Flood Action Programme

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International Commission for the Protection of the Danube River

Internationale Kommission zum Schutz der Donau

Action Programme for Sustainable Flood Protection in the Danube River Basin

//// Deutschland //// Österreich //// Česká republika //// Slovensko //// Magyarország //// Slovenija //// Hrvatska //// Bosna i Hercegovina //// Srbija i Crna Gora //// România //// България //// Moldova //// Україна

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1. Introduction

The disastrous flood events of the past ten years have caused numerous human casualties and the material damage reached unprecedented dimensions. The opinion, widespread especially among Europeans well into the 1990s, that such natural disasters were manageable at reasonable expense, now began to look questionable. More than anything else, the extreme and devastating floods along the rivers Morava and Oder in 1997, the river Tisza between 1998 and 2001 and the rivers Elbe and Danube in 2002 were instrumental in triggering a process of rethinking fundamental attitudes: from dominating nature to coexistence with the floods.

The prediction of climate change, which has all but become a certainty, has been another driving force for preventive action. Climate change is expected to further aggravate the situation, leading to an increased risk of damaging flood events. Floods are the result of meteorological processes and are thus natural events and part of the natural water cycle. Massive damage is caused where humans increase the risk of flooding through inappropriate land use in high-risk areas or through serious interference in natural processes.

Since 1995 the flood protection issues have been addressed on a European scale in the form of guidelines for preventive flood control measures and this topic has gradually initiated a series of international activities in various European river basins. This process has been further boosted by the European Commission's initiative this year to reduce the risks associated with floods.

At its 5th Ordinary Meeting in November 2002, the International Commission for the Protection of the Danube River decided to establish the long-term Action Programme for Sustainable Flood Prevention in the Danube River Basin (hereinafter referred to as the Action Programme). The Action Programme is to be developed on a step-by-step basis. The first major step is its adoption at the Ministerial Meeting in December 2004.

This framework Action Programme is based on the sustainable flood protection programmes developed in the various Danube riparian countries, and on networking existing structures and using the future-oriented knowledge base accumulated through a wide range of activities over the past decade. The overall goal of the Action Programme is to achieve a long term and sustainable approach for managing the risks of floods to protect human life and property, while encouraging conservation and improvement of water related ecosystems. Given that the Danube River Basin is the second largest among European river basins, and the most international worldwide, with marked differences regarding sociological and topographic structures, the Action Programme represents an overall framework which needs to be specified in further detail for sub-basins. These must be consistent with the areas defined for the enforcement of the Water Framework Directive, in order to bring both planning processes together at an appropriate stage.

The framework Action Programme defines the underlying principles and objectives for sustainable flood protection for the entire basin of the Danube River together with a timeframe. In a first stage, it defines a set of general objectives - e.g. the need to network existing national flood reporting and forecasting systems - and sets out several categories of measures likely to reduce the risk of flooding. These objectives and action plans need further specification in the various sub-basins. The Action Programme also contains information on monetary and organisational mechanisms for realization.

In the future it will be crucial to rapidly advance the planning process as well as elaboration of specific action plans for the various sub-basins of the river Danube, in order to be able to assemble from these components an overall programme by 2009. During this planning stage, it must be ensured that a harmonious development process ultimately leads to a consistent flood action programme for the entire Danube River Basin, incorporating the future developments of the EU initiative on flood risk management planning where possible.

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2. Floods and Flood Protection in the Danube River Basin

2.1 General Situation of the Danube River Basin

The Danube River Basin is the second largest river basin of Europe, covering 801 463 km² and territories of 18 countries (see Table 1). The Danube flows 2780-km from west to east. Its catchment area stretches from 8° 09' at the source of the rivers Breg and Brigach in the Black Forest up to 29° 45' eastern longitude in the Danube delta at the Black Sea. Its southernmost point is at 42° 05' northern latitude in the source area of Iskar river in the Rila mountain and its northernmost point at 50° 15' in the Morava/March source area. The Danube has an average discharge of 6550 m³/sec at its mouth in the Danube delta. Some of its largest tributaries are characterised below. Their key hydrologic characteristics are listed in Table 2.

The Danube River Basin is bordered by that of the Rhine tributaries in the west; the Weser, Labe/Elbe, Odra/Oder and Vistula River Basins in the north, the Dnister River Basin in the northeast, and the basins of the rivers flowing into the Adriatic and Aegean Sea in the south. The water divide separating the Danube River Basin from Adriatic basins runs through the Dinaric karst, which brings some uncertainty into the definition of surface and subsurface basin limits. The situation is similar between the upper Danube and the Rhine. Thus, flood conditions of neighbouring basins are often similar.

Most attention is given to floods in lowland plains; however, flash floods and torrential floods of small streams have even higher damage potential. The valleys of the Central Alps, the peripheral mountains, the Carpathians and Dinarians, belong to regions with such type of risks, combined with debris and mud flows. Due to climatic and morphologic conditions ice jam floods may also occur along the Danube and its tributaries in the Carpathian basin.

Coverage of the states in the Danube River Basin (DRB) and estimated population *TABLE 1*

State	Code	Official coverage in DRB [km²]	Digitally determined coverage in DRB [km²]*	Percentage of DRB [%]	Percentage of DRB in state [%]	Population in DRB [Mio.]	Percent of population in DRB [%]
Albania	AL		126	< 0.1	0.01	< 0.01	< 0.01
Austria	AT		80,423	10.0	96.1	7.7	9.51
Bosnia i Herzegovina	BA		36,636	4.6	74.9	2.9	3.58
Bulgaria	BG		47,413	5.9	43.0	3.5	4.32
Croatia	HR		34,965	4.4	62.5	3.1	3.83
Czech Republic	CZ	21,688		2.9	27.5	2.8	3.46
Germany	DE		56,184	7.0	16.8	9.4	11.60
Hungary	HU	93,030		11.6	100.0	10.1	12.47
Italy **	IT	565		< 0.1	0.2	0.02	0.02
Macedonia	MK	109		< 0.1	0.2	< 0.01	< 0.01
Moldova	MD		12,834	1.6	35.6	1.1	1.36
Poland	PL	430		< 0.1	0.1	0.04	0.05
Romania	RO	232,193		29.0	97.4	21.7	26.79
Serbia and Montenegro***	CS		88,635	11.1	90.0	9.0	11.11
Slovak Republic	SK	47,084		5.9	96.0	5.2	6.42
Slovenia	SI	16,422		2.0	81.0	1.7	2.10
Switzerland	CH		1,809	0.2	4.3	0.02	0.02
Ukraine	UA		30,520	3.8	5.4	2.7	3.33
Total			(801,463)	100		81.00	100

* *For the purpose of comparison the coverage of the states was calculated using GIS based on the DRBD overview map. These values differ slightly from the official data of some countries, since other methods of calculation have been used.*

** *Data source: Autonomous Province of Bozen – South Tyrol.*

*** *According to the 2002 census the population in Serbia and Montenegro without the provinces of Kosovo and Metohia is 7.668.000 inhabitants. On the territory of Kosovo and Metohia the last census was in 1981. On the basis of this census and OEBS data the estimated population of Kosovo and Metohia in the Danube river basin today is about 1.300.000 inhabitants.*

The Danube and its main tributaries (catchments > 4 000 km²) in the order of their confluence with the Danube

from the source to the mouth

TABLE 2

River	Mouth at Danube km	Length [km]	Size of catchment [km²] *	Average discharge [m³/s]	Peak discharge (1%) near the mouth [m³/sec]
Danube	0	2,780	801,463	6,460	16 740
Lech	2,497	254	4,125	115	1600
Naab	2,385	191	5,530	49	920
Isar	2,282	283	8,964	174	1250
Inn	2,225	515	26,130	735	5600
Traun	2,125	153	4,257	150	1425
Enns	2,112	254	6,185	200	2560
Morava/March	1,880	329	26,658	119	1 320
Raab/Rába	–**	311	10,113	88	970
Vah	1,766	398	18,296	161	2 000
Hron	1,716	278	5,463	55	800
Ipel/Ipoly	1,708	197	5,108	22	670
Sió***	1,498	121	9,216	39	131
Drau/Drava	1,382	893	41,238	577	2573
Tysa/Tisza/Tisa	1,214	966	157,186	794	3 867
Sava	1,170	861	95,719	1,564	6 408
Tamis/Timis	1,154	359	10,147	47	1 225
Morava (CS)	1,103	430	37,444	232	2 465
Timok	846	180	4,630	31	383
Jiu	694	339	10,080	86	2330
Iskar	636	368	8,684	54	1046
Olt	604	615	24,050	174	3400
Yantra	537	285	7,879	47	2783
Arges	432	350	12,550	71	2090
Ialomita	244	417	10,350	45	1730
Siret	155	559	47,610	240	3950
Prut	132	950	27,540	110	2940

* *For the purpose of comparison the size of the catchments was calculated using GIS on the basis of the DRBD overview map. These values may differ slightly from the official data, because other methods of calculation have been used.*

** *The Raab/Rába flows into the Mosoni Duna, an arm of the Danube, at rkm 14, Mosoni Duna has its mouth at 1793 rkm.*

*** *Sió River is the outflowing river of Lake Balaton, which has in itself a catchment area of 5,737 km². The total catchment area of Lake Balaton and Sió River is 14,953 km².*

2.2 Climate and Flood Conditions of the Danube River Basin

Climatic conditions of the DRB are influenced by their position in the moderate climatic zone of the northern hemisphere, with regular alternating of the seasons of the year. Due to the elongated shape of the DRB in the west–east direction the climatic conditions are variable. In the main contributing areas, the Alpine and Carpathian regions, complicated orographic structure has the most significant impact on climatic variables. Differences extend from the upper Danube with high Atlantic influence to the eastern territories affected by continental climate. South of the Alps and in the Middle Danube basin, especially in the Drava and Sava basins, the climate is influenced by the Mediterranean. Interaction of the above-mentioned effects can trigger floods in the Carpathian basin in any period of the year.

The range of fluctuation of mean monthly air temperatures between the warmest and coldest months increases from the upper Danube basin with 20-21 °C to the confined Carpathian basin with 22-24 °C and to the lower Danube reaches with 26 °C. Average annual air temperature within the basin ranges from -6.2 to 12 °C. The lowest value originates from the Alpine summits, the highest mean annual temperature was observed at the Black Sea coast. In the entire DRB July is the warmest month, January the coldest. Winter usually lasts from December to February. The summer is usually hot and lasts from about June to August. The absolute range of recorded temperatures covers -41 °C to 45 °C.

The hydrological regime, especially the runoff conditions of the Danube, is substantially influenced by precipitation. Average annual precipitation fluctuates within the range of above 3000 mm in high mountains to 400 mm in the delta region. In upper Danube regions, precipitation fluctuates between more than 2000 mm in the upland areas of the Alps and up to 600-700 mm at mid-altitude. However, the actual figures can deviate drastically from the long-term mean values. There has been recorded daily precipitation of more than 260 mm at the upper Danube.

The catchments of Central Danube regions are characterised by similar range. Annual precipitation varies from just above 500 mm in the Middle Tisza region to above 2000 mm in the high mountains. Contributing areas of the upper Drava and Sava in the Julian Alps and in the Kupa spring region have the highest value of up to 3800 mm.

In the plains of the Lower Danube the precipitation is only 500-600 mm, though the lowest annual values are below 400 mm.

The number of days with snow cover, the duration and snow height increase with the altitude. The Alpine valleys have an average of less than 60 days while at elevations above 3000 m this is of more than 190 days.

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The shortest duration of snow cover (~10 days) is at the Black Sea coast. The snow cover lasts for only 20-30 days in the Hungarian Plains, 40-60 days in the upper Danube basin, the mean proportion in the total annual precipitation being 10%-15%. In the Alpine foothills and in high regions of mid-mountains the snow cover lasts more than 100 days (20% to 30% of precipitation falls in the form of snow). The snow cover remains for more than four months in the highest regions of the Alps (above 1500 m a.m.sl.). The snow cover stays relatively longer in the Carpathians, more than 300 days in a year just above 2000 m.

The upstream portion of the Danube river has a regime characterized by two distinct seasons: high-water season and low-water season. All the way to the mouth of the Morava/March the Danube river belongs to the glacial type, with maximum monthly discharge in July and minimum in winter months (January-February). Discharges down to the Tisza mouth are still under the dominant influence of the glacial regime. However, further downstream the river Danube discharge regime is changing, especially downstream from larger tributaries, such as Tisza and Sava rivers. Thus, the histogram of monthly discharges on the Lower Danube is similar to those on the lower Sava and Drina rivers, with two maximums during the year. Low discharges on the Danube River appear during early autumn (September-October).

According to recent results in hydrological and climate modelling, both the probability and the extent of extreme drought events during summers and extreme rain events during winters are expected to increase. This applies also to the Danube River Basin and has therefore to be considered in future flood action plans.

2.3 Description of the Danube River and its main tributaries

Through many centuries records of the occurrences of floods have been kept along the Danube Valley. The most famous among these is the 1501 flood of the upper Danube, thought to be the largest summer flood of the last millennium, causing extensive devastation down to Vienna, and presumably, its impact was extreme downstream as far as the Danube Bend at Visegrád. Among the ice jam-induced floods, that of 1838 has historical significance; it devastated several settlements from Esztergom to Vukovar, including the towns Pest, Óbuda and the lower parts of Buda on the territory of today's Hungarian capital. During the last century characteristic years when maximum flood levels occurred: 1902, 1924, 1926, 1940, 1941, 1942, 1944, 1954, 1965, 1970, 1974, 1991, and 2002. Table 2 shows numerical values of maximum yearly discharges with 1% probability for mouth sections of the Danube and main tributaries.

On the upper Danube the tributaries from the German low-range mountains with a stable flow and no steep incline have relatively little influence on the river Danube as compared to the rivers from the Alps: rivers Altmühl, Naab and Regen. The tributaries Iller, Lech, Isar and Inn on the right bank were regulated from about 1840-1930. Along about one third of the regulated length of the river, dams were built from 1880-1970. Since 1890, numerous hydroelectric power plants were constructed along these rivers. At the river Isar, the furthest-reaching flood control system was established for one of the larger tributaries along the Danube in Germany through regulations, flood dikes and the Sylvenstein reservoir. A system of discharges, redirection and hydroelectric power plants are in place to make use of the runoff of the river Isar.

The Inn is the third largest by discharge and the seventh longest Danube tributary. At its mouth in Passau it brings more water into the Danube than the latter itself. However, its catchment area of 26,130 km² is only nearly half as big as that of the Danube at this point. The main tributary of the Inn is the Salzach River. The Inn often dominates not only the mean flow but also the flood discharge regime of the Danube. The river system is highly regulated.

The Austrian Danube with its main tributaries the Traun and Enns, due to the coincidence with the Inn or upper Danube floods, are the source of major flood events at lower reaches. Flooding is mostly limited to narrow valleys of the tributaries or limited floodplains along the main river. The system of barrages has no direct influence on the flood regime of the Danube; however, it causes acceleration of the propagation of flood waves.

The Morava/March river is a left-hand tributary of the Danube. Its catchment area extends to 26,658 km² and covers parts of the Czech Republic, Slovakia and Austria. Floods originate during various precipitation situations. The upper parts of the catchments play the most significant role in the floods; however, the floods may originate also in other parts of the catchment.

The Pannonian Central Danube, extending from the foothills of the Alps to the divide between the Danube and Tisza rivers, consists of hilly country in Transdanubia, Hungary. There is only one significant river (the Raab/Rába) and a few natural creeks on the territory; more important is the large system of drainage and irrigation canals, which are controlled by pumping stations at the periphery. Flood embankments protect from inundation floodplains of the Danube and tributaries in the Vienna basin, Žitny Ostrov and the Danube Lowland (Podunajská nížina) in Slovakia on the left bank and along the Hungarian (Pannonian) Lowlands in Hungary, Croatia and Serbia down to the Sava mouth. Downstream of Bratislava (river km 1,868) to 1,811 km is the Gabčíkovo barrage system. Downstream of the weir Čunovo (river km 1,851.1) the floodwater is divided between the power canal and the 40-km-long old Danube channel. Thus, operation of the Gabčíkovo hydraulic structures enables transformation of flood waves in the Danube River. Natural floodplains, protected wetlands and Ramsar-sites such as Gemenc in Hungary and the Kopački Rit in Croatia have certain importance in flood protection schemes.

Among the Slovak tributaries the Váh river is a left-hand tributary of the Danube, which enters it at river kilometre 1,766. The Váh River Basin lies in the north and west part of Slovakia. Reservoirs of the Váh River Basin water management system can effectively transform the peak discharges of floods. In case of the coincidence of floods on the Danube and the Váh, the tributary Váh may have some influence on flood conditions of the Danube downstream of the Váh mouth. The Hron and Ipeľ/Ipoly rivers have no significant influence on the Danube's flood conditions, but their valleys are in danger of floods.

The Drau/Drava is the fourth largest and fourth longest Danube tributary. It rises in the Southern Alps in Italy but is the dominant river of southern Austria, eastern Slovenia, southern Hungary and northern Croatia. Main sub-tributaries are Isel, Möll, Lieser and Gurk, in Austria and the Mur/Mura with its mouth at the Croatian-Hungarian border. The flood protection scheme upstream of the Mura's mouth is interrelated with the chain of 22 hydropower plants, barrages and reservoirs in Austria, Slovenia and Croatia. Downstream from the mouth of Mura, flood protection is based on the system of flood embankments. During the last century large floods occured in 1964, 1965, 1966 and 1972.

The Tysa/Tisza/Tisa River Basin is the largest sub-basin in the Danube River Basin (157,186 km²). It can be divided into three main parts:

- the mountainous upper Tysa/Tisa in Ukraine and Romania (upstream of the Ukrainian-Hungarian border),
- the Middle Tisza in Hungary (receiving the largest tributaries: Bodrog river and Slaná/Sajó river collecting water from the Carpathian Mountains in Slovakia and Ukraine, as well as the Somes/Szamos river, the Crisul/Körös River System and Mures/Maros river draining Transylvania in Romania), and
- the Lower Tisa (downstream of the Hungarian-Serbian border, where it receives the Bega/Begej directly, and other tributaries indirectly through the Danube – Tisza – Danube Canal System).

The Tysa/Tisza/Tisa River is also the longest tributary (966 km). Europe's largest flood defence network was created in the region with regulation of rivers, construction of flood embankments and flood walls, system of drainage canals, pumping stations and designated flood detention reservoirs (polders) completing the system.

The Sava River is the largest Danube tributary by discharge (average 1,564 m³/sec) and the second largest by catchment area (95,419 km²). It rises in the western Slovenian Alps and passes through the Croatian lowland before forming the border between Croatia and Bosnia-Herzegovina. Continuing through Serbia-Montenegro it reaches its confluence with the Danube in Belgrade. Its main sub-tributaries are Krka, Kolpa/Kupa, Una, Vrbas, Bosna, Drina and Kolubara. Currently the flood protection in most parts of the Middle and Lower Sava basin relies on flood protection embankments, as well as on natural retention areas. The natural detention and retention area, the Lonjsko Polje (approx. 500 km²) in Croatia, is a nature park of European importance. During the last century large floods occured on the Sava in 1933, 1964, 1966, 1990 and 1998.

Timis/Tamis and other small tributaries of Banat and Eastern Serbia have limited floodplains protected by flood embankments.

The Velika Morava river is the last which still has an influence on the hydrological regime of the main river. An extensive 1,181km length of flood embankments protects the floodplains of the river system.

The Iskar is the largest Danube tributary on Bulgarian territory. It springs from the Rila mountain, flows through the outskirts of Sofia, crosses the Balkan Mountains and continues its 368 km course to the Danube. Its catchment area is 8,684 km². Floodplains are limited due to narrow valleys and high Danube banks.

Muntenian rivers Jiu, Olt, Arges, Ialomnita have a flood regime originating from the Southern Carpathians. An extensive system of reservoirs serving primarily water supply and power generation has an impact on the propagation of floods. Lower sections are protected by flood embankments.

The Siret River Basin has the third largest catchment area and is situated to the east of the Carpathians. Its source lies in Ukraine and it flows through the territory of Ukraine and Romania. Its main sub-tributaries are Suceava, Moldova, Bistrita, Trotus, Barlad and Buzau. The Prut river is the second longest (950 km) and the last tributary of the Danube, with its mouth just upstream of the Danube Delta. Its source is in the Ukrainian Wood Carpathians. Later it forms the border between Romania and Moldova. Main sub-tributaries are Ceremosh, Derelui, Volovat, Baseu, Corogea, Jijia, Chineja, Ciugur and Lapusna. Floods occur every season. Although the volumes of the spring floods caused by snowmelt dominate the annual flow regime, rainfall-induced floods usually exceed the spring flood level. The river water level is steadier in autumn though significant floods may occur quite often. Some of the most dangerous floods have been those of 1911, 1913, 1932, 1941, 1948, 1949, 1955, 1969, 1973, 1980 and 1998, developing in autumn and spring, and rarely in winter. March is the month of most dangerous floods, because of the snowmelt and abundant precipitation.

The Danube delta is mainly situated in Romania and partly in Ukraine. The entire protected area covers 6,790 km² including floodplains and marine areas. Flood regime is governed by attenuated floods of the Danube.

2.4 Floodplains and flood defences in the Danube River Basin

The protection of important cities, towns, villages, industries, communication, transport structures and valuable agricultural lands was the objective which has led to the creation of an extensive system of flood defence structures. More than seven per cent of the total area of the Danube River Basin is considered as a flood plain. Only a marginal part of it remains in its natural form. Flood propagation is constrained by river training works and summer dikes protecting the floodplains from frequent floods. Flood embankments and floodwalls are designed to withstand rare or even extreme flood events. A preliminary estimate of regions below the 1% (100-year) flood level is put at more than 60,000 km². This area would have been affected by regular or infrequent inundation in the absence of flood defences. The total length of these systems exceeds 13,000 km. Six per cent of the total population of the Danube River Basin lives at locations below the flood levels. A somewhat higher share of national assets and infrastructure is affected by floods or protected by flood defences.

2.5 Bilateral and multilateral cooperation

The existing bi-lateral agreements related to flood protection are shown in Table 3.

In addition, multilateral agreements, including Danube Comission Regarding the Regime of Navigation on the Danube, Tisza Forum, Sava Commission and the Danube IHP/OHP cooperation also exist.

Overview of bilateral agreements and bilateral cooperation for flood protection related activities in the Danube River Basin *TABLE 3*

	AL	AT	BA	BG	CH	CS	CZ	DE	HR	HU	IT	MD	MK	PL	RO	SI	SK	UA
AL						X												
AT					(X)		X	X		X	(X)					X	X	
BA									X									
BG						X							X		X			
CH		(X)																
CS	X			X						X					X			
CZ		X						X						X			X	
DE		X					X			X								
HR			X							X						X		
HU		X				X			X						X	X	X	X
IT		(X)																
MD															X			X
MK				X														
PL							X										X	X
RO				X		X				X		X						X
SI		X							X	X								
SK		X					X			X				X				X
UA										X		X		X	X		X	

X = formal agreement between states, (X) = bilateral cooperation without formal agreement

3. Basic Principles and Approaches[1]

This chapter includes general considerations, basic principles and approaches. These apply to all levels: the basin-wide action programme, the sub-basin flood action plans[2] and the national flood protection plans.

3.1 General Considerations and Objectives

- Flood events are part of nature. They have always existed and will continue to exist. Floods can be hazardous, but are also a very important ecological factor for riverine ecosystems and species.
- Due to the present change in the Earth's climate the precipitation pattern will also change. Humid areas will generally become more humid and arid areas more arid. The amount of precipitation will also fluctuate more sharply. In general, this means a greater probability of hazardous flooding and unexpected risk. The results of recent studies have substantiated these apprehensions.
- Although floods are natural phenomena, human activities and human interventions into the processes of nature, such as alterations in the drainage patterns from urbanisation, agricultural practices and deforestation, development of land on the floodplain area, have considerably changed the situation in entire river basins. At the same time, exposure to risk and vulnerability in flood-prone areas has been growing constantly.
- The flood risk increases as a consequence of the climate change and human interventions into the processes of nature, leading to an increase in the probability of the occurrence of flood events and to the intensified use of floodplains for settlements and the rising accumulation of valuable goods. It should be mentioned that mankind is not fully prepared to withstand these phenomena.
- Considering the evolution and trends, the approach to natural hazards requires a change of paradigm. One must shift from defensive action against hazards to management of the risk and living with floods, bearing in mind that flood prevention should not be limited to flood events which occur often. It should also include rare events, as, for instance, multiplying of effect by superposition of processes of snowmelt and extreme precipitation, as well as multiple peak floods triggered by heavy rainfalls and possible failures of different hydraulic structures including flood protection structures themselves.
- As far as possible, human interference into the processes of nature should be reversed, compensated for and, in the future, prevented. It is necessary to promote and harmonise changes in water policies and land-use practices, as well as environmental protection and nature conservation, in order to improve flood management, and also meet the targets and measures of Integrated River Basin Management. The results of the flood action plans should be integrated into the River Basin Management Plans (RBMP) at an appropriate stage for information purposes.
- Preventive measures should be taken to reduce possible adverse effects of floods on human health and on aquatic and terrestrial ecosystems, such as water pollution and soil contamination. Attention should be paid to industrial installations storing harmful substances, to contaminated sites, to agricultural technologies and to the sewerage systems in flood-prone areas. The consequences of interruption of water supply during flood events should also be addressed.
- As the hazard of floods will continue to be present and human activities contribute to the increase of flood risks - for example, by reducing the space available for rivers to discharge their water - it is essential that the management of flood risk is based on a long-term approach.
- Flood prevention should be based on cost-benefit analyses as well as on the careful balance between precautionary and 'living with floods' principles.

1 *Based on the UN-ECE Guidelines on Sustainable Flood Prevention; the EU Best Practices on Flood Prevention, Protection and Mitigation and EU Communication on flood risk management, COM(2004)472*

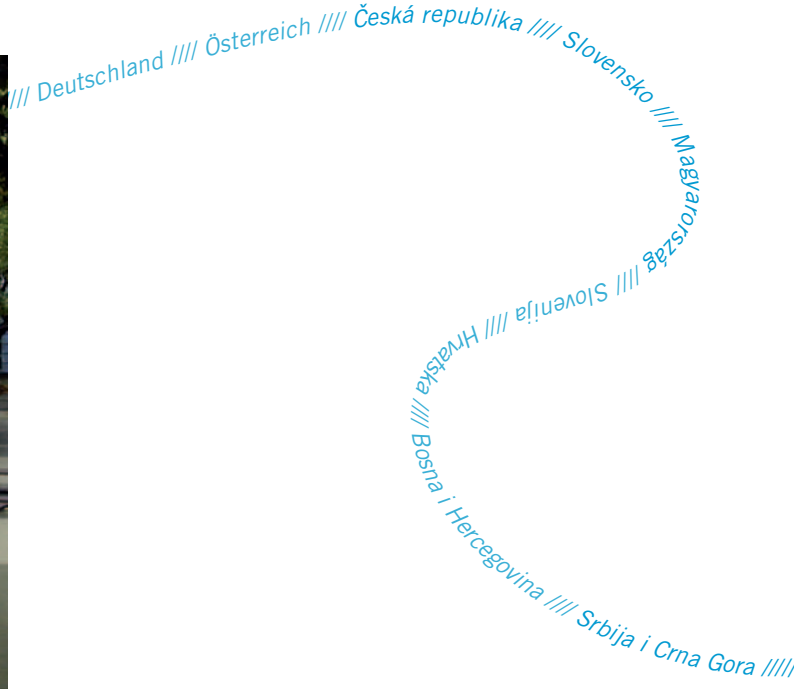
2 *The terminology used in the referred EU Communication is 'Flood risk management plan'*

3.2 River Basin Approach

- Flood strategy should include the entire Danube basin area and promote the coordinated development, management and conservation of water, land and related resources. Such a holistic approach is based on multilateral and even multinational cooperation, including interdisciplinary planning for the entire catchment areas.
- The development of a basin-wide action programme and the sub-basin-wide flood action plans should be based on an integrated approach taking into account the Water Framework Directive, and 11 water-related Directives associated to it, as well as river basin management plans and programmes of measures under the WFD.
- A trans-national effort must be improved to restore rivers' natural flood zones in order to reactivate the capacity of natural wetlands and floodplains to retain water, alleviate flood impacts and mitigate negative consequences such as contamination.
- Rivers do not recognise national borders. Experience has shown that local flood protection measures can have negative effects both downstream and directly upstream. Therefore, these effects need to be assessed. Where these effects cross the national borders, transboundary coordination is required. Therefore, it is important to take the whole impact area into account.
- In addition to the action programme covering the whole Danube catchment, specific flood action plans for sub-basins and tributaries will be necessary reflecting basin-wide requirements. The basin-wide programme and the plans for sub-basins and tributaries must follow these basic principles and approaches and complement each other.
- There is a great need for strengthening cooperation, adopting basic approaches, sharing of experiences, exchange of information and being prepared for common problem-solving at different levels within the Danube basin and among the international river basins. Therefore, the experiences gained in sub-basins and tributaries should be exchanged regularly in the framework of the ICPDR.

3.3 Joint Action of Government, Municipalities and Stakeholders

- Everyone who may suffer from the consequences of flood events should also take - if possible - his/her own precautions. To this end, appropriate information and timely and reliable flood warning and forecasting systems should be established.
- A specific preparedness to alert, rescue and safety measures should be planned and implemented at all levels by maintaining regular basic information and continuous ongoing training actions.
- To implement the basic principles and approaches in the Danube basin, cooperation at all government levels, and coordination of sectoral policies regarding environmental protection, physical planning, agriculture, transport and urban development is needed.
- Successful implementation is not possible without changing broad public opinion about flood and necessity of coexistence with this phenomenon.



3.4 Reduction of Flood Risks – Three Scopes of Action

3.4.1. Natural Retention

- A strategy to mitigate floods in an ecological manner should be based on improving river basin land-use, preventing rapid runoff both in rural and urban areas, and improving a trans-national effort to restore rivers' natural floodplains. This will reactivate the ability of natural wetlands and floodplains to alleviate negative flood impacts. Besides flood mitigation, this will lead to ecological benefits in the form of maintaining biodiversity, frequent recharging underground aquifers and availability of cleaner water for drinking, areas for recreation, opportunities for tourism and so on.
- When planning the reactivation of protected floodplains, special attention should be paid to avoiding possible negative effects on agriculture, rural settlements and water pollution from contamination due to intensive use of chemicals on agricultural lands.
- The appropriate strategy consists of three steps: retaining, storing and draining; therefore protection and restoration of infiltration areas in the upper parts of the catchment and conservation and restoration of wetlands are crucial for the water retention. Every cubic metre of water not drained away immediately to the next water body is a gain for the water regime, and this also removes some of the burden in floods.
- The storage effect of vegetation, soil, ground and wetlands has an important mitigating effect particularly in minor or medium-scale floods. Each of these storage media is capable of retaining certain quantities of water for a certain length of time. A large natural storage capacity results in slow rises in water levels, thus reducing the flood wave, and enables sustaining or contributing to the restoration of self-purification capacity of water.
- However, if there is a long spell of heavy precipitation and if, for example, the storage capacity of the soil, the alluvial plains and the water body itself is exhausted, there is no longer any natural retention, and it is in such conditions that major flood disasters occur. That is why an effective flood control strategy must include not only natural retention measures but also a number of other actions, namely, prevention, protection, raising preparedness, emergency response, recovery and collection, utilisation and exchange of lessons learned.

3.4.2. Structural Flood Protection

- Structural measures (defence structures) will remain important elements and should primarily focus on the protection of human health and safety and of valuable goods and property.
- The major part of population and goods are located in big urban areas, so efforts for avoiding flood problems should also be focused in these urban areas themselves. Urban floods are not always caused by river overflowing; they can also be caused by high rain intensities over the city combined with inappropriate sewer systems. Special attention should be paid to the present drainage of rainwater, for instance the capacity of the sewer systems of our cities. Where appropriate, clean rainwater should preferably seep away instantly.
- Technical flood control measures only offer protection up to the level of the flood event they are designed for. However, this level may be exceeded at any time. The population in the protected areas must continuously be informed about the remaining risk and its possible consequences. The communities concerned must confront the situation by taking further flood preparedness measures.
- Structural flood protection is proposed to be planned as part of multi-purpose water management systems as much as possible involving and serving multiple stakeholder interests, and these should be subject to multi-criteria impact assessment including strategic environmental assessment and economic considerations. Hydraulic structures should be regularly maintained in order to preserve their functionality and safety.
- Individual constructions should be moved out of the flood-prone areas wherever possible. If this is not feasible, private property should mainly be protected with individual measures.

3.4.3. Reduction of Hazards

- Human uses of floodplains should be adapted to the existing hazards. Appropriate instruments and measures should be developed to reduce the risk of flooding (for all flooding-related problems: flooding, rising groundwater tables, sewage network disruption, erosion, mass deposition, landslides and mudflows, ice jams, pollution, etc.). In this respect, a distinction between river floods and flash floods should be maintained.
- Flood protection is never absolute and things can go wrong. The question regularly arises as to what safety is available at what price, and how much of the remaining risk must be accepted by society. Risk management will be the appropriate method to deal with this challenge. Emergency and disaster planning in case of extraordinary situations are important, also in respect of environmental and health effects, which can occur in case of flooding of industrial sites, deposits of harmful substances, pesticides and herbicides, oil tanks and septic tanks of farms and households, etc.
- Flood forecasting and warning is a prerequisite for successful mitigation of flood damage. Its effectiveness depends on the level of preparedness and correct response. Therefore, it is necessary to develop a system for timely and reliable flood warning, flood forecasting and information based on the relevant regional and national systems, covering the whole Danube River and integrating the tributaries.
- Besides public and individual measures, insurance can be an important factor in increasing the awareness and reducing the financial risk for individuals, enterprises and even whole societies where natural hazards are concerned. Proper insurance can considerably mitigate the effects that extreme events have on them and can prevent them from being ruined.

3.5 Floods: A Concern for Everybody

- It is the personal responsibility of anyone who lives and works by, or on, the river, and more broadly in the potential flooded area, to adapt his use of the water and all activities to flood risks. Thus everyone must know the risk and take it into account appropriately when acting.
- Solidarity is essential; one should not pass on water management problems in one region to another.
- All measures linked to public information and awareness-raising are most effective when they involve participation at all levels. Public participation in decision-making is a cornerstone of successful implementation of integrated and comprehensive action plans, both to improve the quality and the implementation of the decisions, and to give the public the opportunity to express its concerns and to enable authorities to take due account of such concerns.
- The authorities should ensure that the information concerning flood action plans is transparent, timely and easily accessible to the public.
- It is recommended that when formulating and adopting legislation concerning floods, Danube States should follow a holistic river basin approach aiming at the precautionary reduction of risk potential and at ensuring implementation.

4. Targets and Demands

Development of a Flood Protection Action Programme for the entire Danube River Basin should require a bottom-up approach, where appropriate built on previously prepared sub-basin plans integrated from national long-term master plans. However, such sub-basin plans do not yet exist in the Danube River Basin, where some of the sub-basins, such as those of the river Tisa/Tisza or Sava, can even be compared to those of the other European large transboundary rivers such as Odra/Oder or the Labe/Elbe. Additionally, the internationality of the Danube River Basin, covering 18 countries, is the highest worldwide, therefore integration of national plans of great variety according to their approach, content and details of elaboration requires introduction of harmonised methods and target setting.

In this respect, since it is the very first Action Programme in the Danube River Basin for Sustainable Flood Management, targets are to be determined not only for the whole catchment of the Danube river but also for the subsequent preparation of the flood action plans for the sub-basins.

Targets will be set comprehensively, taking into account their basin-wide or sub-basin-wide nature, with due regard to principles, approaches and scopes of actions described in Chapter 3.

Detailed explanations underlining the targets as well as illustrations to those as necessary will be given in a separate Guidance Document for Sub-basin Flood Action Planning.

4.1 Basin-wide Targets

There are four major basin-wide targets:

- Improvement of flood forecasting and early flood warning systems; interlinking national or regional systems.
- Support for the preparation of and coordination between sub-basin-wide flood action plans.
- Creating forums for exchange of expert knowledge.
- Recommendation for a common approach in assessment of flood-prone areas and evaluation of flood risk.

4.1.1. Improvement of flood forecasting and early flood warning system

Current conditions of flood forecasting and warning in the Danube River Basin differ in the frequency, methods and techniques used for monitoring and also in data collection and processing, where the solutions range from manual and paper-based work to the most advanced automated and computerised procedures. In some countries the outdated and advanced methodologies are running in parallel. The level of forecasting and dissemination techniques and solutions shows similar differences.

Flood forecasting for the most of the countries is a task carried out by state or regional environmental or water-related agencies. Meteorological (or hydro-meteorological) services always play a significant role in this field.

Under such conditions the major, basin-wide targets in the development of flood forecasting are:

- Develop the methodology and tools of data collection, processing, forecasting and dissemination where necessary, based on preliminary assessment.
- Interlink regional and national agencies on sub-basin and basin level to facilitate and promote the exchange of source data and forecasting and warning in transboundary sub-basins.
- Routing of the information downstream as the basis of improving efficiency and lead time of flood forecasting and warning at lower reaches under different national or regional competence.

Target: improvement of flood forecasting and early flood warning systems; interlinking national or regional systems. Detailed targets are given in sub-basin-wide targets under subheading 4.2.

A European Flood Alert System (EFAS) - covering a large part of Europe, including the Danube - is being developed and pre-operationally tested. Considerable progress is expected by a maximum 10 days' early warning via the LISFLOOD system. EFAS does not intend to replace national or regional forecasting systems but is to provide early warning to national and local warning centres. The LISFLOOD model simulates runoff and flooding in large river basins as a consequence of extreme rainfall. LISFLOOD is a distributed rainfall-runoff model taking into account the influences of topography, precipitation amounts and intensities, antecedent soil moisture content, land-use type and soil type. Follow-up action on monitoring the cooperation is required.

Target: to assist the development of a basin-wide early warning system (by the end of 2006)

4.1.2. Support for the preparation of and coordination between sub-basin-wide flood action plans

Action Plans on Sustainable Flood Management are to be developed by the countries sharing the sub-basins meeting the principles described in this Action Programme and in synergy with the River Basin Management Plans required by WFD. The action plans should serve as essential tools to support cooperation and harmonization between the countries of the given sub-basin in the field of flood risk management by:

- development and maintenance of a long-term flood protection and retention strategy and methodology;
- improvement of the flood protection to prevent areas from flooding, focussing on protection of human life and safety as well as valuable goods and property;
- introduction of flood mapping;
- raising preparedness and emergency response capabilities;
- improvement of bilateral and multilateral cooperation in planning enhancements, especially in contingency planning.

Target: to develop the sub-basin Action Plans preferably by 2009

4.1.3. Creating forums for exchange of expert knowledge

The exchange of knowledge and experience concerning flood protection and prevention is very important for the general public and all stakeholders. Exchange of information must be intensified. Existing facilities must be reviewed for their applicability and improvement by using modern media, such as web sites.

Target:

- monitoring and promoting of information exchange forums at the level of international river basin commissions or higher (EC, UN ECE) in the framework of the ICPDR Secretariat – continuous;
- planning exchange of experience between sub-basins in the framework of bi- and multilateral agreements and also in the framework of the ICPDR Secretariat – continuous;
- planning sub-basin, regional and local exchange of experience in the framework of sub-basins, nations, regions – continuous.

4.1.4. Recommendation for a common approach in assessment of flood-prone areas and evaluation of flood risk

The general objectives of flood maps are:

- to increase public awareness of the areas at risk from flooding;
- to provide information of areas at risk to give input to spatial planning;
- to support management and reduction of the risk to people, property and the environment.

The Action Programme targets a step-by-step approach in developing flood maps in the sub-basins:

- first, to prepare the indicative inundation maps (IIM) for areas where no flood maps are yet available, covering the majority of the floodplains;
- second, to extend indicative inundation maps to all floodplains and develop flood zoning maps (FZM) (defining zones of different magnitude and frequency of hazards) for those areas which are in danger in case of floods exceeding assessment limits;
- the final goal is the comprehensive flood risk map (FRM) which should be developed for those floodplains identified as the most vulnerable by the flood zoning maps.

4.2 Sub-basin-wide Targets

Six targets for the sub-basins have been formulated:

- To reduce the adverse impact and the likelihood of floods in each sub-basin through the development and implementation of a long-term flood protection and retention strategy based on the enhancement of natural retention as far as possible; that also refers to the other objectives in the river basin.
- To improve flood forecasting and warning suited to local and regional needs as necessary.

  The overall target is to ensure coverage of the entire Danube catchment or major parts of it, including special modules developed for the headwater and upstream sections, catchments of secondary tributaries, connecting the secondary tributaries to the primary ones, and finally these to the main river with mouth interfaces, thus creating a multi-level early warning, now- and forecasting system of the Danube River Basin.

  Specific targets:

  - review and evaluate existing solutions and whether they meet the requirements of the best available technology;
  - develop forecasting tools where necessary and further develop and optimise them continuously;
  - establish information systems where such systems do not yet exist;
  - create suitable interfaces to provide links between functioning information dissemination systems;
  - create regional virtual flood management centres where necessary and feasible.
- To increase the capacity building and raise the level of preparedness of the organisations responsible for flood mitigation (advancing contingency plans, organisations, mutual assistance, etc.).

  Specific targets:

  - Review and update of contingency planning (contingency, confinement and possibly evacuation plans of trans-national floodplains should be elaborated jointly by countries concerned);
  - Organise trainings and defence exercises on a regular basis at local, regional, national and trans-national level to improve and test preparedness and cooperation between water authorities, disaster and rescue services, leaders of public administration and local governments, police, road administration, military forces, hydropower companies and local industry;
  - Establish, maintain and update agreements on procedures for mutual assistance among riparian countries in critical situations, including arrangement of formalities to facilitate the travel of flood response personnel from neighbouring countries and interoperability of emergency services' equipment (whether by plane, boat or on land) during flood events.
- To develop flood maps in order to
  - raise the awareness and preparedness of the general public regarding flood hazards on sub-basin-wide and local scale;
  - promote appropriate land uses;
  - support the processes of prioritising, justifying and targeting investments to manage and reduce risk.
- To harmonise design criteria and safety regulations along and across border sections.
- To prevent and mitigate pollution of water caused by floods.

5. Measures

The formulation of the measures follows the structure and sequence of the targets given in Chapter 4.

5.1 Basin-wide Measure

5.1.1. Development and Improvement of Flood Forecasting and Early Warning System

The Danube basin-wide development and upgrading of flood forecasting and warning systems may include:

- Assessment of existing national and international flood forecasting and warning systems;
- Improvement of existing systems and their interconnection;
- Further development and testing of a basin-wide Danube Flood Alert System in cooperation with the FP EG as part of the European Flood Alert System for medium-range forecasts - based on the LISFLOOD system, to provide additional information to national and regional flood forecasting authorities.

5.1.2. Support for the preparation of, and coordination between, sub-basin-wide flood action plans

Supporting the sub-basin action planning, it is advised to deal on demand with issues such as:

- Linking the sub-basin flood action plans;
- Harmonisation of design criteria and safety regulations along and across border sections;
- Improvement of flood forecasting and warning suited to local and regional needs;
- Promotion of impact assessment of the proposed land-use change and structural measures.

5.1.3. Creating Forums for Exchange of Expert Knowledge

The FP EG with the support of the ICPDR Secretariat will promote the exchange of knowledge and experience

- with international river basin commissions;
- with international research institutions and associations;
- between sub-basins in the framework of the ICPDR.

5.1.4. Recommendations for a common approach in assessment of flood-prone areas and evaluation of flood risk

To fulfil the targets set the following measures are planned:

- To conduct a status review and report on flood risk evaluation and flood mapping in the sub-basins and countries of the Danube River Basin
- Recommendations for a common approach on flood mapping defined in Chapter 4

The Flood Protection Expert Group (FP EG) of the ICPDR is mandated to deal with the tasks and issues listed under 5.1.

5.2 Measures at Sub-basin level

The recommended structure of the flood action plans to be prepared at sub-basin level is as follows:

- Introduction (covering the motivation for elaboration, basic principles and approaches applied)
- Brief characterisation, review and assessment of the current situation (including natural, hydrological conditions, floodplains and flood defences of the sub-basins, characterisation of land-uses and known risks, recent conditions of flood forecasting and warning, institutional and legal framework, recent awareness of flooding, actions taken to raise awareness, water quality and accidental water pollution implications of flood events, summary of existing national plans and ongoing programmes)
- Targets with respect to retention vs. protection strategies based on proper analyses and agreement of countries sharing the sub-basin
- Measures for the achievement of the targets
- Socio-economic and organisational conditions of the implementation.

A major task is the preparation of working plans for the sub-basins to control and partially to perform the following activities:

a) Target setting related to:

aa) Development and maintenance of a long-term flood protection and retention strategy and methodology, covering:

aaa) Regulation on land use, and spatial planning to preserve natural retention

- Enhancing natural retention measures at each planning level (local, regional and supra-regional) by
  - assessment and changes of current land-use patterns
  - promoting environmentally sound forest management, agricultural practices and landscape management, using incentive measures for land-use change
  - finding retention possibilities as decentralised and as far upstream as possible
  - mutually agreed extent of protection versus retention
  - involvement of existing wetlands and extension of those where appropriate

aab) Reactivation of former, or creation of new, retention and detention capacities by

- restoration of natural courses of tributaries and their overflow area
- detention along the tributaries and rivers, creation of polders, dry flood reservoirs or multipurpose reservoirs with flood retention capacity
- relocation of flood embankments (dikes) on smaller or larger scale
- partial reactivation of protected floodplains applying controlled inundation

aac) Providing technical flood protection (structural defences)

- Maintenance, restoration and if necessary improvement of the capacities of the structural flood defences, or if appropriate, the construction of new ones, to protect human health as well as properties and valuable goods, should be planned here in accordance with the design criteria and safety regulations of the Danube countries
- Developing cooperation between public and private sector to use hydropower operation for flood protection
- Taking into consideration that floods don't recognise national borders, to ensure proper functioning of flood prevention and protection, harmonisation of design criteria and safety regulations along and across border sections must be addressed on a supra-regional and trans-national level, utilising existing bi- and multilateral frameworks (e.g., trans-boundary water commissions, Sava Commission, Tisza Water Forum)

aad) Preventive actions

- Flood risk analysis and mapping according to basin-wide targets
- Land-use changes reflecting the risks to reduce flood damage potential
- Improvement of flood forecasting and warning suited to local and regional needs as necessary

aae) Capacity building, raising preparedness of the organisations responsible for flood mitigation (advancing contingency plans, organisations, mutual assistance, etc.)

aaf) Raising awareness and preparedness of the general public on sub-basin-wide and local scale by:
- Disseminating leaflets on flood hazards
- Advanced information technological solutions such as web-based information portal on flood management
- Flood marking (rehabilitation of existing ones)
- Programmes on capacity building extended to education and stimulation, addressing utilisation of the benefits of floods thus raising public awareness towards changing of functions and land-uses adequately to the risk of flooding
- Enabling access to and provision of flood information and warning for the public
- Public participation in preparation of the flood risk management plans and in decision-making

aag) Water pollution prevention and mitigation with respect to floods

Floods can have considerable environmental and health consequences, in particular given the very specific vulnerability of potable water supplies and the physical infrastructure necessary for sanitation and contaminated sites in flood-prone areas. Therefore:
- Preventive measures should be taken to reduce possible adverse effects of floods on these infrastructures;
- Special attention should be given to contaminated sites located in flood-prone areas, especially in case of contamination by hazardous substances. In such cases the Recommendation on Safety Requirements for Contaminated Sites in Flood-risk Areas (elaborated by the ICPDR APC EG) is to guide the preparatory as well as implementation activities;
- Contaminants stored in housing areas (oil, sewerage, septic tanks) and in agricultural zones (pesticides, fertilisers, manure /solid and liquid) need also special care as to planning preventive and emergency measures;
- International, national and regional monitoring, reporting and warning system connected to the basin-wide Accident Emergency Warning System should be put into operation to ensure timely warning in case of trans-boundary pollution.

ab) Impact assessment of the proposed land-use change and structural measures

b) Planning measures and implementation phasing related to:

ba) Land-use, and spatial planning to reduce damage potential and to preserve natural retention capacities*

bb) Detention along the tributaries and rivers*

bc) Improvement of existing flood defences and planning new ones if appropriate and necessary*

bd) Improvement of flood forecasting and warning suited to local and regional needs as necessary

be) Capacity building, raising level of preparedness of the organisations responsible for flood mitigation (advancing contingency plans, organisations, mutual assistance, etc.)

bf) Raising awareness and preparedness of the general public on sub-basin-wide and local scale

bg) Water pollution prevention and mitigation with respect to floods

* Based on mutually agreed relation of protection and retention

6. Socio-economic and organisational conditions of the implementation of the action programme

6.1 Competent authorities preparing the Action Plans in the sub-basins

Flood management-related issues, tasks and responsibilities are allocated differently in the countries of the Danube River Basin. There are countries constituted as federal republics, and in these cases the tasks and responsibilities are distributed and shared at federal and state level. Tasks related to the prevention, protection and mitigation of floods are in every country shared by several ministries (for example, ministries for environment, agriculture and interior are often in charge of different flood protection-related activities). There are also tasks and responsibilities of centralised and decentralised (regional, county, local) organisations and NGOs play an important role in some countries.

For the purposes of this Action Programme it is important to designate the competent authorities from each country which are responsible for the internal coordination within the country and for the preparation and implementation of the Action Plans in the sub-basins defined in Chapter II. Decision on the framework of implementation of the sub-basin Action Plans is the task and responsibility of the countries affected, according to their national legislation as well as their bilateral and multilateral agreements. In sub-basins of multinational interest, development of Action Plans should be coordinated using existing frameworks such as the working groups under the Tisza Forum or Sava Commission. Where such mechanisms do not exist, consideration of the establishment of the appropriate working forums is recommended.

List of competent authorities preparing the Action Plans is given in Annex 1.

6.2 Schedule of implementation

Implementation of the Action Programme includes the following activities:

Task	Deadline
Further development and testing of a basin-wide Danube Flood Alert System as part of the European Flood Alert System for medium-range forecasts - based on the LISFLOOD system, to provide additional information to national and regional flood forecasting authorities by EC JRC -ICPDR	Dec 2006
Publication of Progress reports every three years, publication of the 1st Progress Report	end of 2007
Preparation of sub-basin Flood Action Plans – plans to be adopted and published by countries and/or international sub-basin arrangements	preferably by the end of 2009

6.3 Financial resources of implementation

Financial resources for implementation will include:

- National budgets and other national sources
- Stakeholders contribution
- EU funds, including new cohesion funds

  Relevant projects on flood action planning and implementation could financially be supported from programmes and funds of European Union, such as:

  = Common Agriculture Policy,
  = European Regional Development Fund,
  = INTERREG IIIB CADSES,
  = Special Action Programme for Agriculture and Rural Development (SAPARD),
  = LIFE,
  = PHARE Cross Border Co-operation (CBC),
  = TACIS.

  Actions of countries and sectors as well as financing mechanisms must be coordinated.

  EU Solidarity Fund is available in case of disaster to support recovery.
- Loans from International Financing Institutions

Most EU funds mentioned will be available until the end of 2006 and, at that time, the programmes will be revised. The European Commission has made a proposal for European Regional Development Fund 2007-2013 (COM(2004) 495 final) and has proposed to simplify the funding of external assistance (COM(2004) 626 final). The ICPDR Secretariat will continuously provide information on new funding instruments, their applicability for flood protection issues and the conditions of their utilisation.

6.4 Reviewing of progress and procedures

Review of the progress made in the tasks of flood action planning and implementation on sub-basin level will be provided in the framework of the FP EG

Annex 1

List of competent authorities responsible for preparation and implementation of the Action Plans

Country	Name of institution	Address
Austria	Federal Ministry of Agriculture & Forestry Environment and Water Management	Stubenring 1 A-1012 Wien, Austria
Bosnia and -Herzegovina	Federal Ministry of Agriculture, Water Management and Forestry Environment	Marsala Tita No 15, Sarajevo, Bosnia and Herzegovina
	Ministry of Agriculture, Forestry Environment and Water Management,	Bijeljina, Bosnia and Herzegovina
Bulgaria	Ministry of Environment and Water	22 Maria-Luisa Blvd. BG-1000 Sofia, Bulgaria
Croatia	Ministry of Agriculture, Forestry and Water Management, Water Management Directorate	Ulica grada Vukovara 220 10000 Zagreb, Croatia
Czech Republic	Ministry of Enviroment	Vršovická 65 100 10 Praha 10
	Ministry of Agriculture	Těšnov 17 117 05 Praha 1
Germany	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety	Robert-Schuman-Platz 3 53175 Bonn
	Bavarian State Ministry of the Environment, Public Health and Consumer Protection	Rosenkavalierplatz 2 81925 München
	Ministry for Environment and Transport Baden-Württemberg	Kernerplatz 9 70182 Stuttgart
Hungary	Ministry of Environment and Water	Budapest, Fő u. 44-50. H-1011
	National Directorate for Environment, Nature and Water	Budapest, Márvány u. 1/c. H-1012
Moldova	Ministry of Ecology and Natural Resources	9, Cosmonautilor str. MD- 2005, Chisinau
Romania	Ministry of Environment and Water Management	12 libertatii Blvd, sector 5, Bucharest, Romania
Serbia-Montenegro	Republic of Serbia Ministry of Agriculture, Forestry and Water Management Directorate for Water	Bulevar umetnosti 2a 11070 Novi Beograd
Slovakia	Ministry of Environment	Nám. Ľ. Štúra 1, 812 35 Bratislava 1, Slovak Republic
Slovenia	Ministry of Environment Spatial Planning and Energy	Dunajska 48 SI-1000 Ljubljana, Slovenia
Ukraine	Ministry for Environmental protection of Ukraine Ukrainian State Committee of Water Management	35 Uritskogo str. UA-03035 Kyiv, Ukraina

Annex 2

List of Abbreviations and Acronyms

APC EG	Accident Prevention and Control Expert Group of the ICPDR
CADSES	Central, Adriatic, Danubian and South East European Space (in the INTERREG initiative)
CBC	Cross Border Co-operation
DRB	Danube River Basin
DRBD	Danube River Basin District (according to WFD)
EC JRC	Joint Research Centre of the European Commission (in this document it refers to, its constituent part, the Institute for Environment and Sustainability – IES, Ispra, Italy)
EU	European Union
FP EG	Flood Protection Expert Group of the ICPDR
FZM	flood zoning map
ICPDR	International Commission for the Protection of the Danube River
INTERREG	EU Community initiative concerning trans-European cooperation intended to encourage harmonious and balanced development of the European territory
IIM	indicative inundation map
LIFE	EU Programme - The Financial Instrument for the Environment
LISFLOOD	Name of a physically based large scale hydrological model
NGO	non-governmental organisation(s)
PHARE	EU Programme - Poland, Hungary Assistance for the Reconstruction of the Economy (named after countries initially it was designed for)
SAPARD	EU Special Action Programme for Agriculture and Rural Development
UN-ECE	United Nations Economic Commission for Europe
TACIS	EU Programme - Technical assistance to the Commonwealth of Independent States and Georgia
WFD	EU Water Framework Directive

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