
ICPDR Flood Risk Management Plan: ANNEX 2 Overview of measures



Overview of measures for achieving the objectives for the management of flood risks in the Danube River Basin District

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1 Introduction

Directive 2007/60/EC on the assessment and management of flood risks (European Floods Directive, EFD) requires that Member States on the basis of the flood hazard and flood risk maps shall establish flood risk management plans coordinated at the level of the river basin district.

Member States shall establish appropriate objectives for the management of flood risks for the areas identified under EFD Article 5(1) and the areas covered by EFD Article 13(1)(b), focusing on the reduction of potential adverse consequences of flooding for human health, the environment, cultural heritage and economic activity, and, if considered appropriate, on non-structural initiatives and/or on the reduction of the likelihood of flooding.

The flood risk management plans have to include a summary of the measures and their prioritisation aiming to achieve the appropriate objectives of flood risk management, including the measures taken in accordance with EFD Article 7, and flood related measures taken under other Community acts, including Council Directives 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment (1) and 96/82/EC of 9 December 1996 on the control of major accident hazards involving dangerous substances (2), Directive 2001/42/EC of the European Parliament and of the Council of 27 June 2001 on the assessment of the effects of certain plans and programmes on the environment (3) and Directive 2000/60/EC.

In accordance with the EFD Article 7(2) the ICPDR agreed upon the following objectives for the Flood risk management plan for the Danube River Basin District:

- Avoidance of new risks
- Reduction of existing risks
- Strengthening resilience
- Raising awareness
- Solidarity principle

This overview of measures is structured in accordance with these basin-wide objectives.

This is a living non exhausting list of measures which could be amended if relevant.

2 Measures to avoid new risks

Aspects of flood risk management	Type	Description	Measures by countries
Prevention	Avoidance	Measure to prevent the location of new or additional receptors in flood prone areas, such as land use planning policies or regulation	<p>GERMANY</p> <ul style="list-style-type: none"> • Regional planning • Designation of floodplains • Area development planning • Adopted landuse • Conceptions / studies / expertices • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Compilation and update of hazard zone plans • Incorporation of hazard zone plans • Development of concepts, plans, projects, strategies on catchment scale to improve the water and sediment balance • Compilation and incorporation of local and regional land use planning strategies • Definition of a framework for implementation and maintenance of flood protection and mitigation measures. <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Elaboration or update of the zoning plans (to define area without buildings) • Application of results of flood hazard maps and flood risk maps as a limits in zoning plans

			<ul style="list-style-type: none"> • Change of functional use in zoning plans • Raising of buildings and other structures resilience (technical regulations) <p>SLOVAKIA</p> <ul style="list-style-type: none"> • Incorporation of delineated flood prone areas into spatial planning <p>HUNGARY</p> <ul style="list-style-type: none"> • New regulations on the flood risk areas on land use planning (less valuable land use) • New regulations on the flood risk areas in the field of construction (water resistant constructions) <p>SLOVENIA</p> <ul style="list-style-type: none"> • Legal restrictions for public or private investments through conditions and limitations for constructions and activities on flood risk areas (O since 2008) • Prevention of increasing the damage potential on flood hazard areas through municipal spatial plans and national spatial plans (O) <p>CROATIA</p> <ul style="list-style-type: none"> • Continuation of activities on formal introduction of a special level of protection and maintenance of natural water retention and wetland areas and boundaries of the public water domain in the process of physical planning • Continuation of activities on registration of the public water domain in land registry • Monitoring of conditions on the public water domain <p>SERBIA</p> <ul style="list-style-type: none"> • Delineate “water land” and include this land category in land registries and municipal spatial plans • Implement results of flood hazard and flood risk mapping in spatial plans
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			<ul style="list-style-type: none"> • Limit the increase of flood risk in the actually and potentially flooded areas through special conditions and permits, set in the law • Update the Erosion map of Serbia and designate erosion-prone areas, with conditions for their use and necessary works and measures for erosion and torrent control <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Inclusion of flood areas into the spatial plans and other planning documentation • Preparation of missing maps of flood hazards for rivers <p>ROMANIA</p> <ul style="list-style-type: none"> • Resettlement, land acquisition and cultural changes <p>BULGARIA</p> <ul style="list-style-type: none"> • Legislative restrictions of the construction works in the floodplains • Prohibition of the construction in flood-prone zones. • Restrictive measures to the investment intentions in areas adjacent to the river's bed. <p>MOLDOVA</p> <ul style="list-style-type: none"> • Preventing location of new or additional receptors in flood prone areas
Preparedness	Emergency Event Response Planning / Contingency planning	Measure to establish or enhance flood event institutional emergency response planning	<p>GERMANY</p> <ul style="list-style-type: none"> • Emergence event response planning • Conceptions / studies / expertices • Information and training <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Flood inspection on rivers, water reservoirs and water structures <p>HUNGARY</p> <ul style="list-style-type: none"> • Renewal of the flood protection plans

			<ul style="list-style-type: none"> Recalculation of design flood levels <p>SLOVENIA</p> <ul style="list-style-type: none"> Renewal of national and municipal plans for flood protection and rescue (estimation of endangerment, measures and tasks, needed forces and equipment) (O) Update of discharge return periods and hydraulic consequences including climate change projections (F) <p>CROATIA</p> <ul style="list-style-type: none"> Updating of flood protection systems management plans and operative flood defence plans Harmonization of operative flood defence plans with National civil protection directorate Monitoring of data on flood events and effectiveness of flood protection measures <p>SERBIA</p> <ul style="list-style-type: none"> Study of climate change impacts <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> Preparing report on setting limits concerning surface water in municipal cadastres Application of restrictions related to flood areas and surface waters. Application of agro-technical measures, forests managing measures and land-use in accordance with the nature protection. <p>ROMANIA</p> <ul style="list-style-type: none"> Planning and Emergency Situations Management
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			<p>BULGARIA</p> <ul style="list-style-type: none"> • Elaboration or update of emergency action-plans for water systems and hydrotechnical facilities. • Develop of special flood-related action-plans for the “SEVESO” facilities <p>MOLDOVA</p> <ul style="list-style-type: none"> • Issuing of the DECISION NO. 1340 from 04.12.2001 of the Commission for Emergency Situations of the Republic of Moldova on undertaking specific tasks related to population and territory protection from emergency situations
	Other preparedness	Other measure to establish or enhance preparedness for flood events to reduce adverse consequences	<p>GERMANY</p> <ul style="list-style-type: none"> • Insurance, financial precautions <p>HUNGARY</p> <ul style="list-style-type: none"> • Communication of flood risk • New regulation of the financial circumstances <p>SLOVENIA</p> <ul style="list-style-type: none"> • Identification and administrative protection of significant inundation areas (F) <p>CROATIA</p> <ul style="list-style-type: none"> • Regulation of obligations of regular monitoring, analysis and reporting <ul style="list-style-type: none"> ○ Conditions of flood protection structures and systems ○ Data on flood events and effectiveness of flood protection measures ○ Conditions on the public water domain • Establishment of a registry of legal entities certified for performing preventive and operational flood defence

			<p>SERBIA</p> <ul style="list-style-type: none"> • Permanent monitoring and inspection of erosion control and flood protection structures • Permanent monitoring of erosion processes and the state of torrential rivers <p>ROMANIA</p> <ul style="list-style-type: none"> • Improvement and maintenance of defence structures <p>BULGARIA</p> <ul style="list-style-type: none"> • Monitoring and forecasting of rainfall / runoff in the river basins. Monitoring of the dams. • Broad access to the information and forecasts on water level, river-flow and ice conditions • <p>MOLDOVA</p> <ul style="list-style-type: none"> • Communication on flood situation • Strengthening levees
Protection			<p>AUSTRIA</p> <ul style="list-style-type: none"> • Improvement of retention capacity on catchment scale • Restoration of flood plains and sedimentation areas • Structural protection measures • Object oriented measures • Relocation and reallocation • Improvement of river inspection • Maintenance of protection and mitigation measures, river maintenance <p>ROMANIA</p>

		<ul style="list-style-type: none"> • Improvement and maintenance of defence structures
Other		<p>GERMANY</p> <ul style="list-style-type: none"> • Other measures • Financial aid program <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Application of anti-erosion measures in the river basins and measures for torrents defence • Protection of objects against erosion and torrents <p>CROATIA</p> <ul style="list-style-type: none"> • Analysis of the climate change effects on the concepts of flood protection and flood risk management <p>SERBIA</p> <ul style="list-style-type: none"> • Update and apply principles and methods of flood-resilient construction • Update the Cadastre of erosion and torrents • Update the Cadastre of water structures • Include all data in Water Information System of Serbia <p>BULGARIA</p> <ul style="list-style-type: none"> • Flood-resilient design and construction of buildings

3 Measures reducing the existing risks

Aspects of flood risk management	Type	Description	Measures by countries
Prevention	Removal or relocation	Measure to remove receptors from flood prone areas, or to relocate receptors to areas of lower probability of flooding and / or of lower hazard	<p>GERMANY</p> <ul style="list-style-type: none"> • Removal/relocation • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Incorporation of hazard zone plans • Relocation and reallocation <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Removal or relocation of buildings • Spend the rest of buildings and functional use life <p>HUNGARY</p> <ul style="list-style-type: none"> • Removal or relocation of dykes <p>SLOVENIA</p> <ul style="list-style-type: none"> • Setting a regulation on flood resilient construction (F) <p>SERBIA</p> <ul style="list-style-type: none"> • Re-asses legalisation of illegally built structures on flood-prone areas • Remove structures illegally built on flood-prone areas

			<p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Relocation of most endangered population based on risk map data • Relocation of any potentially dangerous industrial facilities away from the flood risk areas <p>ROMANIA</p> <ul style="list-style-type: none"> • Resettlement, land acquisition and cultural changes • Permits for the use of land and building, their control • Improved tools, methods and standards of appropriate evaluation <p>BULGARIA</p> <ul style="list-style-type: none"> • Removal of illegally built constructions, barriers, and other artificial obstacles located in the river's beds or in the gullies • Closure and reclamation of unused and abandoned industrial and contaminated sites <p>MOLDOVA</p> <ul style="list-style-type: none"> • Removal or relocation of buildings
	<p>Reduction</p>	<p>Measure to adapt receptors to reduce the adverse consequences in the event of a flood actions on buildings, public networks, etc...</p>	<p>GERMANY</p> <ul style="list-style-type: none"> • Flood adapted planning, construction and renovation • Physical protection of buildings • Flood proof storage of water-hazardous substances • Conceptions / studies / expertices • Information and training • Research and development projects and best practice projects

			<p>AUSTRIA</p> <ul style="list-style-type: none"> • Object oriented measures • Definition of a framework for implementation and maintenance of flood protection and mitigation measures. <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Individual flood protection measures <p>SLOVAKIA</p> <ul style="list-style-type: none"> • optimisation of floodplains zoning with respect to existing infrastructure <p>HUNGARY</p> <ul style="list-style-type: none"> • Heightening and reinforcement of dykes, flood walls • Constructing of dyke rings • Dredging • River channelling <p>SLOVENIA</p> <ul style="list-style-type: none"> • Adaptation of constructions to flood hazard intensity (F) <p>SERBIA</p> <ul style="list-style-type: none"> • Local flood protection measures (on single or group of buildings), wherever possible • Reassessment and modification of vulnerable infrastructure (esp. road and railroad crossings on rivers) <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Capacity building on municipal level – organizing educational workshops
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			<p>ROMANIA</p> <ul style="list-style-type: none"> • Reducing social vulnerability to flooding • Reducing individual vulnerability <p>BULGARIA</p> <ul style="list-style-type: none"> • Assessment of the discharge and drainage of rainwater – especially via the sewage network • Construction /re-construction of drainage facilities • Construction of new sewerage networks with sufficient capacity
	<p>Other prevention</p>	<p>Other measure to enhance flood risk prevention (may include, flood risk modelling and assessment, flood vulnerability assessment, maintenance programmes or policies etc...)</p>	<p>AUSTRIA</p> <ul style="list-style-type: none"> • Compilation and update of hazard zone plans • Compilation and incorporation of local and regional land use planning strategies <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Individual evaluation of flood risk and comparison with vulnerability • Programme to finance, to maintain and to check flood protection measures • Technical and safety supervision of water structures • Using of good agricultural practice principle (selection of plants, rotation of plants etc.) <p>HUNGARY</p> <ul style="list-style-type: none"> • Flood modelling • Land use changes on the catchment area • Education <p>CROATIA</p> <ul style="list-style-type: none"> • Assessment of status and updating (if needed) of concepts of the existing:

			<ul style="list-style-type: none"> ○ For the purpose of harmonization with the flood risk management objectives ○ For the purpose of compensation for an increase in the flood risks due to the use of natural water retention, wetland and floodplain areas for settlements and agricultural areas in the process of uncontrolled construction and urbanization of such areas ○ Assessment of functionality of the existing regulation and protection facilities <p>SERBIA</p> <ul style="list-style-type: none"> • Regular upgrade of the General Flood Defence Plan for the Republic of Serbia • Regular upgrade of the Annual Flood Defence Plans for the Republic of Serbia • Preparation and regular upgrade of the Annual Flood Defence Plans for municipalities • Update/preparation of technical documentation for all existing flood protection structures (incl. data on water estate) • Update/preparation of flood defence manual • Establish efficient bilateral cooperation with all neighbouring countries, including common actions on transboundary rivers during flood and ice defence • Plan and implement the ice control measures, economically feasible and tailored according to river specific conditions • Flood risk modelling • Flood vulnerability assessment <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Reconstruction measures for flood defence objects • Regular ongoing maintenance of existing flood defence objects
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			<ul style="list-style-type: none"> • River training projects in the areas indicated by flood risk maps <p>ROMANIA</p> <ul style="list-style-type: none"> • Improved tools, methods and standards for appropriate evaluation • Develop and implement management plans for flood risk or directory schemes <p>BULGARIA</p> <ul style="list-style-type: none"> • Flood risk modelling and mapping <p>MOLDOVA</p> <ul style="list-style-type: none"> • Preparation of flood risk and flood hazard maps
Protection	Natural flood management / runoff and catchment management	Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc and including in-channel , floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.	<p>GERMANY</p> <ul style="list-style-type: none"> • Natural water retention in the catchment • Natural water retention in wetlands • Reduction of sealing • Natural water retention in settlement area • Recovery of floodplains • Conceptions / studies / expertices • Research and development projects and best practice projects • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Restoration of flood plains and sedimentation areas • Definition of operating instructions for flood prone and flood influencing facilities <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Erosion protection measures in the river basins (complex land processing)

			<ul style="list-style-type: none"> • Support of rainfall infiltration • Interruption of trajectories of concentrated runoff (including forest roads) • Restoration of small retention areas • Restoration or revitalization of old amelioration structures • Protection and restoration of floodplains • Good management of alluvial plains to reduce runoff • Revitalization of rivers <p>SLOVAKIA</p> <p>measures to reduce (decelerate) run-off from river basin into the water courses, to increase retention capability of river basin or to support natural accumulation of water in the suitable areas – measures at agricultural soils, in forests and urban areas</p> <ul style="list-style-type: none"> • operational erosion control measures (organisation of land with respect to erosion control, agrotechnical erosion control measures, biological erosion control measures) • technical erosion control measures (erosion control trenches, terraces at hillslopes) • technical forestry measures to influence interception and transpiration of forest vegetation, improvement of infiltration properties of forest soils • measures to decrease stormwater runoff • measures to control runoff and decrease water pollution (trenches and ditches, detention and retention ponds and reservoirs, retention soil filters, underground retention reservoirs) <p>HUNGARY</p> <ul style="list-style-type: none"> • Leading the flood to another river basin <p>SLOVENIA</p> <ul style="list-style-type: none"> • Natural water retention measures (restoration and reconnection of floodplains and meanders, upstream afforestation, adaptation of agricultural
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			<p>practices to improve infiltration potential and to decrease runoff and erosion, reduction of soil sealing in urban areas)</p> <p>CROATIA</p> <ul style="list-style-type: none"> • Encourage selection of technical solutions that will ensure: <ul style="list-style-type: none"> ○ Retention of water in the watershed as long as possible and allowing room for watercourses to slow down the runoff ○ Preservation, restoration and enlargement of areas that can retain flood waters, such as natural water retention areas, wetlands and floodplains ○ Prevention of pollution of water and soil by harmful substances during flood events in areas reserved for flood water retention by land use restrictions and administrative measures ○ Continue creating lowland retentions in the areas of former floodplains for the purpose of flood flow reductions and flood protection of downstream areas ○ Usage of the existing lowland retention areas for meadows and grazing areas or for restoration of alluvial forests • Identification and preparation of protection and management programmes for floodplains and retention areas that could be used as natural water retention areas • Repair, reconstruction and construction of flood protection systems according to Multiannual programme of construction of water regulation and protection facilities and amelioration facilities (selected projects or project components) <p>SERBIA</p> <ul style="list-style-type: none"> • Sustain existing wetlands and inundated areas • Investigate the possibilities for economically feasible restoration or enlargement of natural retention areas
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			<ul style="list-style-type: none"> • Sustain existing forests and afforest new areas, especially in hilly and mountain areas prone to erosion • Create green spaces in new urban areas, to enhance water infiltration • Revitalise drainage channels <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Re-forestation of deforested areas within the catchment <p>ROMANIA</p> <ul style="list-style-type: none"> • Improvement the torrential flood control • Strengthening flood defence structures <p>BULGARIA</p> <ul style="list-style-type: none"> • Restoration of the natural river beds, meanders and floodplains • Creation of polders and small buffer basins in the river terraces • Afforestation of the river banks and floodplains
	<p>Water flow regulation</p>	<p>Measures involving physical interventions to regulate flows, such as the construction, modification or removal of water retaining structures (e.g., dams or other on-line storage areas or development of existing flow regulation rules), and which have a significant impact on the hydrological regime.</p>	<p>GERMANY</p> <ul style="list-style-type: none"> • Planning and construction of flood retention systems • Operation, maintenance and reconstruction of flood retention systems • Conceptions / studies / expertices • Research and development projects and best practice projects • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Improvement of retention capacity on catchment scale • Structural protection measures <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Construction of control structures for inundations • Improvement of existing water structures (raising of storage volume,

			<p>increasing of discharge capacity, increasing of safety)</p> <ul style="list-style-type: none"> • Update of operational rules and service regulations for water structure <p>SLOVAKIA</p> <ul style="list-style-type: none"> • measures which reduce flood peak discharge – construction, maintenance, repair or reconstruction of water structures <ul style="list-style-type: none"> ○ dams and reservoirs ○ dry or semi-dry reservoirs, polders ○ bypass canals • optimisation of operational rules with respect to flood control and other purposes of reservoirs utilisation <p>HUNGARY</p> <ul style="list-style-type: none"> • Creating of polders for floods, flash floods and inland water • Operation of polders • Use of mobile protecting constructions • Optimization of reservoir operation • Relocation of dikes (space for the river) • Designation of natural retention areas where applicable <p>SLOVENIA</p> <ul style="list-style-type: none"> • Renewal and construction of dry and wet retentions and bypasses (F) • Optimisation of operational rules for dams (F) <p>CROATIA</p> <ul style="list-style-type: none"> • Repair, reconstruction and construction of flood protection systems according to Multiannual programme of construction of water regulation and protection facilities and amelioration facilities (selected projects or project components)
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			<p>SERBIA</p> <ul style="list-style-type: none"> • Investigate possibilities for construction of dry flood-retention reservoirs on large international rivers (Danube, Sava and Tisza) in order to reduce pikes of extreme floods • Use existing reservoirs and retentions for flood management, according to specific regulation rules • Explore possibilities and construct new flood retention capacities on smaller rivers <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Defining the necessary storage volume and operation regime of the existing retention areas and reservoirs for flood defence • Consideration on construction of new multipurpose reservoirs and retention areas • Reconstruction and remediation of the flood defence system <p>ROMANIA</p> <ul style="list-style-type: none"> • Improving the management of flow and water courses • Strengthening flood defence structures • Reduce vulnerability to flooding of agricultural land <p>BULGARIA</p> <ul style="list-style-type: none"> • Constructions for controlled inundation • Use of mobile flood-defence facilities • Efficient management of dams and retention structures • Removal of dangerous and/or inefficient dams and reservoirs <p>MOLDOVA</p> <ul style="list-style-type: none"> • Operation of water reservoirs
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	Channel, Coastal and Floodplain Works	Measures involving physical interventions in freshwater channels, mountain streams, estuaries, coastal waters and flood-prone areas of land, such as the construction, modification or removal of structures or the alteration of channels, sediment dynamics management , dykes, etc.	<p>GERMANY</p> <ul style="list-style-type: none"> • Dikes, dams, floodprotection walls, dunes, beach ridges, mobile flood defences • Maintenance measures of static/mobile flood defence systems • Conceptions / studies / expertices • Research and development projects and best practice projects • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Development of concepts, plans, projects, strategies on catchment scale to improve the water and sediment balance <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Increasing of river discharge capacity • Construction of flood protection dikes • Construction of mobile walls • Evaluation of possible removal of transversal structures in the rivers (lowering of water level) • Increasing of discharge capacity of bridges, culverts, inundation structures etc.) • Construction of embankment walls • Grading in floodplains <p>SLOVAKIA</p> <ul style="list-style-type: none"> • measures which protect land from inundated water of water courses – technical river training works, flood protection dykes, walls, embankments, other linear flood protection structures • measures to ensure adequate flow capacity of the channels of water courses – maintenance of river channels and their vegetation, removal of deposits • reconstruction or maintenance of bridges to enhance their capacity during floods
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			<p>HUNGARY</p> <ul style="list-style-type: none"> • Removal of obstacles <p>SLOVENIA</p> <ul style="list-style-type: none"> • Renewal, construction and maintenance of flood and erosion protection structures • Maintenance of natural and artificial river channels, frequent obstacle removal and reconstruction of culverts • Development of concepts and plans on catchment scale to improve the water and sediment balance <p>CROATIA</p> <ul style="list-style-type: none"> • Repair, reconstruction and construction of flood protection systems according to Multiannual programme of construction of water regulation and protection facilities and amelioration facilities (selected projects or project components) <p>SERBIA</p> <ul style="list-style-type: none"> • Levee system on lowland rivers • Restoration of structures damaged during 2014 flood • Completion and reconstruction of flood protection structures • Upgrade of flood protection level of the most important areas, using combination of permanent structures and mobile protection • Implement sediment management measures to maintain river conveyance capacity <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • River training works • Floodplain protection dykes (levies) • Torrent control barriers
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			<p>ROMANIA</p> <ul style="list-style-type: none"> • Improvement the torrential flood control • Strengthening flood defence structures <p>BULGARIA</p> <ul style="list-style-type: none"> • Expansion of the "bottlenecks" such as bridges, etc., which obstruct the river flow. • Heightening and reinforcement of dykes • Terracing; • Reconstruction and maintenance of drainage channels • Maintenance of river-channels and gullies, ensuring adequate flow capacity of the channels of water courses
	Surface Water Management	Measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacities or though sustainable drainage systems (SuDS).	<p>GERMANY</p> <ul style="list-style-type: none"> • Keeping clear flood discharge cross-sections in settlement area and wetlands • Keeping clear flood discharge cross-sections by maintenance measures and floodplain-management • Conceptions / studies / expertices • Information and training <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Infiltration structures to catch the rainfall water • Flood protection measures on sewerage system • Construction of retention storages on sewerage system • Creation of complex control systems on sewerage systems • Using of green roofs and rain gardens • Support of rainfall management in the urban areas

			<p>SLOVAKIA</p> <ul style="list-style-type: none"> measures which protect land from inundated „inner waters“ – installations (equipment) for pumping the „inner waters“ <p>SLOVENIA</p> <ul style="list-style-type: none"> Improving the capacity of urban drainage systems and opening of paved channels (F) <p>SERBIA</p> <ul style="list-style-type: none"> Prepare/update designs of second flood defence lines Reconsider capacity of urban drainage systems <p>ROMANIA</p> <ul style="list-style-type: none"> Strengthening flood defence structures Reducing the vulnerability to floods of the transport infrastructure and the technical and urban works <p>BULGARIA</p> <ul style="list-style-type: none"> Protective drainage channels in settlements Reduction of sealing in urban areas Management of rivers and channels in urban areas
	Other Protection	Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies	<p>GERMANY</p> <ul style="list-style-type: none"> Other measures of protection Information and training <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> Inspection of the function of existing flood protection measures

			<p>SLOVAKIA</p> <ul style="list-style-type: none"> • mobile flood protection barriers <p>SLOVENIA</p> <ul style="list-style-type: none"> • Introducing the use of mobile barriers where possible (F) <p>CROATIA</p> <ul style="list-style-type: none"> • Implementation of Programs of regular technical maintenance of watercourses, water domain and water structures in accordance with nature protection conditions. • Monitoring of conditions of flood protection structures and systems. <p>SERBIA</p> <ul style="list-style-type: none"> • Regularly maintain flood protection structures, as well as erosion and torrent control structures • Purchase and repair of machinery, tools, materials, equipment and communications need for flood defence units and emergency management units <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Developing guidelines for new reservoirs and retention work regime • Design and construction of new defence systems • Design and construction of new multipurpose reservoirs, barrages and retentions <p>ROMANIA</p> <ul style="list-style-type: none"> • Reducing social vulnerability to flooding
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			<p>BULGARIA</p> <ul style="list-style-type: none"> • Annual inspection of the technical and operational conditions of potentially dangerous water objects • Review and update of the regulations for maintenance and operation of small dams in order to guarantee the conduction of high water wave caused by flash floods
Preparedness	Public awareness and preparedness		<p>GERMANY</p> <ul style="list-style-type: none"> • Awareness-raising, preparation for emergency event <p>SLOVAKIA</p> <ul style="list-style-type: none"> • Awareness-raising about flood risk, possible flood protection measures, general public input into increasing flood protection at local level <p>ROMANIA</p> <ul style="list-style-type: none"> • Public participation at exercises for flood protection <p>BULGARIA</p> <ul style="list-style-type: none"> • Preparing the population for actions in case of flood
Other			<p>GERMANY</p> <ul style="list-style-type: none"> • Other measures) • Financial aid program <p>CROATIA</p> <ul style="list-style-type: none"> • Harmonization of interpretation of water fees as fees for covering costs of resources and costs of water environment and adjustment of water fees with 6-year planning cycle (financing issue) • Improvement to procedures of issuance of nature protection conditions for works of regular maintenance of watercourses, water domain and water structures (administrative issue, to enhance the efficiency of implementation of operation and maintenance measures)

		<ul style="list-style-type: none"> • Improvement to integrated water and flood risk management in the aspect of planning of measures of construction and maintenance of flood protection structures and systems through: <ul style="list-style-type: none"> ○ Development of a methodology for establishment of ecologic potential of the heavily modified water bodies under the influence of flood protection structures and systems ○ Establishment of a classification system for the ecologic potential of the heavily modified water bodies under the influence of flood protection structures and systems ○ Monitoring of conditions of the heavily modified water bodies under the influence of flood protection structures and systems (according to the established classification system) <p>SERBIA</p> <ul style="list-style-type: none"> • Strengthening the capacity of professionals and institutions responsible for flood management and emergency management
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4 Measures strengthening resilience

Aspects of flood risk management	Type	Description	Measures by countries
Preparedness	Flood Forecasting and Warning	Measure to establish or enhance a flood forecasting or warning system	<p>GERMANY</p> <ul style="list-style-type: none"> • Flood information and forecast

			<ul style="list-style-type: none"> • Establish/improve local warning systems and information • Research and development projects and best practice projects • Studies in climate change <p>AUSTRIA</p> <ul style="list-style-type: none"> • Implementation of monitoring, forecasting, warning systems <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Revision and completion of forecast profiles and flood announcement limits • Construction of local warning and notification systems • Improvement of flood forecast • Creation of expert systems to analyse measured data <p>SLOVAKIA</p> <ul style="list-style-type: none"> • upgrade and enhancement of national flood forecasting and warning services by building new monitoring system (radar and precipitation stations) and new forecasting models for more water gauge stations • strengthening cooperation in the field of flood forecasting and warning – Danube basin-wide, international and bilateral agreements and systems <p>HUNGARY</p> <ul style="list-style-type: none"> • Renewal of the early warning system <p>SLOVENIA</p> <ul style="list-style-type: none"> • Improving the flood monitoring, forecast and warning information system (O) • Improve and renew the existing alert system on individual and community level
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			<p>CROATIA</p> <ul style="list-style-type: none"> • Improvement to the system for the flood alert and warning system with the goal of improvement of the efficiency of data transfer procedures. • Continuation of the development of the automatic delivery of meteorological data and their systematic dissemination on the internal web pages adjusted to the needs of the water management sector • Harmonization of the flood alert and warning systems in transboundary basins with the neighbouring countries • Modernization of the hydrologic data monitoring network and information systems • Development and implementation of hydrologic flood forecasting models • Harmonization of flood forecasts in transboundary basins with the neighbouring countries <p>SERBIA</p> <ul style="list-style-type: none"> • Improve the system of hydro-meteorological monitoring, forecast and early warning (more automated precipitation and gauging stations, use of radars and satellite imagery, contemporary forecast models) • Measured data available to relevant services in real time • Improve the alarm systems and systems for issuing timely warning to population at risk, especially on river basins without structural flood protection • Upgrade the international exchange of meteorological and hydrological data <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Improvement of meteorological and hydrological forecasting system connected with Water Information System (WIS) • Improvement of automatic forecasting station connected with WIS • International exchange of meteorological and hydrological data od flood defence operational measures <p>ROMANIA</p>
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			<ul style="list-style-type: none"> • Consultation and training of the population, feedback and build the collective resilience to flooding • Improving monitoring, flood forecasting and warning - alarming in case of floods • Training, education and research <p>BULGARIA</p> <ul style="list-style-type: none"> • Building of early-warning systems addressed to flash floods • Improvement and modernization of the hydro-meteorological monitoring network • Improvement of the existing hydrological information system - real-time transfer of data for the entire river basin <p>MOLDOVA</p> <ul style="list-style-type: none"> • Improvement of flood forecasting
	<p>Emergency Event Response Planning / Contingency planning</p>	<p>Measure to establish or enhance flood event institutional emergency response planning</p>	<p>GERMANY</p> <ul style="list-style-type: none"> • Emergence event response planning • Conceptions / studies / expertices • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Compilation of emergency plans <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Update of flood protection plans (municipalities, companies, building owners, districts, regions) • Update of emergency and crisis plans (municipalities, companies) • Assignment of technical devices and materials for rescue activities during

			<p>floods</p> <ul style="list-style-type: none"> • Training and professional support of flood and crisis authorities <p>SLOVAKIA</p> <ul style="list-style-type: none"> • emergency flood equipment response measures – strengthening flood response capacities, improvement of cooperation between different sectors, institutions and professionals involved in flood management <p>SLOVENIA</p> <ul style="list-style-type: none"> • Exchanging knowledge and cooperation between prevention, intervention and recovery sector • Harmonizing the flood risk management plans and plans for protection and rescue <p>CROATIA</p> <ul style="list-style-type: none"> • Continuation of activities on formal introduction of a special level of protection and maintenance of natural water retention and wetland areas and boundaries of the public water domain in the process of physical planning • Continuation of activities on registration of the public water domain in land registry • Monitoring of conditions on the public water domain <p>SERBIA</p> <ul style="list-style-type: none"> • Preparation of plans for protection and rescue in emergency situations, including catastrophic floods on the state level, municipality level etc. <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Preparation, adoption and updating flood defence plans • Continuous data exchange between institutions in charge of flood defence
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			<ul style="list-style-type: none"> • Strengthening the capacity of professionals and institutions responsible for flood management <p>ROMANIA</p> <ul style="list-style-type: none"> • Implementation of a clear and consistent national policies for flood risk management • Institutional Arrangements and appropriate connections • Legal provisions • Planning and Emergency Situations Management <p>BULGARIA</p> <ul style="list-style-type: none"> • Establishment of a National Centre for real-time water management • Development and/or update of national regulations on prevention of emergency events and related recovery-activities, addressed to the state administrations, local administrations and business <p>MOLDOVA</p> <ul style="list-style-type: none"> • Preparation of plans for protection and rescue in emergency situations, including catastrophic floods on the state as well as municipality level. • Improvement of cooperation between different sectors, institutions and professionals involved in flood management
	Public Awareness and Preparedness	Measure to establish or enhance the public awareness or preparedness for flood events	<p>GERMANY</p> <ul style="list-style-type: none"> • Awareness-raising, preparation for emergency event • Conceptions / studies / expertices • Consulting services <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Publishing of flood protection plans • Raining of individual public preparedness

			<ul style="list-style-type: none"> • Marking of flood risk areas on terrain <p>HUNGARY</p> <ul style="list-style-type: none"> • PR methods and education to increase the awareness of the population • Increase the participation of the population in the flood fighting works <p>SLOVENIA</p> <ul style="list-style-type: none"> • Detection of important risk areas, information and education of highly endangered inhabitants and other subjects of self-protective measures for vulnerability reduction before and during the event (F) • Raising the awareness, preparation for emergency event and increase the level of community participation during the event (F) <p>CROATIA</p> <ul style="list-style-type: none"> • Encourage public participation in the implementation of flood risk management plans and solution of problems caused by global climate changes • Establishment of a system for regular education of the public regarding flood risk management issues, especially in areas under significant flood risks • Continuation of activities on the system for informing the public on the activities and initiatives related to the flood risk management and activities during flood events <p>SERBIA</p> <ul style="list-style-type: none"> • Training exercises <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Public access to flood hazard and flood risk maps • Municipal authorities capacity building and training on data use
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		<ul style="list-style-type: none"> Implementation of flood insurance system <p>ROMANIA</p> <ul style="list-style-type: none"> Preliminary assessment of flood risk and improving knowledge Training, education and research <p>BULGARIA</p> <ul style="list-style-type: none"> Maintenance and update of water registers Provision of updated information in appropriate format to the stakeholders Training and information campaign <p>MOLDOVA</p> <ul style="list-style-type: none"> Informing people about the flood risks through mass-media and local administration and placing warnings on the state hydro-meteorological Station web-site
Other preparedness	Other measure to establish or enhance preparedness for flood events to reduce adverse consequences	<p>GERMANY</p> <ul style="list-style-type: none"> Insurance, financial precautions <p>AUSTRIA</p> <ul style="list-style-type: none"> Ensure availability of facilities for emergency <p>SLOVENIA</p> <ul style="list-style-type: none"> Renewal of national and municipal plans for flood protection and rescue (estimation of endangerment, measures and tasks, needed forces and equipment) (O) Building the new gauge stations for monitoring the discharges relevant for significantly endangered areas (O) Development of hydrologic models for flood prediction and setup of local

			<p>alarm systems for significantly endangered areas (F)</p> <p>SERBIA</p> <ul style="list-style-type: none"> • Update/build scientific base for flood management • Preparation of studies and designs <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Improving international cooperation in flood management <p>ROMANIA</p> <ul style="list-style-type: none"> • Consultation and training of the population, feedback and build the collective resilience to flooding • Training, education and research • Reducing individual vulnerability <p>BULGARIA</p> <ul style="list-style-type: none"> • Implementation of insurance policies; promotion of flood-oriented insurance products
Recovery and Review	Individual and societal recovery	<p>Clean-up and restoration activities (buildings, infrastructure, etc)</p> <p>Health and mental health supporting actions, incl. managing stress</p> <p>Disaster financial assistance (grants, tax), incl. disaster legal assistance, disaster unemployment assistance</p> <p>Temporary or permanent</p>	<p>GERMANY</p> <ul style="list-style-type: none"> • Assistance with post-flood repair, restoration activities, aftercare planning, elimination of environmental damage • Conceptions / studies / expertices <p>AUSTRIA</p> <ul style="list-style-type: none"> • Emergency response <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Assignment of technical devices and material for recovery activities

		<p>relocation Other</p>	<p>SLOVENIA</p> <ul style="list-style-type: none"> • Improving the realization of recovery plans and providing the financial assistance in possible relocation of damage potential • Financial aid and insurance schemas (F) <p>SERBIA</p> <ul style="list-style-type: none"> • All enlisted measures <p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Removal of buildings located in flood risk areas destroyed by war <p>ROMANIA</p> <ul style="list-style-type: none"> • Institutional arrangements and appropriate connections • Legal provisions • Reducing the vulnerability to floods of the transport infrastructure and the technical and urban works • Permits the use of land and building, their control • Resettlement, land acquisition and cultural changes • Funding and compensation <p>BULGARIA</p> <ul style="list-style-type: none"> • Elimination of pollution during and immediately after the flood-accident • Restoration work on roads, water supply facilities, sewage, power supply networks and other type of infrastructure • Restoration work for elimination of local damages on banks, embankments and other protective constructions.
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			<p>MOLDOVA</p> <ul style="list-style-type: none"> Assistance with post-flood repair, restoration activities, aftercare planning, elimination of environmental damage
Environmental recovery	<p>Clean-up and restoration activities (with several sub-topics as mould protection, well-water safety and securing hazardous materials containers)</p> <p>Other</p>	<p>AUSTRIA</p> <ul style="list-style-type: none"> Evaluation and repair of damages <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> Financial support of environmental recovery Preparation of materials for environmental recovery <p>SERBIA</p> <ul style="list-style-type: none"> All enlisted measures <p>ROMANIA</p> <ul style="list-style-type: none"> Reducing the vulnerability to floods of environmental infrastructure <p>BULGARIA</p> <ul style="list-style-type: none"> Elimination of pollution in the water-supply safeguard zones Stabilization of landslides caused/activated by flooding <p>MOLDOVA</p> <ul style="list-style-type: none"> Evaluation and repair of damages 	
Other recovery and review	<p>Lessons learnt from flood events</p> <p>Insurance policies</p> <p>Other</p>	<p>GERMANY</p> <ul style="list-style-type: none"> Other recovery and review Research and development projects and best practice projects <p>AUSTRIA</p> <ul style="list-style-type: none"> Documentation and analysis <p>CZECH REPUBLIC</p>	

			<ul style="list-style-type: none"> • Reports on floods and revision of recommendations • Register of flood damages <p>SERBIA</p> <ul style="list-style-type: none"> • Study of 2014 flood, reconsideration of flood management concept and proposal of new developments • Preparation of grounds for wider implementation of flood insurance
Other			<p>GERMANY</p> <ul style="list-style-type: none"> • Other measures • Financial aid program <p>AUSTRIA</p> <ul style="list-style-type: none"> • Relocation and reallocation <p>ROMANIA</p> <ul style="list-style-type: none"> • Implementation of a clear and consistent national policies for flood risk management • Consultation and training of the population, feedback and build the collective resilience to flooding • Legal provisions <p>BULGARIA</p> <ul style="list-style-type: none"> • Study on changes in the ecological status of surface water after flooding • Exchange of knowledge and experience • Recording of flood-events; assessment of the damages

5 Awareness raising measures

Aspects of flood risk management	Type	Description	Measures by countries
Preparedness	Public Awareness and Preparedness	Measure to establish or enhance the public awareness or preparedness for flood events	<p>GERMANY</p> <ul style="list-style-type: none"> • Awareness-raising, preparation for emergency event • Conceptions / studies / expertices • Consulting services <p>AUSTRIA</p> <ul style="list-style-type: none"> • Information of public in an appropriate way • Improve participation • Educational activities • Implementation of monitoring, forecasting, warning systems • Compilation of emergency plans • Ensure availability of facilities for emergency <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Raising of public flood risk knowledge • Publishing of information regarding flood protection options <p>SLOVAKIA</p> <ul style="list-style-type: none"> • presentation of flood hazard and flood risk maps, flood management plans • raising public awareness

			<ul style="list-style-type: none"> • training campaigns focused at flood preparedness among municipalities <p>HUNGARY</p> <ul style="list-style-type: none"> • PR methods and education to increase the awareness of the population • Increase the participation of the population in the flood fighting works <p>SLOVENIA</p> <ul style="list-style-type: none"> • Updating an information system for flood events data, hazard and risk maps and status of measures (O) • Public information about flood hazard and risk conditions (O, F) • Raising community awareness flood extent and intensity (F) <p>CROATIA</p> <ul style="list-style-type: none"> • Encourage public participation in the implementation of flood risk management plans and solution of problems caused by global climate changes • Establishment of a system for regular education of the public regarding flood risk management issues, especially in areas under significant flood risks • Continuation of activities on the system for informing the public on the activities and initiatives related to the flood risk management and activities during flood events <p>SERBIA</p> <ul style="list-style-type: none"> • Introduction of water management issues into schools (from elementary school to university level) • Preparation of flood leaflet, film, TV broadcasts etc. • Flood hazard and flood risk maps available in WISS • Exercises
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			<p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Public awareness of flood life strategy • Production of fliers, movies, radio and TV shows <p>ROMANIA</p> <ul style="list-style-type: none"> • Develop and implement management plans for flood risk or directory schemes • Consultation and training of the population, feedback and build the collective resilience to flooding <p>BULGARIA</p> <ul style="list-style-type: none"> • Educational activities • Public access to the flood hazard and flood risk maps. Public access to the annual reports on the status and operational conditions of dams and other <p>MOLDOVA</p> <ul style="list-style-type: none"> • Informing people about the flood risks through mass-media and local administration and placing warnings on the state hydro-meteorological Station web-site
Other preparedness	Other measure to establish or enhance preparedness for flood events to reduce adverse consequences		<p>GERMANY</p> <ul style="list-style-type: none"> • Insurance, financial precautions <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Flood exercises for flood and crisis authorities <p>SERBIA</p> <ul style="list-style-type: none"> • Continuous data exchange between institutions in charge for flood defence • Municipal authorities capacity building and training

			<p>BOSNIA AND HERZEGOVINA</p> <ul style="list-style-type: none"> • Municipal capacity building <p>MOLDOVA</p> <ul style="list-style-type: none"> • Continuous data exchange between institutions in charge of flood defence
Prevention/Protection			<p>AUSTRIA</p> <ul style="list-style-type: none"> • Compilation and update of hazard zone plans • Incorporation of hazard zone plans • Compilation and incorporation of local and regional land use planning strategies • Structural protection measures • Object oriented measures • Relocation and reallocation • Definition of operating instructions for flood prone and flood influencing facilities <p>SLOVENIA</p> <ul style="list-style-type: none"> • Detailed flood hazard and risk mapping through unified methodology (ongoing since 2007) • Renewal of flood hazard indication map every 6 years (ongoing since 2007) • Establishment of erosion hazard indication map
Other			<p>GERMANY</p> <ul style="list-style-type: none"> • Other measures • Financial aid program

6 Measures implementing the solidarity principle

Aspects of flood risk management	Type	Description	Measures by	Actions taken to avoid negative downstream effects
Protection	Natural flood management / runoff and catchment management	Measures to reduce the flow into natural or artificial drainage systems, such as overland flow interceptors and / or storage, enhancement of infiltration, etc and including in-channel , floodplain works and the reforestation of banks, that restore natural systems to help slow flow and store water.	<p>GERMANY</p> <ul style="list-style-type: none"> Natural water retention in the catchment Natural water retention in wetlands Reduction of sealing Natural water retention in settlement area Recovery of floodplains Conceptions / studies / expertises Research and development projects and best practice projects Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> Restoration of flood plains and sedimentation areas Definition of operating instructions for flood prone and flood influencing facilities <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> Land use change (grassing, 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which significantly increase the risk of flooding upstream or downstream:</p> <ul style="list-style-type: none"> § 5: Obligation of general diligence: Where activities can have an impact on a waterbody, everyone shall be obliged to exercise all dure reyuired caution under the circumstances in order to <ol style="list-style-type: none"> avoid adverse impacts on waterproperties, .. preserve the vitality of natural water resources and prevent the increase and acceleration of water run-off. § 67 Principle on river development and construction of dykes, dams and coastal protection structures: Water bodies shall be developed in such a way that natural floodplains are preserved, the natural water run-off is not influenced significantly, species and biocoenoses typical for specific ecosystems are protectec and any other negative impacts on the water properties are prevented. Otherwise compensation measures shall be taken. § 68: plan approval procedure, planning licence Planning approval shall only be granted, if

			<p>afforestation)</p> <ul style="list-style-type: none"> Raising of hydric function of forest <p>SLOVENIA</p> <ul style="list-style-type: none"> Improvement of retention capacity on catchment scale Adjusting the design flood levels on border rivers <p>SERBIA</p> <ul style="list-style-type: none"> Establish efficient bilateral cooperation with all neighbouring countries, including common actions on transboundary rivers during flood and ice defence <p>ROMANIA</p> <ul style="list-style-type: none"> Improvement the torrential flood control Strengthening flood defence structures <p>BULGARIA</p> <ul style="list-style-type: none"> Prohibition on felling of natural forest vegetation on the river banks and river islands Creation of water retention areas; restoration of wetlands; 	<p>1. an impairment of the public interest is not to be expected, especially with regard to a considerable and permanent increase in flood risks that cannot be compensated or the destruction of natural flood retention areas, especially in riparian forests.</p> <p>§ 77: Natural retention areas Natural floodplains shall be maintained. Former floodplains shall be restored as far as possible.</p>
	Water flow regulation	Measures involving physical interventions to regulate flows, such as the construction,	<p>GERMANY</p> <ul style="list-style-type: none"> Planning and construction of flood 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which</p>

		<p>modification or removal of water retaining structures (e.g., dams or other on-line storage areas or development of existing flow regulation rules), and which have a significant impact on the hydrological regime.</p>	<p>retention systems</p> <ul style="list-style-type: none"> • Operation, maintenance and reconstruction of flood defence systems • Conceptions / studies / expertises • Research and development projects and best practice projects • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Improvement of retention capacity on catchment scale • Structural protection measures <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Construction of dry reservoirs • Construction of water reservoirs <p>HUNGARY</p> <ul style="list-style-type: none"> • Adjusting the design flood levels on border rivers. <p>ROMANIA</p> <ul style="list-style-type: none"> • Improving the management of flow and water courses • Strengthening flood defence structures • Resettlement, land acquisition and cultural changes • Permits the use of land and building, their control 	<p>significantly increase the risk of flooding upstream or downstream:</p> <ul style="list-style-type: none"> - § 68: see above - § 75: Flood risk management plans (4): Flood risk management plans shall not include measures which, by their extent and impact, significantly increase flood risks in other countries
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	Channel, Coastal and Floodplain Works	Measures involving physical interventions in freshwater channels, mountain streams, estuaries, coastal waters and flood-prone areas of land, such as the construction, modification or removal of structures or the alteration of channels, sediment dynamics management , dykes, etc.	<p>GERMANY</p> <ul style="list-style-type: none"> • Dikes, dams, floodprotection walls, dunes, beach ridges, mobile flood defences • Maintenance measures of static/mobile flood defence systems • Conceptions / studies / expertises • Research and development projects and best practice projects • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Development of concepts, plans, projects, strategies on catchment scale to improve the water and sediment balance <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Relocation of river dikes (make more space to rivers) • Construction of diversion and lateral channels <p>ROMANIA</p> <ul style="list-style-type: none"> • Improvement the torrential flood control • Strengthening flood defence structures 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which significantly increase the risk of flooding upstream or downstream:</p> <ul style="list-style-type: none"> - § 67: see above § 68: see above
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	<p>Surface Water Management</p>	<p>Measures involving physical interventions to reduce surface water flooding, typically, but not exclusively, in an urban environment, such as enhancing artificial drainage capacities or though sustainable drainage systems (SuDS).</p>	<p>GERMANY</p> <ul style="list-style-type: none"> • Keeping clear flood discharge cross-sections in settlement area and wetlands • Keeping clear flood discharge cross-sections by maintenance measures and floodplain-management • Conceptions / studies / expertises • Information and training <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Infiltration structures to catch the rainfall water <p>ROMANIA</p> <ul style="list-style-type: none"> • Strengthening flood defence structures • Reducing the vulnerability to floods of the transport infrastructure and the technical and urban works 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which significantly increase the risk of flooding upstream or downstream:</p> <p>§ 77: see above</p>
	<p>Other Protection</p>	<p>Other measure to enhance protection against flooding, which may include flood defence asset maintenance programmes or policies</p>	<p>GERMANY</p> <ul style="list-style-type: none"> • Other measures of protection • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Restoration of flood plains and sedimentation areas • Definition of operating instructions for flood prone and flood influencing facilities • Improvement of retention capacity on catchment scale 	

			<ul style="list-style-type: none"> • Structural protection measures • Development of concepts, plans, projects, strategies on catchment scale to improve the water and sediment balance <p>HUNGARY</p> <ul style="list-style-type: none"> • Trans boundary cooperation with the neighbouring countries • Participation in international cooperation I • Participation in international projects, researches • Renewing the existing international flood management contracts (e.g. ice breaking) <p>ROMANIA</p> <ul style="list-style-type: none"> • Reducing social vulnerability to flooding 	
Preparedness				
	Emergency Event Response Planning / Contingency planning	Measure to establish or enhance flood event institutional emergency response planning	<p>GERMANY</p> <ul style="list-style-type: none"> • Emergence event response planning • Conceptions / studies / expertises • Information and training <p>AUSTRIA</p> <ul style="list-style-type: none"> • Compilation of emergency plans <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Construction and upgrade of rainfall and gauging stations with data 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which significantly increase the risk of flooding upstream or downstream</p> <p>§ 5: see above</p> <p>SLOVAKIA</p> <p>In Slovak Act No. 7/2010 Coll. on Flood protection in § 14 the process of providing information on hydrological situation on transnational rivers and the process on providing international help are</p>

			<p>transfer online</p> <p>SLOVAKIA</p> <ul style="list-style-type: none"> strengthening of operational cooperation among the emergency response authorities in the international Danube basin, improvement of interoperability <p>ROMANIA</p> <ul style="list-style-type: none"> Funding and compensation International cooperation <p>BULGARIA</p> <ul style="list-style-type: none"> Establishment of a mechanism for cooperation and coordination of flood-related activities in border areas 	<p>codified.</p>
Public Awareness and Preparedness	Measure to establish or enhance the public awareness or preparedness for flood events	<p>GERMANY</p> <ul style="list-style-type: none"> Awareness-raising, preparation for emergency event Conceptions / studies / expertises Consulting services <p>AUSTRIA</p> <ul style="list-style-type: none"> Information of public in an appropriate way Improve participation Educational activities Implementation of monitoring, forecasting, warning systems 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which significantly increase the risk of flooding upstream or downstream: § 5: see above</p> <p>SLOVAKIA</p> <p>In Slovak Act No. 7/2010 Coll. on Flood protection in § 14 the process of providing information on</p>	

			<ul style="list-style-type: none"> • Compilation of emergency plans • Ensure availability of facilities for emergency <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Update of documentations of special floods below water reservoirs <p>SLOVAKIA</p> <ul style="list-style-type: none"> • Information about flood event and warning between neighbouring countries based on bilateral commissions. • Using the outputs of EFAS - flood warning system among Danube's countries <p>ROMANIA</p> <ul style="list-style-type: none"> • Consultation and training of the population, feedback and build the collective resilience to flooding <p>BULGARIA</p> <ul style="list-style-type: none"> • Informing the people and local administrations downstream the river as well as the neighbouring countries about the hydrological conditions and flood-event <p>MOLDOVA</p> <ul style="list-style-type: none"> • Informing people about the flood risks through mass-media and local 	<p>hydrological situation on transnational rivers and the process on providing international help are codified.</p>
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			administration and placing warnings on the state hydro-meteorological Station web-site	
	Other preparedness	Other measure to establish or enhance preparedness for flood events to reduce adverse consequences	<p>GERMANY</p> <ul style="list-style-type: none"> Insurance, financial precautions <p>ROMANIA</p> <ul style="list-style-type: none"> Adequate Insurance policies 	
Recovery and Review	Individual and societal recovery	<p>Clean-up and restoration activities (buildings, infrastructure, etc)</p> <p>Health and mental health supporting actions, incl. managing stress</p> <p>Disaster financial assistance (grants, tax), incl. disaster legal assistance, disaster unemployment assistance</p> <p>Temporary or permanent relocation</p> <p>Other</p>	<p>GERMANY</p> <ul style="list-style-type: none"> Assistance with post-flood repair, restoration activities, aftercare planning, elimination of environmental damage Conceptions / studies / expertises <p>AUSTRIA</p> <ul style="list-style-type: none"> Emergency response <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> Financial support of recovery of flood damaged areas <p>ROMANIA</p> <ul style="list-style-type: none"> Institutional Arrangements and appropriate connections Legal provisions Reducing the vulnerability to floods of the transport infrastructure and the technical and urban works Permits for the use of land and building, their control Resettlement, land acquisition and 	<p>GERMANY</p> <p>In Federal Water Act (WHG) it is codified , that no measures shall be taken within a river basin which significantly increase the risk of flooding upstream or downstream: § 5: see above</p>

			<p>cultural changes</p> <p>BULGARIA</p> <ul style="list-style-type: none"> • Elimination of pollution during and immediately after the flood-accident 	
Environmental recovery	<p>Clean-up and restoration activities (with several sub-topics as mould protection, well-water safety and securing hazardous materials containers)</p> <p>Other</p>		<p>AUSTRIA</p> <ul style="list-style-type: none"> • Evaluation and repair of damages <p>ROMANIA</p> <ul style="list-style-type: none"> • Reducing the vulnerability to floods of environmental infrastructure 	
Other recovery and review	<p>Lessons learnt from flood events</p> <p>Insurance policies</p> <p>Other</p>		<p>GERMANY</p> <ul style="list-style-type: none"> • Other recovery and review • Research and development projects and best practice projects <p>AUSTRIA</p> <ul style="list-style-type: none"> • Documentation and analysis <p>CZECH REPUBLIC</p> <ul style="list-style-type: none"> • Lessons learnt from past flood events and application of findings <p>ROMANIA</p> <ul style="list-style-type: none"> • Implementation of a clear and consistent national policies for flood risk management • Consultation and training of the population, feedback and build the collective resilience to flooding • Legal provisions 	

			<p>BULGARIA</p> <ul style="list-style-type: none"> • Transboundary exchange of experience and data about flood-events, incl."lessons learnt" 	
Other			<p>GERMANY</p> <ul style="list-style-type: none"> • Other measures • Financial aid program 	

7 List of transboundary projects supporting DFRMP

The projects or project proposals/ideas presented here were developed by the ICPDR and/or EUSDR PA5 and they shall i.a.:

- Reflect the objectives and priorities set in this Danube Flood Risk Management Plan;
- Have a transboundary character;
- Help to implement the needs listed i.a.in this Annex.

There is no ranking or prioritization of these projects, they are all considered as supportive to the implementation of the Danube Flood Risk Management Plan.

7.1 Danube Sediment Project

One of the main goals of the proposed project is to establish for the first time a Danube river basin sediment budget, identify reaches with surplus and deficit, river bed aggradation and degradation, sediment-related problems in flood risk management, drinking water production, hydropower generation, navigation, water quality and ecology, as well as gain knowledge and better understanding of sediment transport and morphodynamic processes in the Danube River.

The specific aims of the Danube Sediment Project are the following:

- Collect existing sediment data and analyse their quality
- Perform limited sediment transport monitoring at short but important reaches with significant data gaps
- Perform limited sediment transport monitoring and modelling in Pilot Reaches
- Identify the sediment quantity related issues at different space and time scale
- Identify reaches with sediment deficits and surplus and quantify the trends
- Quantify the role of major tributaries in the sediment transport of Danube River
- Develop a sediment balance for the whole Danube River and the input of major tributaries
- Discuss with stakeholders the sediment management problems and options associated with sediment transport
- Summarize and evaluate existing sediment management options
- Risk analysis related to sediment quantity
- Improve the knowledge on sediment transport mechanisms in Danube River
- Prepare a Danube Sediment Management Concept
- Policy recommendations

7.2 Danube Floodplain project

Overall objective of the proposed project is to reduce the flood risk through floodplain restoration along the Danube and other DRB rivers

The specific objectives include the following:

- to develop a common approach on restoring the water storage capacity of floodplains, from upstream to downstream sections;
- to develop best practice on using 'green infrastructure' for sustainable flood risk management in the Danube River Basin;
- to contribute to the more effective implementation of the EU WFD and Floods Directive with their Programmes of Measures;
- integrating the requirements and opportunities related to other EU policies, notably the Nature Directives, Biodiversity and Climate policy, and of the 2020 Strategy;
- to foster cooperation among Danube Basin countries in using restored floodplains for flood management;
- to demonstrate the feasibility of integrated flood management, including a combination of classical and “green infrastructure” in selected floodplain areas;
- to stimulate stakeholder involvement and cooperation in floodplain restoration / flood management planning and implementation.

The Danube Floodplain project should also include the project module “FOREst TRaining in the Danube floodplain”:

- Based on existing land use data, discretization of important sections of the floodplain that are covered with forests, which are main conveyance lines and obstructed by the vegetation
- 2D modelling of the areas, development of the good modelling practices by pilot areas
- Initiative for long term maintenance of the forest to support the flood propagation

7.3 "DANICE" project

DANube river basin ICE conveyance investigation and icy flood management shall focus on:

- Report of recorded ice floods /events in the Danube basin
- Creating a database of registered ice observations and GIS-based map summary in the Danube basin
- Hydrologic and hydraulic investigation on the ice observation, conveyance and forecasting
- Discretization of stretches (Danube and tributaries), structures and certain sections that are frequently exposed to “freezing hazard”
- Listing monitoring stations, well placed observation points, webcams etc. that are suitable for tracing ice conveyance and ice coverage development along the river and its tributaries
- Definition of efficient observation methodology of floating ice plate conveyance on the Danube (e.g. satellite images), suggestions of monitoring development
- Setup of an online international tracking site for ice transport,
- Identification of 1D and 2D modelling capabilities of ice conveyance calculations, listing and evaluation of tools' capabilities
- Evaluation of different measures to open ice barriers or avoid their development,
- Measures and pilot areas

- Summarizing the ice breaker fleet in the Danube basin (synergies could be noticed with Newada and Newada Duo project, FAIRway), evaluation of international agreements
- Definition of good practices to avoid ice jams

7.4 "LAREDAR" project

Hazard and risk mapping, risk management planning of the LAkes and REservoirs in the DANube River basin shall focus on:

- Inventory of potential flood-problematic lakes and reservoirs (L&R), realization of problems, GIS database and bed geometry data with supplying rivers (sub-catchments)
- Hydrologic assessment of the events that cause inundation around the lake or failure of defense system
- Hazard and risk mapping of the L&R, risk management strategies for L&R
- International consequences and conditions in the operation, good practice or agreements for the future

7.5 Coca-Cola - WWF "Partnership for a living Danube"

The Coca-Cola Company (TCCC) and WWF are working in a seven year partnership to restore vital wetlands and floodplains along the River Danube and its tributaries. The project aims to restore 53 km² of wetland habitat in the Danube region by 2020. The ICPDR is observer in the Steering Group of the partnership.

The partnership will reconnect former floodplains to the river system by opening dikes and dams, as well as retaining water on the floodplains by working closely with relevant local authorities and stakeholders. At the same time, a regional movement is planned to be created for wetland conservation and restoration, as well as good water stewardship.

The plan is to restore wetlands in Hungary, Croatia, Serbia, Romania and Bulgaria, as well as a project in Austria. Over the restoration period, measures such as removing dikes and dams to reconnect former floodplains and improve flooding capacity, reconstructing the wetland habitats of six threatened and endangered species and building a fish pass will be executed.

The partnership was introduced to the ICPDR and officially launched in the frame of the 12th Standing Working Group Meeting in June 2014.

7.6 Improvement of flood forecasting

Implementation step I: Inventory on the available data, information and exchange mechanism, designation of data needs by the national flood forecasting institutions and transnational instruments. Possible solutions is to create and operate national, bilateral, multilateral data exchange platforms for the national forecasting services of the Danube Region to provide them with the necessary data/information to improve their flood forecasting capabilities, taking into account the existing mechanisms and systems.

Implementation step II: Launch a research programme to improve the flood forecasting models by:

- Comparing the efficiency, accuracy, lead time etc. of the existing national, regional and Danube basin wide models
- Exchanging information on the national and trans-national Danube Basin forecasting models for better understanding of their outputs
- Further developing the national models or developing international models (like the Dráva-Mura forecasting model or the European Flood Awareness System)
- sharing models and/or methods

7.7 Information exchange on the operation of hydraulic structures

Flood forecasting and flood management need real time information and data on the operation of flow control structures. Pre-emptying the reservoirs of holding back water to fill up the reservoirs influence the precision of the flood forecasting and can endanger the flood management of the downstream stretches.

Implementation steps: The goal is to agree with the Danube countries and the operators of flow control structure to make their operational rules and real time data available for the national flood forecasting institutes and for the flood management organisations.

Elements of the cooperation have to:

- Identify relevant structures
- Make the real-time operational parameters available to forecasters,
- Make the operational rules (operational manuals) of the flow control structures available for flood forecasters and flood managers,
- Establish procedures and ICT infrastructure to warn flood forecasters when the pre-emptying or filling up of the reservoirs start (e.g. changes in discharge),
- Develop cooperation among the operators and flood managers to ensure that flood protection has got priority in the operation of flow control structures in peak periods (e.g. flood managers shall have the possibility to ask the operators to change the operational state if flood situation requires it),
- Prepare a unilateral framework agreement based on previous steps for the Danube Basin.

7.8 Coordination of operative flood management plans

Coordination in operative flood management is increasingly important with more floods affecting multiple countries and exceeding peak historical levels in the last years.

Implementation steps: Coordinate the operative flood management and civil protection plans (evacuation plans and procedures, safeguarding people, goods, emergency rescue plans, etc.) considering the benefits of the civil protection mechanisms for the shared flood basins or stretches of common interest to better use the available resources.

7.9 Development of elements of flood risk management plans for trans-boundary sub-units of common interest

Implementation steps: Provide sub-units that need further support to meet the EUFD deadline on FRMP with resources and pilot projects developed under this Measure. Support the monitoring of the implementation and the review of the plan with planning the next FRMP for the sub-basin

7.10 Exchange of flood protection techniques, technologies and experiences

For the last decade a proliferation of new flood protection techniques and technologies could be seen. Some countries use mobile dams, some use mobile walls, some others prefer inflatable dams etc. The floods of the recent decade provided the opportunity to learn about advantages and/or disadvantages of these structures.

Proposal: collect and exchange information of the new equipment both from design and operational point of view. This can be done through a networking project by organising workshops and or seminars.

7.11 Develop an education/training network

Proposal: Develop an education/training network of universities/training centres to “train trainers” and develop curricula for training of flood managers.

7.12 Enhance coordination of operative flood protection methods and equipment

For risks that are common to a large number of countries in the region (i.e. floods) it is important to strengthen cross-border cooperation. To ensure that civil protection authorities have a good understanding of each other's systems. For instance available assets and potential gaps, working procedures, and that teams can also function smoothly in case of major emergencies involving bilateral, European, or international response. This measure will be developed also in close collaboration with the envisaged voluntary pool of European assets for disaster risk management as foreseen by the EU's Civil Protection mechanism.

Task 1: Coordination of the regional disaster risk assessment / damage data recording methods and measures, taking into account the specific effects of the climate change phenomena in the region, for better disaster prevention.

Task 2: Build advanced training and appropriate capacity of the flood rescue teams and civil protection operative units

Task 3: Establishment of the cooperation forum of the Danube basin municipalities and/or relevant institutions for better preparedness, awareness and data sharing during flood related interventions and other regional disasters.