ogosta River and Rivers West of Ogosta
- Iskar River
- Vit River
- Osam River

- Yantra River
- Roussenski Lom River
- Danube Dobrudja Rivers

Figure 1. Main sub-basins in the Bulgarian part of the Danube River Basin

Ogosta River and Rivers West of Ogosta

Ogosta River starts its way from Chiprovska River springing from Vraja glava peak at the border with Serbia. In its upstream part it cuts through Mountain ous areas with steep slopes. The relief in Ogosta midstream and downstream sections changes form semi-mountainous to plain.

The total area of river basins including Ogosta is 8 022 km^2. Ogosta River has about 40 tributaries, of which the most significant are Botunia (length 69 km catchment area 732 km^2) and Barsia (length 35 km catchment area 241 km^2).

Iskar is the only river in the Bulgarian part of the Danube River Basin (DRB) which springs in the southern part of the country. Its source is in the Rila Mountain and its upstream section collects water from Vitosha, Lyulin, Plana Mountains and the southern slopes of the Balkan Mountain, before cutting through the latter by the Iskar Gorge. With its 368 km Iskar River is the longest Bulgarian tributary of the Danube River and also has the largest catchment area in the Bulgarian part of the DRB – 8 647 km^2.

The density of river network is 1,1 km / km^2. There are 25 tributaries over 15 km. Greater than they are Palakaria (39.2 km), Stari Iskar (65,2 km), River Slivnishka (38,1 km), of Slatina (50,3 km), Batuliyska (40,2 km), Malak Iskar (85,5 km).

Vit River leads its way from the northern slopes of the Balkan Mountain. Its length is 189 km and it has a long and narrow catchment area of about 3 220 km^2, and a small number of tributaries (about 10 Rivers exceeding 10 km in length).

The shape of the catchment area is highly elongated (average width of 25 km). The density of river network is too small - 0,5 km/km^2, mainly due to the shape of the catchment area and its small altitude.

Osam River is formed by the confluence of Cherni Osam and Beli Osam Rivers near the town of Troyan. Both of these main tributaries spring from the northern slopes of the middle

section of the Balkan Mountain. It is 314 km long and has a small catchment area of just over 2 824 km^2. The small number of tributaries it has is relatively short.

The average slope of the river is 57‰. Catchment area is narrow with an average width of 20 km, which limited the opportunity to develop a dense river network. Tributaries of the river are few, short and small catchments. The density of river network is 0,4 km/km^2, a separate tributaries to downstream reaches 0,15 km/km^2.

Yantra River is the second largest among Bulgarian tributaries of the Danube in terms of catchment area 7 879 km^2 and length of 285 km. Its spring is at an altitude of about 1340 m at Hadji Dimitar peak in the Balkan Mountain. Yantra River has 30 tributaries of length above 10 km, the longest among them being Rositsa River.
The density of river network in the basin varies. For the Yantra River, it is 0.7 km / sq km, while for the tributaries it varies in the range of 0.3 km / sq km to 1.5 km / sq km.

Roussenski Lom River is 197 km long and unlike the other main tributaries of the Danube starts its way from the relatively low part of the Danube Plain.

Russenski Lom River is formed by the merger of White with Black Lom. Beli Lom River originated south of Razgrad, and Cherni Lom River - southeast of the town of Popovo. The two main branches - Black and White Lom are respectively, 130 and 140 km in length to the merger and have catchment areas 1549 km^2 and 1276 km^2.

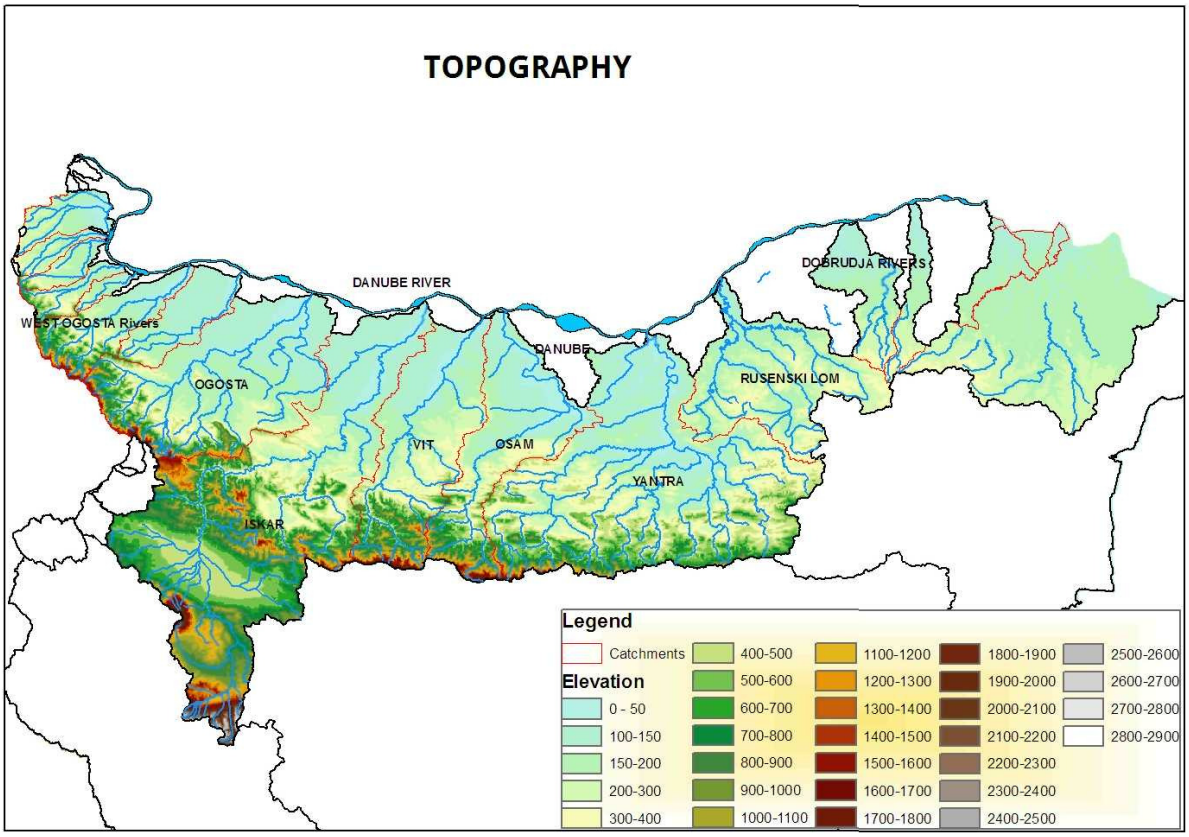
Danube Dobrudjanski Rivers
The Danube Dobrudzha tributaries occupy the upper northeastern part of Bulgaria. These are all the rivers in the area bounded on the south and southwest lines of the watershed of rivers Provadiyska Lom and Roussenski Lom, north of the Danube and the Romanian-Bulgarian border and east of the Black Sea Basin.
Unlike other Bulgarian rivers that start from the steep slopes of high mountains and gradually descend to the plains, Danube Dobrudjanski Rivers starts from the vast plains of the high plateaus and descend into the dry river valleys only have surface runoff in their upper sections with water gradually absorbed and disappearing down the flow due to the high permeability of the soil and the small slope long before the point of discharge of rivers.
Rivers flowing into the Danube River, spring from the high plateau situated in the southern part of Dobrudja between the towns of Razgrad and Varna and run to the North. Most important rivers are:-Suha River 126 km long with a catchment area 2404 km^2, Tsaratsar River 108 km in length and catchment area 1062 km^2, Kanagyol River- 110 km long, with 1745 km^2.
Besides these three rivers, which in its upper course adopted by several tributaries, there are about 4-5 separate rivers with smaller catchment areas. The average gradient of the rivers is too small - between 3 and 12%.

Bulgaria is situated in the semi-arid zone under the mixed continental and Mediterranean climate influence. Floods are generated on the Bulgarian territory under the following conditions:

- Intensive snowmelt mixes with rainfall in springtime (this is usually the case at some Bulgarian tributaries of the Danube, e.g. Yantra and the plain regions in Northeast Bulgaria);
- Flush floods caused by relatively isolated heavy rainfalls in the summer (this happens often at some Danube tributaries like Yantra and Rusenski Lom Rivers);

- High flows with long duration which might affect the stability of the levees and subsequent flooding (this is an issue only along the Danube River).

2.1.2 Hydrology



Precipitation is relatively well distributed annually, the high and low flow periods are quite well outlined, mostly because of the evaporation conditions.

The high flow period of the rivers under the continental influence is at April and June. These are the rivers of the Danube River basin, in the Northern part of Bulgaria. The low flow of those rivers is higher than of those at the Southern part of Bulgaria.

Significant influence on the annual distribution of the discharges cause the permanent snow cover which is formed in high Mountains during the winter. The snow pack is accumulating the winter precipitation thus transfering water from the winter season to late Spring and early Autumn.

Ogosta River and Rivers West of Ogosta
In the Ogosta River high water occur in April and May when spring rains overlap with mass snow melt forfeited by the high parts of the basin snow lasting until mid-March. High water is terminated in June and in July comes the summer low water. In the river valleys west of Ogosta River, the high water flow occurs in March-April.

Iskar River
As an extreme amount of low water, the minimum average monthly flow occurs in two forms (winter and summer) for mountain streams, especially from Rila Mauntain. The winter minimum is usually in February and/or January and the summer – in September. Winter minimum is lower than in the summer one. For the middle sections of the tributaries of the Iskar summer minimum is better developed, the quantity is lower than the winter. It also occurs earlier: August - September.

Vit River
Vit River high water occurs during March - May when the spring is coupled with snow melt and rainfall over the catchment. In the high mauntain part of the catchment at an altitude of 1500 m above permanent snow cover is maintained until the end of March. High water of the river terminates at the end of June, then begins summer - autumn low water.

Osam River
Osam River high water occurs during March - May when the spring is coupled with snow melt and rainfall over the catchment. In the high mauntain part of the catchment at an altitude of over 1500 - 1700 m lasting snow cover is maintained until the end of March. High water of the river terminates at the end of June, then begins summer - autumn low water.

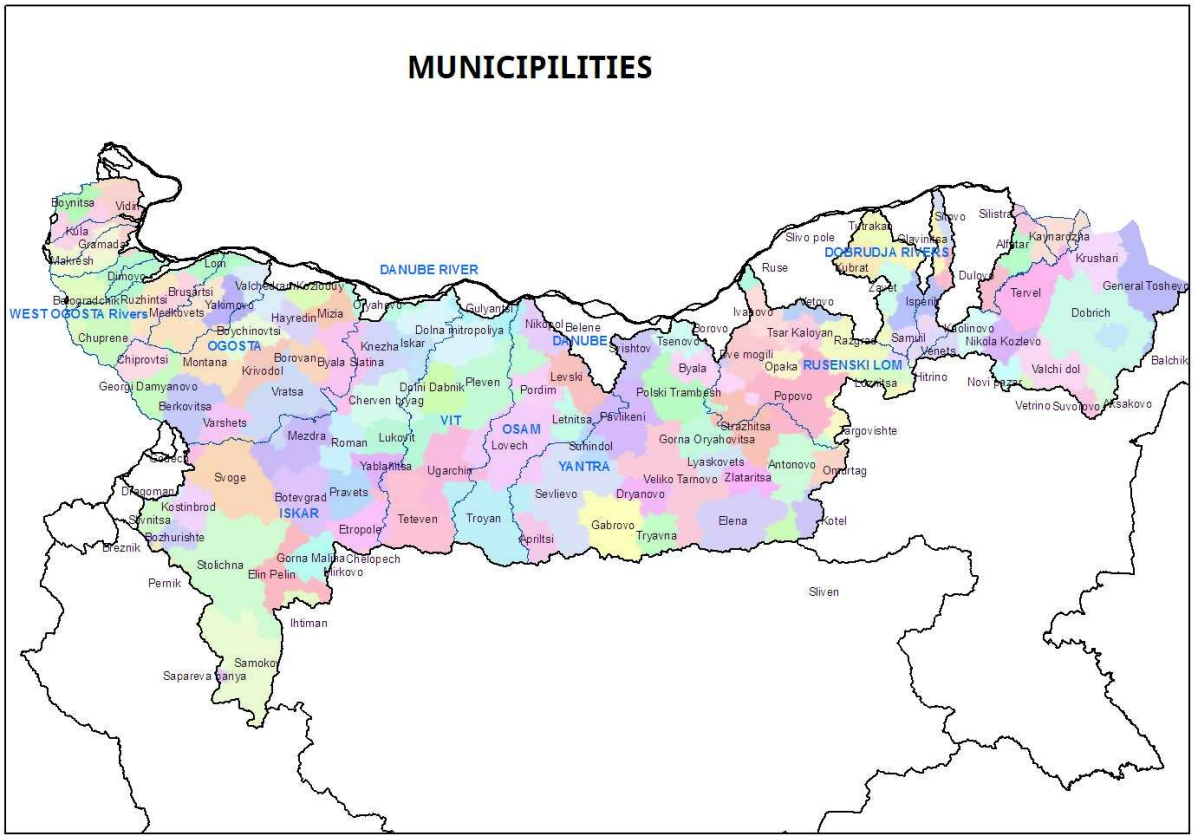
Yantra River
Yantra River high water occurs during March - May when the spring is coupled with snow melt and rainfall over the catchment. In the high mauntain part of the catchment at an altitude of 1500 meters above permanent snow cover is maintained until the end of March. High water of the river terminates at the end of June, then begin summer - autumn low water.

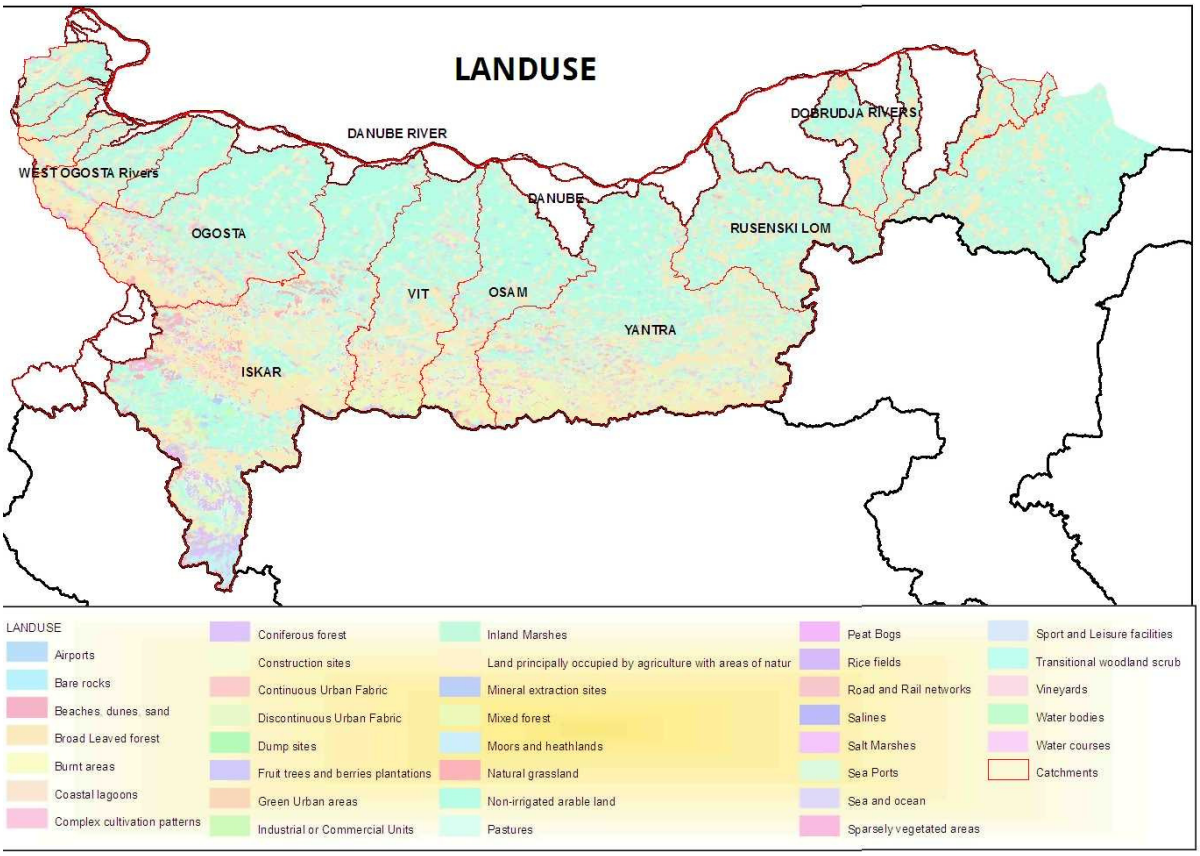
Roussenski Lom River
High water in the upper basin of the Roussenski Lom River is concentrated mainly in spring (April-June), when intense rain falls. In winter (January-March) there is small increase in run-off, more significant in the middle and lower part of the basin and the basin of the Cherni Lom River, where the maximum of the monthly distribution appears in March. Low water is in summer-autumn period and mainly during the months of August - November, when appear the minimum values of average flow.

Danube Dobrudja Rivers
High water in the Danube Dobrudja Rivers is mainly in spring. Most rivers dry up in May-June. For most eastern rivers high water is during the winter months February and March.

It should be noted that, the Bulgarian Danube tributaries are comparatively small and account for only a modest increase in the total runoff of the Danube River .

2.1.3 Characterisation of land uses


MUNICIPILITIES
DANUBE RIVER
WEST OGOSTA Rivers
OGOSTA
DANUBE
DOBRUDJA RIVERS
RUSENSKI LOM
VIT
OSAM
YANTRA
ISKAR
Boynitsa
Vidin
Kula
Gramada
Makresh
Lom
Dimovo
Valchedram
Kozloduy
Brusartsi
Belogradchik
Ruzhintsi
Yakimovo
Medkovets
Hayredin
Mizia
Oryahovo
Gulyantsi
Dolna mitropoliya
Nikopol
Belene
Iskar
Knezha
Chuprene
Boychinovtsi
Chiprovtsi
Montana
Krivodol
Borovan
Byala
Slatina
Georgi Damyanovo
Berkovitsa
Vratsa
Dolni Dabnik
Pleven
Cherven bryag
Levski
Pordim
Varshets
Mezdra
Roman
Lukovit
Letnitsa
Pavlikeni
Lovech
Suhindol
Gorna Oryahovitsa
Strazhitsa
Yablanitsa
Ugarchin
Lyaskovets
Antonovo
Omurtag
Targovishte
Svoge
Dragoman
Botevgrad
Pravets
Kostinbrod
Slivnitsa
Bozhurishte
Etropole
Teteven
Troyan
Sevlievo
Dryanovo
Veliko Tarnovo
Zlataritsa
Gabrovo
Tryavna
Elena
Kotel
Apriltsi
Breznik
Stolichna
Gorna Malina
Elin Pelin
Chelopech
Pirkovo
Pernik
Ihtiman
Samokov
Sapareva banya
Sliven
Slivo pole
Tutrakan
Silistra
Kaynardzha
Alfatar
Krushari
Ruse
Kubrat
Dulovo
Tervel
General Toshevo
Dobrich
Ivanovo
Tsenovo
Borovo
Tsar Kaloyan
Razgrad
Samuil
Kaolinovo
Nikola Kozlevo
Isperih
Zavet
Venets
Byala
Opaka
Polski Trambesh
Popovo
Dve mogili
Kubratsa
Hitrino
Novi Pazar
Valchi dol
Balchik
Vetrino
Suvorovo
Aksakovo
Shishtov


LANDUSE
DANUBE RIVER
WEST OGOSTA Rivers
OGOSTA
DANUBE
DOBRUDJA RIVERS
RUSENSKI LOM
VIT
OSAM
YANTRA
ISKAR
LANDUSE
Airports
Bare rocks
Beaches. dunes. sand
Broad Leaved forest
Burnt areas
Coastal lagoons
Complex cultivation patterns
Coniferous forest
Construction sites
Continuous Urban Fabric
Discontinuous Urban Fabric
Dump sites
Fruit trees and berries plantations
Green Urban areas
Industrial or Commercial Units
Inland Marshes
Land principally occupied by agriculture with areas of natur
Mineral extraction sites
Mixed forest
Moors and heathlands
Natural grassland
Non-irrigated arable land
Pastures
Peat Bogs
Rice fields
Road and Rail networks
Salines
Salt Marshes
Sea Ports
Sea and ocean
Sparsely vegetated areas
Sport and Leisure facilities
Transitional woodland scrub
Vineyards
Water bodies
Water courses
Catchments

2.1.4 Flood forecasting and warning

National Institute of Meteorology and Hydrology at BAS (Bulgarian Academy of Science) is the main body carrying out scientific research and operational activities in the field of meteorology and agrometeorology. The guiding principles of these activities, especially the operational ones, are the Technical Regulations of the World Meteorological Organization, where NIMH is the official representative of Bulgaria.
In September 2005 NIMH started to receive the European Flood Alert System (EFAS) bulletins with indicative hydrological forecasts.

Ogosta River and Rivers West of Ogosta
The hydrological stations network of the river basins in question consists of 33 hydrological stations (HS), 4 of which are on Ogosta River, 12 HS of them are located on Ogosta River's tributaries. The rest are located in the other river basins.

Iskar River
The hydrological stations network in the catchment of the Iskar River is composed of 18 hydrological stations. Of these, 4 are on the main river, and the rest on the tributaries.

Vit River
The hydrological stations network of Vit River's catchment consists of 6 hydrological stations. 3 of which are on the main river, and the rest on the tributaries.

Osam River
The Osam River's hydrological stations network consists of 7 hydrological stations, 5 of which are on the main river.

Yantra River
The Yantra River's hydrological stations network consists of 16 hydrological stations, 3 of which are on the main river, and the rest on the tributaries.

Roussenski Lom River
The Russenski Lom River's hodrological station network comprises 4 hodrological stations, 2 of which are on the main river, while the remaining 2 HMS are on the main tributary Cherni Lom River.

Danube Dobrudja Rivers

The Danube Dobrudzha tributaries' hydrological stations network, consists of only two stations.

The operational issues of flood monitoring, forecasting and warning are based on:

- Operational observations of River levels and provisional rating curves for real time conversion of levels into discharges;
- Operational synoptic meteorological forecasts of precipitation and air temperature;
- Operational forecasts of precipitation and air temperature coming from the High Resolution Limited Area meteorological forecasting model (ALADIN).

Under the umbrella of the World Meteorological Organization an agreement between Bulgaria and Romania for real time data and flood forecasts/warnings exchange was signed in 2001. As a result, Bulgaria sends to Romania certain data on the main Bulgarian Danube tributaries as it is given in the table below.

Operational data used for flood forecasting services and transmitted operationally to Romania.

Station No.	River	Cross-section	Data collection
16850	r. Ogosta	Misia	daily
18850	r. Iskar	Orehovitza	daily
21800	r. Vit	Tarnene	weekly
22800	r. Osam	Izgrev	weekly
23850	r. Yantra	Karantzi	daily
31830	r. Rusenski Lom	Bojichen	weekly

2.1.5. Institutional and legal framework

Water Act regulates the ownership and management of water within the territory of the Republic of Bulgaria as a national indivisible natural resource and the ownership of the water development systems and facilities.

Water management at the national level is implemented by the Minister of Environment and Water.

Under the Ministry, as its regional structure, the Danube River Basin Directorate (DRBD) is responsible for integrated water management at river basin level aiming to achieve good ecological status and to ensure sustainable water use.

The state policy related to activities involving operation, construction, remodelling and modernization of water development systems and facilities is implemented by:

- the Minister of Regional Development and Public Works: in respect to protection against water-related damage and loss within the boundaries of settlements;
- the Minister of Agriculture and Food: in respect to protection against water-related damage and loss beyond the boundaries of settlements;
- the Minister of Economy and Energy: in respect to hydro-power systems and projects;

The policy related to activities involving operation, construction, remodelling and modernization of water development systems and facilities constituting municipal property shall be implemented by the competent municipality mayor.

Protection against water-related damage and loss covered herein shall be operational and permanent.

Operational protection is implemented against flooding, ice accumulation and ice action, and water-related natural disasters, and shall be directed by Ministry of Interior - the Civil

Protection.

Operational protection shall be implemented in accordance with an emergency response plan. Emergency plans shall be drafted by the owners or users of water development systems and hydraulic-engineering facilities.

Permanent protection shall include:

1. construction and maintenance of dikes and other hydraulic-engineering facilities and protective structures;
2. establishment and maintenance of monitoring, forecasting and warning systems;
3. regulation of the groundwater level in the event of a hazardous raising or lowering thereof;
4. activities for protection of drainage basins against water erosion;
5. maintenance of the hydraulic conductivity of river beds.

The hydraulic-engineering facilities and protective herein shall be maintained by the owner or user thereof.

The Executive Environment Agency (ExEA) is another body of the Ministry of Environment and Water which carries out monitoring functions on the territory of the whole country and develops and maintains of the National Monitoring System of Environment and information about state of environmental components. The Agensy also is a national referent center in the frame of the European Environment Agency and in this respect it deals with collecting, processing and reporting information as well as makes analyses and assessments.
Civil Protection Service Directorate is a structure under the Ministry of Interior and implements the state policy in this frame. The main activities of Civil Protection Service are directed towards protection of the population, the national economy, the material and cultural values. The Service organizes and conducts life-saving and urgent emergency-reconstruction activities in case of disasters occurring and also has the responsibility to collect data about disasters and accidents, including floods, to advise on prevention activities and to solve resulting consequences for the human life and environment.

2.1.6. Recent awareness of flooding

The flood events in 2006 were mostly driven by snowmelt causing long-lasting high discharges in the Danube. Due to these high discharges, large floods affected the whole lower Danube and the high water levels lasted for over six weeks.

High water levels of the Danube made three Bulgarian Danube tributaries - the Iskar, Vit and Osam Rivers flow backward thus causing flooding of large areas along their banks.

The spring flood wave on the tributaries followed the one of the Danube, so there wasn't accumulation of adverse conditions due to the Danube's backwater.

2.2. Review and assessment of the predictable long term developments (consider the impact of climate change too)

2.2.1. Possible impacts on a current flood protection level

- Trend of flood level
- Climate change

2.2.2. Summary of existing national plans and ongoing programs

Ongoing structural flood protection projects

1. Local flood protection projects;

2. Local erosion control projects.

Ongoing non-structural flood protection projects
1. The Basin council under the Danube River Basin Directorate is in a process of elaboration of Action Programme on sustainable flood protection for whole Danube catchment area at the Bulgarian territory.
2. Project on elaboration of methodology and determination of coastal areas and flood plain areas of the main River s is under preparation. It shall include maps showing territory at risk to be flooded by water level with different return periods and finalisation is foreseen in 2011.

3 Target Settings

3.1 Regulation of land use and spatial planning

Target 1: Landscape development plans and spatial plans respect flood hazard maps and flood risk maps.

3.2 Technical Flood Defences

Target 1. Reconstruction and rehabilitation of flood protection structures in the towns and municipalities

3.3 Preventive actions

Target 1. Enhancing flood forecast service
Target 2. Introduce principles of EU Flood Directive

3.4 Capacity building of professionals

Target 1 Build capacity of professionals and institutions responsible for flood management

3.5 Raising awareness and preparedness of general public

Target 1 Inform the public about the causes of floods and improving awareness and preparedness to avoid detrimental effects

4 Measures to Achieve Targets

Measures	Type of intervention	Responsibility	Costs	Deadlines	Remarks
4.1 Regulation of land use and spatial planning					
Target 1: Landscape development plans and spatial plans respect flood hazard maps and flood risk maps.					
M 1: Landscape development plans respect flood-hazard maps and flood-risk maps	Technical	Ministry of regional development and public works (MRDPW), Ministry of Agriculture and Food (MAF), Executive Agency of Forestry (EAF)		Continuous	
M 2: Introduction of flood maps into development and spatial plans of municipalities	Administrative	MRDPW		Continuous	
4.2 Technical flood protection					
Target 1. Improvement of Structural Flood protection of municipalities					
M 1: Building and reconstruction of flood protection structures in towns and villages	Technical	MRDPW, Municipalities,		Continuous	
M 2: Maintenance of the existing flood protection structures and sustainable River -bed	Technical	MRDPW, MAF, Municipalities		Continuous	
4.3 Preventive actions					
Target 1. Enhancing flood forecast service					
M 1: Improving flood forecasts and gauging stations	Technical			Continuous	
M 2: Information service	Administrative			Continuous	

Target 2. Introduce principles of EU Flood Directive					
M 1: Preparation and adoption of new or amendment of the existing Water law	Legal / Administrative	State		2009	
M 2: Flood-risk management planning	Administrative	MoEW, Basin Directorates			
M 2.1. Preliminary flood risk assessment	Scientific/ Technical			2010	
M 2.2. Preparation of flood hazard maps	Scientific/ Technical			2013	
M 2.3. Preparation of flood risk maps	Scientific/ Technical			2013	
4.4 Capacity building of professionals					
Target 1 Build capacity of professionals and institutions responsible for flood management					
M 1: Proficiency courses, meetings for exchange knowledge, seminars	Administrative	Ministries		Continuous	
M 2: Developing alert and operational plans	Administrative	Municipalities		Continuous	
M 3: Improvement of coordination between different authorities in case of floods	Organizational	State		Continuous	
4.5 Raising awareness and preparedness of general public					
Target 1 Inform the public about the causes of floods and improving awareness and preparedness to avoid detrimental effects					
M 1: Presentation of flood risk management plans to the public	Information	MoEW, Basin Directorates		2015	
M 2: Training activities, publishing informational brochures etc.	Administrative	MoEW, Basin Directorates, Municipalities, CPSD		Continuous	