

**363**

# CURRENT STANDARDS FOR FLOOD PROTECTION

**CEframe**

Central European Flood Risk Assessment  
and Management in CENTROPE

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## 1 Introduction

As transnational tool the documentation of flood protection facilities, current standards and concepts of flood protection strategies will be documented for all partner countries, building up on national documentations (e.g. information about the current level of flood threat and the corresponding emergency response plans for threatened locations, information about protective measures and evacuation plans).

Measures and strategies for flood protection, have been developed on the basis of national requirements and investigations. The consequence is that national differences are increasing. In isolated efforts, stand-alone solutions have been developed for border areas. All efforts have to be questioned regarding today's situation.

The use of this documentation will be to draw up an inventory of all structural and non-structural measures to prevent, control and reduce floods. Their potential impacts on the other countries in the project area are assessed and inadequacies of the technical and non-technical flood prevention and management will be identified.

The documentation will serve as a basis for harmonized flood protection management in the project region by the possibility to identify usable flood management strategies and assess differences and synergies of flood protection.

## 2 Inventory and review of applied legislation in the Partner Countries

The following chapters sum up the implementation of the flood directive in national law and the current state of the implementation.

### 2.1 EU – FD

[http://ec.europa.eu/environment/water/flood\\_risk/index.htm](http://ec.europa.eu/environment/water/flood_risk/index.htm)

The Directive was proposed by the European Commission on 18/01/2006, and was finally published in the Official Journal on 6 November 2007. Its aim is to reduce and manage the risks that floods pose to human health, the environment, cultural heritage and economic activity. The Directive requires Member States to first carry out a preliminary assessment by 2011 to identify the river basins and associated coastal areas at risk of flooding. For such zones they would then need to draw up flood risk maps by 2013 and establish flood risk management plans focused on prevention, protection and preparedness by 2015.

The Directive shall be carried out in coordination with the Water Framework Directive, notably by flood risk management plans and river basin management plans being coordinated, and through coordination of the public participation procedures in the preparation of these plans. All assessments, maps and plans prepared shall be made available to the public.

Member States shall furthermore coordinate their flood risk management practices in shared river basins, and shall in solidarity not undertake measures that would increase the flood risk in neighbouring countries. Member States shall take considerations in long term developments, including climate change, as well as sustainable land use practices in the flood risk management cycle addressed in this Directive.

#### 2.1.1 Austria

In 2007 the European Flood Directive (EFD - 2007/60/EC) entered into force and was transposed into national law -with the amendment to the Water Act - in 2011.

The ICPDR gives a short overview of the implementation and methodological approach ([http://www.icpdr.org/icpdr-pages/implementation\\_efd.htm](http://www.icpdr.org/icpdr-pages/implementation_efd.htm)) of all member states. The description of the Austrian approach is shown below.

The following web site of the Lebensministerium contains a detailed description of the Austrian approach for the preliminary assessment of flood risk (in german language).

[http://www.lebensministerium.at/publikationen/wasser/hochwasser\\_schutz/Vorlaeufige-Bewertung-des-Hochwasserrisikos-2011.html](http://www.lebensministerium.at/publikationen/wasser/hochwasser_schutz/Vorlaeufige-Bewertung-des-Hochwasserrisikos-2011.html)

#### **Methodological approach for the preliminary assessment of flood risk**

In Austria the preliminary assessment of flood risk was conducted on the basis of an expanded nationwide river network (catchments larger than 10 km<sup>2</sup> plus additional river catchments smaller than 10 km<sup>2</sup>).

All available geo-data on flood hazards and risk receptors (population, infrastructure, potential pollutants, WFD protected areas, cultural heritage) were put together in a geo-database. In this geo-database flood risk data from various sources was integrated and attributed to river-stretches of about 0.5 km. The results were classified into five flood risk classes (very high, high, moderate, low or no risk) separately for each risk receptor.

The most important thresholds for “high flood risk” were:

- 100 persons (inhabitants + employees) in flooded areas per 0.5 km river stretch

- destruction or blockage of important infrastructure facilities for several days
- destruction of cultural assets of national importance and
- heavy pollution of protected areas.

In a first step, data on the adverse consequences of past floods were collected, assigned to the river stretches in the geo-database and classified according to the five risk classes. Flood zones (data sources: HORA and more detailed hazard studies) provided the basis to assess the adverse consequences of potential future floods in the geo-database. They were overlaid with data of the risk receptors.

All risk assessments for past and future floods were finally combined to assess the “total risk per river stretch” considering only the highest risk class for each river stretch. Future development of land use was taken into account, in case that reliable data was available.

As a result a total of about 1,840 km - relating to 5.2 % of the total river length that has been assessed - are classified as having high or very high flood risk in the Austrian part of the Danube River Basin.

The predominant causes for the assessment of high and very high risks are the residential population and economic activities (employees) in flood prone areas, followed by traffic infrastructure. Due to Austria’s alpine topography, land use is particularly located in lowlands and valleys including flood prone areas.

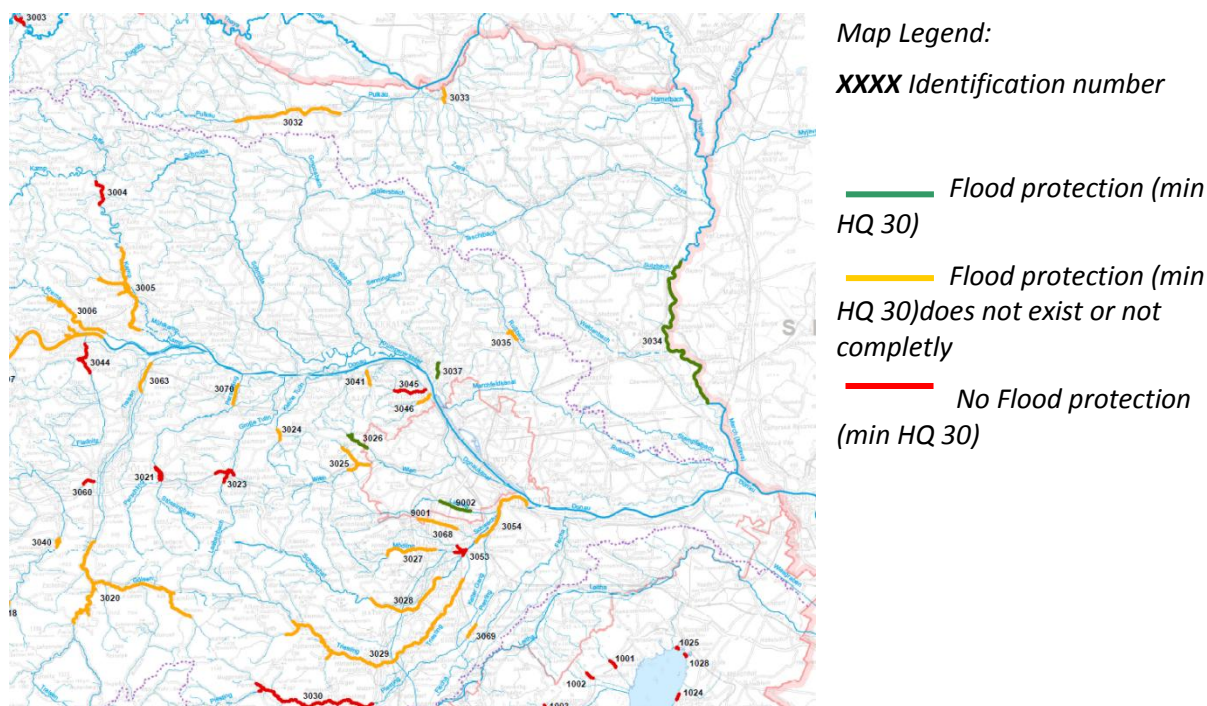
### Report to the European Commission and publication in Austria

In March 2012 the results of the preliminary assessment of flood risk study were sent to the European Commission and were published on the following Austrian website:

<http://duz.lebensministerium.at/article/articleview/90850/1/31407> (only in German)

The results includes the report of the preliminary assessment of flood risk, the lists and the maps of the potential flood risk areas.

The picture below is part of a flood risk map which shows flood risk areas around the river Danube (west of Vienna) and at the border site to Slovakia (March/Morava). If you take a closer look at the Danube east of Vienna you can see that there is no endangered area.



**Figure 1:** flood risk areas in Austria

The area with potentially significant flood risk in CEframe project area is:

ID-number	Name	Competence	Flood protection	length
3034	March	BWV, BMVIT	yes	31,9

The **next steps** will be the development of

- flood hazard maps and flood risk maps by the end of 2013 (for areas of potential significant flood risk).
- Until the end of 2015 flood risk management plans

A precise evaluation of the flooded areas along the rivers Morava, Dyje and Danube has already been completed.

### Further links

Another public information site about flood endangered areas is the following website <http://www.hora.gv.at/>. This site provides information about various kinds of natural hazards and about flood endangered areas. Flood protection systems are not included in the calculation.

### 2.1.2 Czech Republic

In the Czech Republic the Flood Directive was transposed into amendment of **Water Act No. 150/2010 Col.**, and into **decree No. 24/2011 Col., on river basin management plans and flood risk management plans**. Ministry of the Environment and partly Ministry of Agriculture are competent authorities for its implementation. According to the Directive and legislation there might be done:

Preliminary flood risk assessment was completed until December 2011 including delimitation of areas with potentially significant flood risk. Morava River Basin Authority will prepare flood hazard and flood risk map for those areas until December 2013. Next phase will be preparation of Documentation of the areas which will be annexed to the Plan of Morava subbasin.

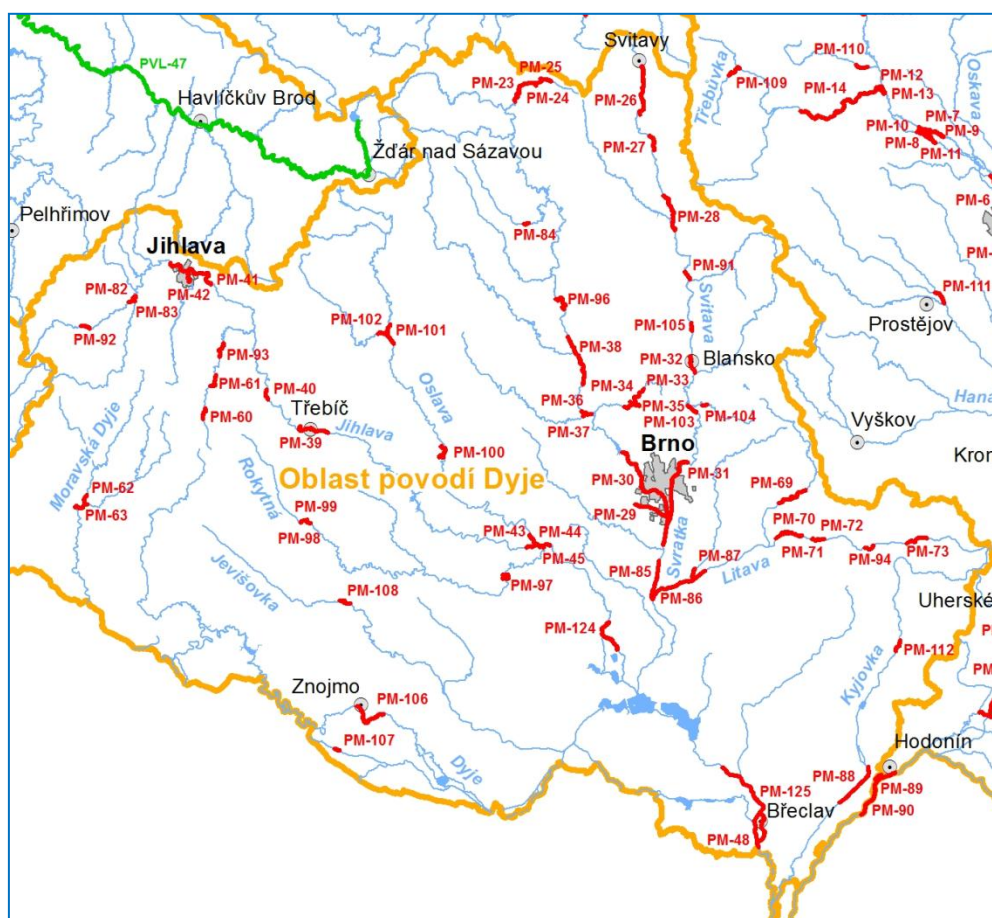
Furthermore, detailed documentation of the areas of a significant flood risk will be processed as an appendix of the plan of a partial river basin of the Morava. The flood risk management plan for the Czech part of the international river basins of the Danube, the Morava and Dyje river basins, will be processed by December 2015.

Information on the process of implementation of "Flood Directive" including reference to data and outputs are released at the Flood Information System POVIS: <http://www.povis.cz/>, part "ke stažení", "Implementace povodňové směrnice" (in the Czech language only).

Identification and proposal of areas with a potentially significant flood risk continues in the river basin areas according to the **Proposal of Methodology for preliminary flood risk assessment (MoE, TGM WRI, p.r.i., 2010)**, see the Appendix "**Methodology of Preliminary Flood Risk Assessment in the Czech Republic**".

Delimitation of river sections defining the areas with potentially significant flood risk in CEframe project area:

- |                     |  |
|---------------------|--|
| PM 88: Kyjovka      | - Kyjovka from Mikulčice up to Hodonín                 |
| PM 89: Stará Morava | - Stará Morava from Morava up to sluice gate structure |
| PM 90: Morava       | - Morava from Mikulčice up to weir Hodonín             |
| PM 106: Dyje        | - Dyje above Dobšický creek up to Granický creek       |
| PM 107: Daníž       | - Daníž in Šatov                                       |
| PM 125: Dyje        | - Dyje from Pohansko up to Bulhary                     |



**Figure 2:** Execution of the maps of flood hazard and flood risks will proceed according to the already approved Methodology of Ministry of Environment 2009 for creation maps of flood hazard and maps of flood risks. (Czech Republic)

All flood related national legislation in Czech Republic is summarized in the table (see chapter 2.2.1.2).

### 2.1.3 Hungary

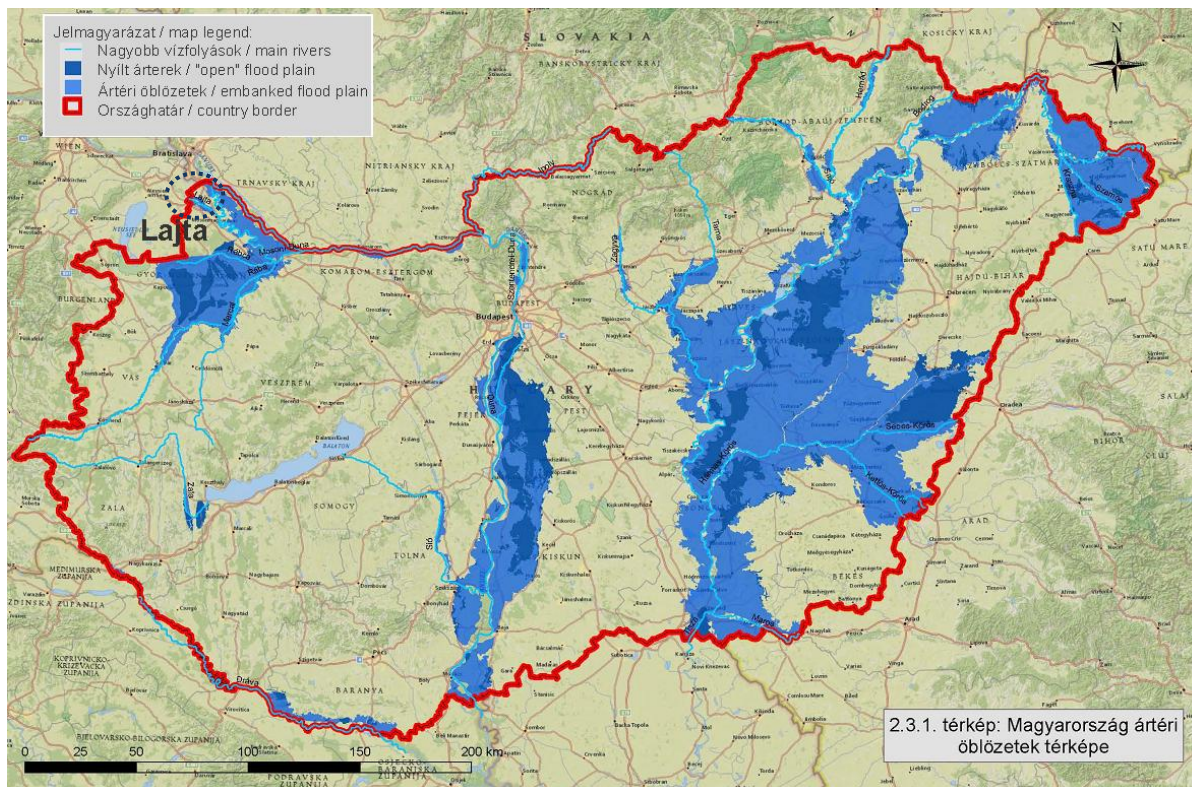
**National decree, adaptation of the EU Flood Directive: 178/2010. (V. 13.) Governmental decree on the determination of areas endangered by inundation, procedure and content of the flood hazard and risk maps, risk management plans**

In Hungary the EU FD was implemented into the national legislation in 2010. The creation of the decree was one of the tasks for the Hungarian “ÁKK - Árvízi kockázati térképezés és stratégiai kockázati terv készítése (KEOP-2.5.0.B)” - “*Flood risk mapping and developing strategic risk management plan*” project, which deals with the establishment of the national fulfilment (methodology of realization, data collection and creation of maps). This decree is under actualization now, since the methodology is finalized. The “ÁKK” project is in its II. phase, coordinated by OVF (National Water Head Directorate General, former VKKI). At present the missing spatial and soil data are under purchase and the III. phase tendering is ongoing.

As it is written in the national legislation, the development of the hazard and risk maps is the task for the Water Directorates (VIZIG), coordinated by National Water Head Directorate. The Minister of Interior is responsible for the delivery to the Government. The cooperating ministries have to provide the basic data sets. The scale of the maps is equal to the sub-catchments, defined in the WFD national legislation. The objectives of the risk-management plans will be suggested by the Water

Directorates and commented by the Regional Land Development Committees. The finalized objectives will be presented by the Government to the Parliament for acceptance. The national risk-management (concept) plan is responsibility of the Minister of Interior, the regional/local plans are carried out by the Water Directorates. In both case the National and Regional Land Development Committee involvement is necessary.

The delivery of the APSFR was one of the tasks of the contractor, working in I. phase of ÁKK. Hungary uploaded three datasets of polygons, which show the endangered areas of fluvial floods, flash floods and inland inundation (high groundwater). The following map shows the fluvial flood extents.



**3. Figure:** APSFR-HUNGARY: areas with significant risk of flooding (fluvial floods)

The embanked floodplains were defined by VITUKI in the 1970's. The extents for the fluvial floods' possible inundation were terminated for the 100 and 1000 year events. For the Lajta the delineation of the inundation has the same content as the Hungarian partners plotted in the 3.1.2 map with blue polygon as "preliminary inundation".

Ceframe project is the first realization of hazard maps in Hungary and it is kept as a pilot project for the national methodology as well. In the Ceframe project we focus on two APSFR listed areas:

**HUABX143** "Lajta bal parti ártéri öblözet" (Lajta left side embanked floodplain)

**HUABX143** "Lajta jobb parti ártéri öblözet" (Lajta right side embanked floodplain)

META_ID	COUNTRY	NAME	EUCD_APSFR	FLOOD_TYPE	LONGITUDE	LATITUDE
APSFR_a_HU1000	HU	Lajta bal parti ártéri öblözet	HUABX143	A11	17,189	47,934
APSFR_a_HU1000	HU	Lajta jobb parti ártéri öblözet	HUABX144	A11	17,173	47,917

It is notable that Austria did not indicate the Leitha border section in the APSFR. It is due to the criteria defined in their national methodology (not settlements are directly touched).

### 2.1.4 Slovak Republic

Act no. 7/2010 on the flood protection represents the basic legislation document of the 2007/60/ES directive transposition in the Slovak legislation. Practical implementation of this act is based (along with other decrees) at the Decree of the Ministry of the Environment No. 313/2010 on the preliminary flood risk assessment, its reassessment and updating. PFRA is performed at the whole territory of Slovakia in the partial river basins.

Ministry of Environment of the Slovak Republic (MoE SR) is in charge of PFRA elaboration, reassessment and updating via river basin authorities. The task group „Floods“ was formed in order to support implementation of the directive. Task group headed by the MoE SR consists from the representatives of river basin authorities, other relevant organizations administered with the MoE SR, Slovak Academy of Science and selected universities, self-governing regions, municipalities, other administrators of watercourses, representatives of private sector.

Determination of the geographic areas with existing significant flood risk was based at the analysis of the occurrence of floods at the Slovak territory in the period 1997-2010. Only fluvial floods were considered. The following criteria were taken into account in the selection of areas and their ranking:

- repeated occurrence of floods in the period 1997-2010
- vulnerability of territory expressed with the „flood index“ (GIS analysis of hydrological data – see figure)
- flood consequences expressed in damages

In the final determination and ranking of areas with existing significant flood risk several other factors were taken into account – sites of cultural heritage, sources of potential water pollution, economic activities, expected number of affected inhabitants. Final assessment was based at the weighting system and risk matrix.

The final list of areas identified in a frame of the preliminary flood risk assessment is available on web page of the Ministry of the Environment of the Slovak republic <http://www.minzp.sk/sekcie/temy-oblasti/voda/ochrana-pred-povodnami/manazment-povodnovych-rizik/>.

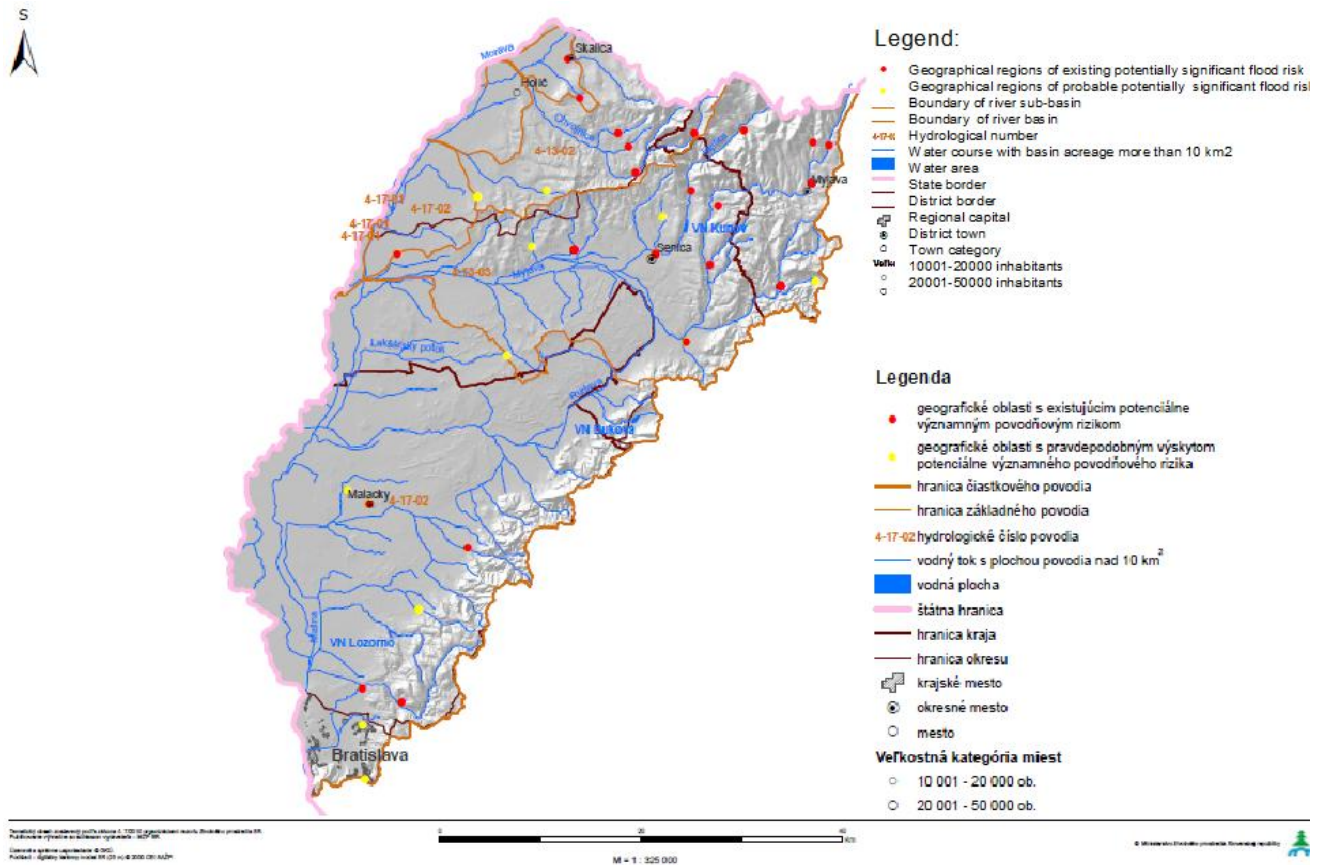


Figure 4: areas identified in a frame of the preliminary flood risk assessment (Slovak Republic)

### 2.1.5 Summary

All states which are working together on the Ceframe-project have already transposed the Flood Directive in national law and are working on flood risk maps and flood hazard maps. Until 2013 these plans should be finished and send to the European Commission. The last step will be the establishment of flood risk management plans until 2015 which should be focused on prevention, protection and preparedness.

#### More text will follow!

The Austrian maps shows only one part of the river Morava as an area with potentially significant flood risk.

The Czech Republic identified areas near Znojmo (Dyje), Bréclav (Morava) and Hodonin.

The Hungarian map of areas with significant risk of flooding shows that there are flooded areas near the Austrian border along the river Lajta.

The Slovak Republic shows that there are areas with significant risk of floods near Skalica.

## 2.2 National policies and regulations

The various components of flood protection are regulated by laws which are listed in chapter 2.2.5 to 2.2.8. Therefore the chapters 2.2.1 to 2.2.4 describe the national flood protection strategies.

## 2.2.1 Austria

### 2.2.1.1. Flood protection strategies at national level

*The table in chapter 2.2.5 lists all legislative documents which are related to flood risk.*

*In general the Austrian flood protection strategy is based on prevention, response and aftercare. This strategy is named “integrated flood management” and means aiming to achieve the common goal - i.e. best possible flood protection - through the sensible combination of a variety of measures like spatial planning, structural engineering and organisation.*

[http://www.lebensministerium.at/wasser/schutz\\_vor\\_naturgefahren/hws\\_in\\_oe.html](http://www.lebensministerium.at/wasser/schutz_vor_naturgefahren/hws_in_oe.html)

#### **Prevention:**

This includes taking precautions, protective measures and the creation of awareness. In sum they aim at a sustainable flood protection. Taking precautions comprises spatial planning which is coordinated with protective planning, building regulations and operational regulations as well as prognosis models and emergency plans. The Federal Water Engineering Administration (Bundeswasserbauverwaltung) contributes to this mainly through the development of hazard zone plans and risk assessments as well as the provision of information for municipalities and affected people.

#### **Response:**

Events are dealt with through plans of action (emergency plans). The Federal Water Engineering Administration contributes to this mainly through the preparation of necessary fundamentals (e.g. hydrologic and hydraulic assessments, operational regulations for protective measures including taking technical precautions in case the degree of protection is insufficient). Moreover, the Federal Water Administration contributes immediate disaster relief measures.

#### **Aftercare:**

Aftercare comprises all necessary activities following a flood, among other things clean-up operations and the restoration of flood protection. The Federal Water Engineering Administration contributes to this through the evaluation of protective measures and if necessary their restoration, improvement and extension on the basis of appropriate planning.

All planning of the Federal Water Engineering Administration is committed to the principles of sustainable flood protection, building on the interaction of various protective strategies:

**Preventive flood protection** comprises measures that lead to a reduction in run-off peaks and velocities.

The best way to achieve this goal is to increase the natural retention of water and the seepage. This leads to a lower high-water level downstream.

**Structural flood protection** involves protective structures within or at the river/stream in areas threatened by floods.

Technical flood protection through embankments, dams and flood storage reservoirs is indispensable. Nevertheless, possibilities are limited and any gained safety is relative. After all, there can always be even more severe floods.

**Provisions** aim to reduce the loss potential through measures such as land use, engineering and risk provisions.

Despite preventive and structural flood protection, there always remains a residual risk that can only be minimized through the appropriate provisions on all societal levels: e.g. land use provisions (designation of areas), engineering provisions (flood-compatible construction), risk provisions (insurance), behavioural provisions and timely warnings.

## 2.2.2 Czech Republic

### 2.2.2.1. Flood protection strategies at national level

In 2000, Flood protection strategy of the Czech Republic was adopted by the Czech government. The Strategy is the general conceptual document which formed the principles of the flood protection and concrete programmes for its implementation. Great importance has the delimitation of the flooded areas and following the principles of the flood protection in landscape planning. The Strategy plays an important role in covering the system of flood prevention.

Flood protection in the Czech Republic is managed by flood protection authorities that are responsible for organization of the protection of their territory and who manage, coordinate and check the activities of all other participants of the flood protection. Flood protection management based on administrative structure of the Czech Republic must be coordinated at the level of hydrological river basins.

State and activity of the flood protection authorities is specified in two time levels.

**a) At no flood risk the flood protection authorities consist of:**

- municipality administration and administration of town parts in the capital Prague,
- administration of the municipalities with extended responsibility and in the capital Prague of town parts administration set by the Statute of the capital Prague,
- regional administration,
- Ministry of Environment;

**b) During the flood, the flood protection authorities consist of:**

- flood committee of the municipality and, in the capital Prague, flood committees of the town parts,
- flood committees of the municipalities with extended responsibility and, in the capital Prague, of the flood committees of town parts administration set by the Statute of the capital Prague,
- regional flood committees,
- Central flood committee.

Special governmental donations, loans from the European Investment Bank and recently, also the possibility of using financial funds from the EU in the frame of Operational Programmes allowed: preparation and realization of number of flood protection measures, improvement of warning and forecasting flood service, creation of the flood information system, and mapping of the flood risk.

Flood protection measures could be classified as:

**a) preventive and preparative** (not during flood event) – long-term systematic measures prepared within the frame of the plans for managing flood risks, flood event management plans, flood inspections, organization and technical preparation, ensuring flood reserves, evacuation of flooded areas, preparation of the information system, education of the flood service staff, ensuring technical and safety supervision on water buildings,

**b) operative during flood event** – operation of the flood forecasting service and warning system, influencing of the outflow regime (for example use of the available storage capacity of the reservoir and polders), preventive and rescue flood action (warning and notification, population evacuation, humanitarian help), alternative traffic, ensuring food, water and power supplies, activities of other participants of the flood protection (Army, Police) etc.

**c) After flood** – renewal of the activities damaged by the flood (except build-up), ensuring and evaluation of the flood damage, works concerning evidence and documentation and general analysis of the course of the flood.

All basic and predictable flood protection measures should be concluded in the flood management plans. Other measures are managed and coordinated by flood protection authorities.

## 2.2.3 Hungary

### 2.2.3.1. Flood protection strategies at national level

Due to the geographical situation of Hungary the flood defense work played always very important role in the country's life. Since most of the state area is shallow and lowland, the increased water levels in case of flood could convey free on the terrain and inundate large areas. Thus Hungarian flood protection strategy is more focused on the improvement of the dike systems and field localization of the inundation on the terrain, using existing infrastructure or localization dikes. Beside the concept of having the flood regime in the floodplains between the dikes and make them be transported easily, the idea in case of inundation in the protected area (e.g. dike break) is to slow down or block the spread of the water volume (reservoirs, localization cassettes). The fundamental element of the defense work is the earth dam.

The flood protection obligation is related to the number of settlements that are protected by the structure. The local municipalities are responsible for those structures which protect one or two settlements. The national water institutes (Water Directorates) are responsible for the sections that provide safety for more than two settlements (1995 LVII. Act)

The necessary preparatory actions, inventory plans, measures and responsibilities are written in 10/1997. (VII. 17.) decree. The main actor is the Water Directorate (VIZIG) and its division. In normal conditions the Directorates maintain and inspect the infrastructures and the defence plans. The catastrophe services are informed about the related topics (e.g. extent in possible inundation, settlements in danger etc.)

The national supervisor of the flood defense work is the OMIT – National Flood Protection Committee. If the situation reaches the havaria level a governmental committee becomes the national leader (1995 LVII. Act). The national level keeps the connection with the press and informs other institutes.

The main actor of the flood protection activities in the different alert levels (I-II-III and extreme) are the Water Directorates (VIZIG). If one Directorate lacks capacity, there is another Directorate assigned to help with manpower and machines (predefined pairs). Also the water associations in the operational are of the VIZIG could be utilized. Every VIZIG has their resources and pre-contracted companies who provide necessary capacities in case of need. Military support is possible but only via the national level.

The defense lines are divided to smaller sections and all those have one or more water gauges with defined alert levels. The flood protection work is based on these sections. In case of flood the defense sections settle local headquarters that are controlled by the Regional Flood Defense Leader (Director). The state-owned infrastructure's reconstruction after the flood is also the task of the Water Directorates.

For the municipalities the VIZIG provides technical assistance during the flood events and helps creating the preparation plans.

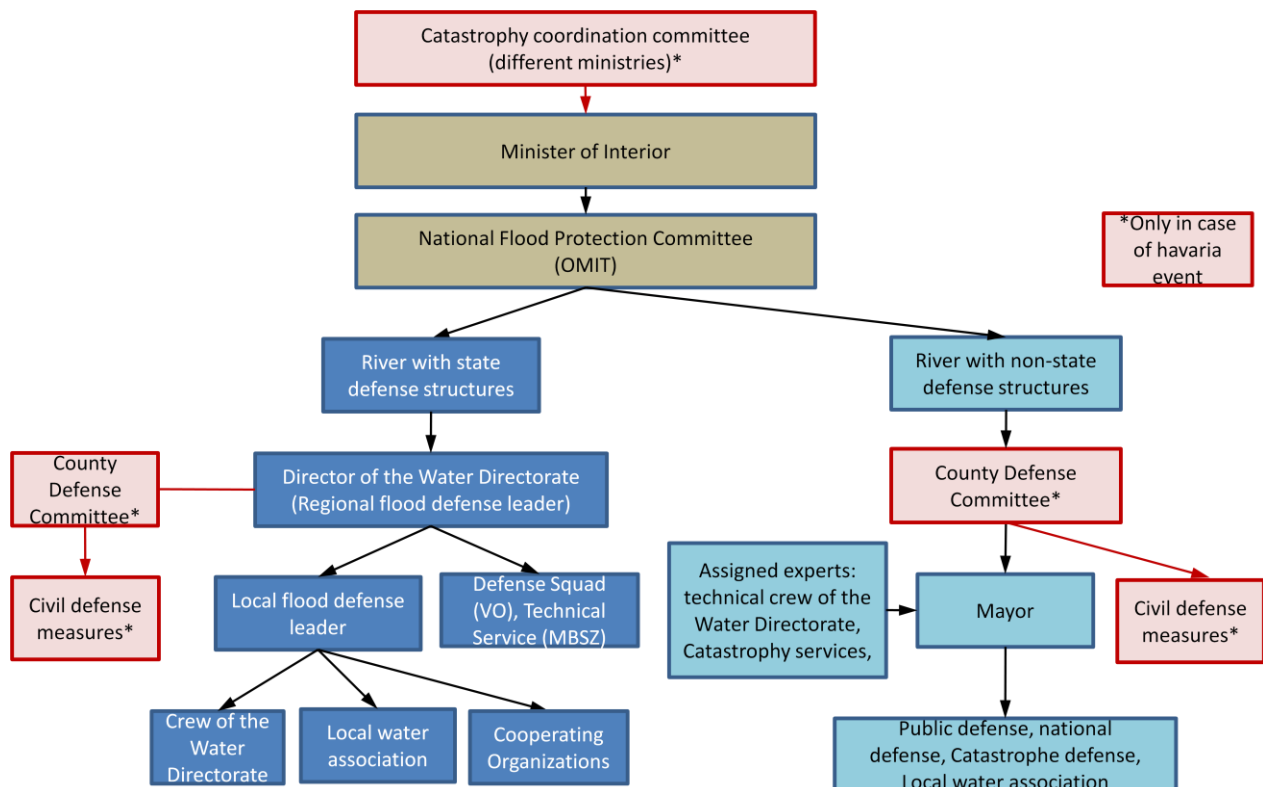


Figure 5 Organization of the Hungarian flood protection work

The related legislative documents are listed in chapter 2.2.7. The table briefly describes the content of the orders. The more complete list of laws, decrees and directives are in report “Inventory and review of applied legislation in Hungary” ( Annex-I)

The Hungarian flood protection establishment and construction is based on the “MÁSZ” – “design flood level” parameter. The 11/2010. (IV. 28.) decree contains definite sections of rivers with the water level heights at those certain cross-sections. The compulsory freeboard is also defined there. The MÁSZ is around 1% probability flood level. This water level (surface line) determines the height of the dikes and their defense capacities. We could say that the level of safety is generally 100 year in the dikes, the freeboard and the defense work – carried out by the Water Directorates – could provide successful avoidance of inundation in the protected areas for even more rare events.

The most important standards for design work (comprehensive list in 331-332 documents):

- MSZ 15292 / 1999. Safety of Flood Control Levees
- MSZ 15221-69 Hydraulic engineering. Tests for seepage within soil layers bordering building constructions

## 2.2.4 Slovak Republic

### 2.2.4.1. Flood protection strategies at national level

Conception of flood protection in Slovak republic and in this way also within the partial Morava river basin is defined within the following documents:

- Flood protection program up to 2010, which was approved by Slovak republic government decree No.31 of 19<sup>th</sup> January 2000
- Slovak republic government decree No. 990 of 17<sup>th</sup> October 2001 dealing with report on system measures of SR government on flood protection over Slovak republic territory.

- Slovak republic government decree No. 1025 of 21<sup>st</sup> December 2005 related to report on Status of carrying out of Notification and warning of inhabitants in Slovak republic up to 2010.
- Decree No. 117 of 15<sup>th</sup> February 2006 on draft of Conception of water management politics of Slovak republic up to 2015.
- Decree No. 646 of 23<sup>rd</sup> September 2009 related to bill on Flood protection
- Decree No. 109 of 10<sup>th</sup> February 2010 related to Water plan of Slovakia.
- Decree No. 472 of 14<sup>th</sup> July 2010 related to information on situation arisen as to floods together with drafts of steps and solutions within short-term and long-term time period.
- Government decree No. 556 of 27<sup>th</sup> August 2010 on draft of principles, framework conditions for ensuring prevention from floods, decreasing flood risks, draught risks, other risks of immediate natural disasters and integrated management of catchments.
- Decree No.744 of 27<sup>th</sup> October on draft of Program of country revitalization and integrated management of Slovak republic catchments and draft of its realization project 2010.
- Decree No. 847 of 8<sup>th</sup> December 2010 on draft of the indemnification system in serious situations.

Name lists of flood protection projects according to Water management politics valid at present up to 2015 and in the future planned conception of Flood risk management plan are transformed from long term and medium term investments plans within public works to their utility nature.

Flood protection measures of the territory by Morava river by means of protection constructions are built in the line with mutual agreements and at present they can be understood as satisfactory. According to results of flood risk preliminary assessment which was carried out in 2011 pursuant to directive of European parliament and Council 2007/60/ES on assessment and management of flood risks, on Slovak bank of Morava there have been identified neither areas with existing potentially significant flood risk nor areas where probable occurrence of potentially significant flood risk can be expected. Because of above mentioned reason till the next term of reassessment and updating of preliminary assessment no change of current strategy of flood protection by Morava river is expected.

Development program of investments of water course authority in 6-year plan period covers the whole list of investment projects such as medium-range planning document and at the same time it is a system of all investment measures within the frame of the plant regardless their realisation purpose.

The list is a source document for public investments, when the activities are based on public interest and the investment costs exceed € 1.33 Mill (Law No. 254/1998 Coll).

Investments exceeding the volume of 6.64 million Euro are subject to state expertise process. All public benefit investments applied in this way are according to requirements of government departments and organizations of local self-government a part of Complex program of public works. Based on mentioned summary list, every year the Ministry of transport, construction and regional development of Slovak republic works out a priorities program of public works valid for 3 years and this program is approved by Slovak government decree. There are not included any planned investments on boundary section of Morava river in this list. Measures within Morava river basin according to list of public works include these constructions: „Turá Lúka – Adjustment of Myjava river bed capacity“ and „Polder over Smíchov water course“.

## 2.2.5 Applied Legislation of Austria

**Table 1:** List of applied legislation of Austria

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	weblink
<b>Flood maps and risk maps</b>	nat.	act.	original version: 215/1959 last amend. 14/2011	Wasserrechtsgesetz	Water Law Act 1959	ministry	requirements for approval of flood protection, incorporation of Water Framework Directive and Floods Directive		<a href="http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010509">http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010509</a>
<b>Land development and spatial planning</b>	reg./loc.	act	original version: 18/1996, 48/1996 last amend. 1/2010.	Raumplanung Burgenland	spatial planning laws (Burgenland)	regional	zoning regulation		
	reg./loc.	act		Niederösterreichisches Raumordnungsgesetz NÖ ROG 1976	spatial planning laws (Lower Austria)	regional	zoning regulation		<a href="http://www.ris.bka.gv.at/Dokumente/LrNo/LRNI_2007072/LRNI_2007072.pdf">http://www.ris.bka.gv.at/Dokumente/LrNo/LRNI_2007072/LRNI_2007072.pdf</a>
<b>building codes</b>	reg./loc.	decree		Bauverordnung Burgenland NÖ Bauordnung	building codes		constructional precautions		<a href="http://www.ris.bka.gv.at/Dokumente/LrNo/LRNI_2010090/LRNI_2010090.pdf">http://www.ris.bka.gv.at/Dokumente/LrNo/LRNI_2010090/LRNI_2010090.pdf</a>
	reg./loc.	decree		NÖ Bautechnikverordnung 1997 (NÖ BTV 1997)	constructional engineering laws		constructional precautions		<a href="http://www.ris.bka.gv.at/Dokumente/LrNo/LRNI_2010080/LRNI_2010080.pdf">http://www.ris.bka.gv.at/Dokumente/LrNo/LRNI_2010080/LRNI_2010080.pdf</a>
<b>adapted land use and watercourse restoration</b>	nat	act.	original version: 215/1959 last amend. 14/2011	Wasserrechtsgesetz	Water Law Act 1959	Ministry, regional government	requirements for approval of flood protection, incorporation of Water Framework Directive and Floods Directive	includes transposition of the water framework Directive	<a href="http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010509">http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010509</a>
<b>Flood defence measures (dams, walls, retention ponds, ...)</b>	nat	act.	original version: 215/1959 last amend. 14/2011	Wasserrechtsgesetz	Water Law Act 1959	government	requirements for approval of flood protection, incorporation of Water Framework Directive and Floods Directive	includes transposition of the water framework Directive	<a href="http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010509">http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010509</a>
	nat	act.	original version: 177/2004 last amend. 11/2010	Wasserstraßengesetz	Federal Waterways Act Hydraulic	ministry	Regulation of the tasks and organization of the		<a href="http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR30004670">http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR30004670</a>
	nat	act.	original version: 148/1985 last amend. 82/2003	Wasserbautenförderungsges.	Hydraulic Engineering Assistance Act 1985	ministry	Federal Waterway Administration Hydraulic		<a href="http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010691">http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NR11010691</a>

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	<i>weblink</i>
	nat	act.	original version: 372/1927	Donauhochwasserschutzkonkurrenz	Danube Flood Control Agency Act	Regional government	Law of the Danube Flood Control Agency		<a href="http://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&amp;Gesetzesnummer=10010201">http://www.ris.bka.gv.at/GeltendeFassung.wxe?Abfrage=Bundesnormen&amp;Gesetzesnummer=10010201</a>
	nat				RIWA-T		Funding regulation		
<b>contingency measures</b>									
<b>compensatory measures (flood recovery, insurance, reserve funds, ...)</b>	nat.	act.	original version: 201/1996 last amend. 100/2003	Katastrophenfondgesetz	Disaster Relief Fund Act (1996)	government	Income and expense of the fund money (cover preventive measures and state aid contributions to compensate damages resulting from disasters)		<a href="http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NOR11005084">http://www.ris.bka.gv.at/Dokument.wxe?Abfrage=Bundesnormen&amp;Dokumentnummer=NOR11005084</a>

## 2.2.6 Applied Legislation of Czech Republic

**Table 2:** List of applied legislation of Czech Republic

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	weblink
Flood maps and risk maps	nat.	act.	254/2001 Sb.	Zákon č. 254/2001 Sb., o vodách	Act No. 254/2001 Col., on Waters	government	The basic legislative document for flood protection management		<a href="http://www.mvcr.cz/soubor/sbirka-zakonu-dokumenty-sb101-10-pdf.aspx">www.mvcr.cz/soubor/sbirka-zakonu-dokumenty-sb101-10-pdf.aspx</a>
	nat.	act	150/2010 Sb.	Novela vodního zákona	Amendment of the Act No. 254/2001	government	The Flood Directive was transposed		<a href="http://www.mvcr.cz/soubor/sb053-10-pdf.aspx">www.mvcr.cz/soubor/sb053-10-pdf.aspx</a>
	nat	decree	236/2002 Sb.	Vyhláška MŽP č. 236/2002 Sb., o způsobu a rozsahu zpracování návrhu a stanovování záplavových území	Decree of MoE No. 236/2002 Col.	ministry	Method of determining the floodplains		<a href="http://aplikace.mvcr.cz/archiv2008/sbirka/2002/sb089-02.pdf">aplikace.mvcr.cz/archiv2008/sbirka/2002/sb089-02.pdf</a>
Land development and spatial planning	nat.	act.	183/2006 Sb.	Zákon č. 183/2006 Sb., o územním plánování a stavebním řádu	Act No. 183/2006 Col., on spatial planning and building rules	government	Spatial planning and building rules		<a href="http://aplikace.mvcr.cz/archiv2008/sbirka/2006/sb063-06.pdf">aplikace.mvcr.cz/archiv2008/sbirka/2006/sb063-06.pdf</a>
	nat.	decree	500/2006 Sb.	Vyhláška MMR č. 500/2006 Sb., o územně analytických podkladech, územně plánovací dokumentaci a způsobu evidence územně plánovací činnosti	Decree of MRD No. 500/2006 Col.	ministry	Spatial planning documentation, planning analytical background materials		<a href="http://aplikace.mvcr.cz/archiv2008/sbirka/2006/sb163-06.pdf">aplikace.mvcr.cz/archiv2008/sbirka/2006/sb163-06.pdf</a>
building codes	nat	techn. stand.	TNV 75 2931 (2006)	Norma TNV 75 2931 "Povodňové plány"			This standard applies to the development of flood plans of regions, municipalities with extended powers, municipalities and property endangered by floods.		
	nat	techn. stand	TNV 75 2910 (2004)	Norma TNV 75 2910 "Manipulační řády vodohospodářských děl na vodních tocích"			Handling regulations of hydraulic structures		
	nat	techn. stand	TNV 75 2935 (2003)	Norma TNV 75 2935 "Posuzování bezpečnosti vodních děl při povodních"			The safety assessment of dams during floods		

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	weblink
	<i>nat.</i>	<i>act.</i>	183/2006 Sb.	Zákon č. 183/2006 Sb., o územním plánování a stavebním řádu	Act No. 183/2006 Col., on spatial planning and building rules	government	Spatial planning and building rules		<a href="http://aplikace.mvcr.cz/archiv2008/sbirka/2006/sb063-06.pdf">aplikace.mvcr.cz/archiv2008/sbirka/2006/sb063-06.pdf</a>
<b>adapted land use and watercourse restoration</b>	<i>local</i>	<i>conceptual doc.</i>	(2009)	Plán oblasti povodí Dyje (Povodí Moravy, 2009)	Plan of the area of the Dyje river basin	ministry	part D – Protection against floods and water regime of the countryside Conceptual document of water management for the area of the Dyje river basin for years 2010 – 2015.		<a href="http://www.pmo.cz/pop/2009/Dyje/end/index_en.html">http://www.pmo.cz/pop/2009/Dyje/end/index_en.html</a>
	<i>local</i>	<i>conceptual doc.</i>	(2009)	Plán oblasti povodí Moravy (Povodí Moravy, 2009)	Plan of the area of the Morava river basin	ministry	part D – Protection against floods and water regime of the countryside Conceptual document of water management for the area of the Morava river basin for years 2010 – 2015.		<a href="http://www.pmo.cz/pop/2009/Morava/End/index_en.html">http://www.pmo.cz/pop/2009/Morava/End/index_en.html</a>
<b>Flood defence measures (dams, walls, retention ponds, ...)</b>	<i>local</i>	<i>flood plan</i>	(2009)	Povodňový plán Jihomoravského kraje	Flood plan of South Moravian Region	local	The basic document for flood protection management in the South Moravian Region		<a href="http://www.kr-jihomoravsky.cz/Default.aspx?PubID=47346&amp;TypeID=7">www.kr-jihomoravsky.cz/Default.aspx?PubID=47346&amp;TypeID=7</a>
	<i>local</i>	<i>study</i>	(2007)	Studie protipovodňových opatření na území Jihomoravského kraje	Study of flood protection measures in the area of South Moravian Region (SMR)		The study evaluates the current state of flood protection and the state of water regime of countryside in the area of SMR and defines objectives of flood protection including the proposal of procedure of solution.		<a href="http://195.113.158.83/archiv/ozp/protipovodnova.../3.../Kapitola_3.pdf">195.113.158.83/archiv/ozp/protipovodnova.../3.../Kapitola_3.pdf</a>
<b>contingency measures</b>									
<b>compensatory measures (flood recovery, insurance, reserve funds, ...)</b>	<i>nat.</i>	<i>act.</i>	238/2000 Sb.	Zákon č. 238/2000 Sb., o Hasičském záchranném sboru České republiky	Act No. 238/2000 Col., on the Fire Rescue Corps	government			<a href="http://www.hid.cz/clanky/zakony.pdf">www.hid.cz/clanky/zakony.pdf</a>
	<i>nat.</i>	<i>act.</i>	239/2000 Sb.	Zákon č. 239/2000 Sb., o integrovaném záchranném systému	Act No. 239/2000 Col., on the Integrated Rescue System	government			<a href="http://www.hid.cz/clanky/zakony.pdf">www.hid.cz/clanky/zakony.pdf</a>
	<i>nat.</i>	<i>act.</i>	240/2000 Sb.	Zákon č. 240/2000 Sb., o krizovém řízení	Act No. 240/2000 Col., on Crisis Management	government	Crisis management authorities assume the responsibilities of flood protection authorities in case of declaring a state of danger or emergency by Act on Crisis Management.		<a href="http://www.hzs-kvk.cz/ks/zakon240.pdf">http://www.hzs-kvk.cz/ks/zakon240.pdf</a>

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	<i>weblink</i>
	<i>nat.</i>	<i>act.</i>	241/2000 Sb.	Zákon č. 241/2000 Sb., o hospodářských opatřeních pro krizové stavy	Act No. 241/2000 Col., on economic measures for crisis situations	government			aplikace.mvcr.cz/sbirka-zakonu
	<i>nat.</i>	<i>act.</i>	12/2002 Sb.	Zákon č. 12/2002 Sb., o státní pomoci při obnově území postiženého živelnou nebo jinou pohromou	Act No. 12/2002 Col., on State assistance in the renewal of areas affected by a natural or other disaster	government	Principles of providing state financial assistance for areas affected by a natural or other disasters		aplikace.mvcr.cz/sbirka-zakonu
	<i>nat.</i>	<i>decree</i>	24/2011 Sb.	Vyhláška č. 24/2011 Sb., o plánech povodí a plánech pro zvládnutí povodňových rizik	Decree No. 24/2011, on river basin management plans and flood risk management plans	ministry	The Flood Directive was transposed		aplikace.mvcr.cz/sbirka-zakonu

## 2.2.7 Applied Legislation of Hungary

**Table 3:** List of applied legislation of Hungary

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	weblink
flood defence measures (general terms)	nat.	act	1995. évi LVII.	Törvény a vízgazdálkodásról	Act on the water management	Parliament	General rules of water management	Including the flood protection general instructions	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=23134.576569">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=23134.576569</a>
	nat.	act	2011. évi CXXVIII.	Törvény a katasztrófavédelemről	Act on disaster management	Parliament	Disaster management is a state role and horizontal control have to be provided	States that every inhabitant have the right to know the threats and self-protecting actions, and must cooperate in disaster management	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=140504.568002">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=140504.568002</a>
flood defence measures (technical principles and rules)	nat.	decree	147/2010. (IV. 29.)	Korm. rendelet a vizek hasznosítását, védelmét és kártételeinek elhárítását szolgáló tevékenységekre és létesítményekre vonatkozó általános szabályokról	Governmental decree on general rules of the activities and structures of use, protection and prevention against the damages of water	Government	Defines the technical rules for water management and flood protection	Very detailed definition of crossing waters with other structures in the Annex.	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=131346.570041">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=131346.570041</a>
	nat.	ministerial decree	30/2008. (XII. 31.)	KvVM rendelet a vizek hasznosítását, védelmét s kártételeinek elhárítását szolgáló tevékenységekre és létesítményekre vonatkozó műszaki szabályokról	Ministerial decree on technical rules of management and protection for natural waters, and actions and structures for prevention of water-related damages	Ministry	Defines the technical minimum circumstances and rules for water-related structures	e.g. flood dike dimensions	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=116076.581447">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=116076.581447</a>
	nat.	ministerial decree	11/2010. (IV. 28.)	KvVM rendelet a folyók mértékadó árvízszintjeiről	Ministerial decree about rivers' design flood water level	Ministry	Level of the design flood for every river (where appropriate)		<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=129000.581164">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=129000.581164</a>

flood defence measures (organizational aspects)	nat.	decree	232/1996. (XII. 26.)	Korm. rendelet a vizek kártételei elleni védekezés szabályairól	Governmental decree on the rules of protection against the water-related damages	Government	Defines the organization of the flood defence work and the working method with responsibilities	Core document for the flood defence work	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=26839.580334">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=26839.580334</a>
	nat.	ministerial decree	10/1997. (VII. 17.)	KHVM rendelet az árvíz- és a belvízvédekezésről	Ministerial decree about the protection works against the flood- and inland water	Ministry	Defines the flood protection work preparatory, in case of emergency and aftercare tasks	most important document for flood protection institutes (VIZIG)	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=28379.581144">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=28379.581144</a>
	nat.	ministerial order	7/2012 (II. 10.)	BM utasítás a vízkárelhárítás országos irányításának szervezeti és működési szabályzatáról	Ministerial order about the organization and rules of procedure of the national water-related calamity management	Ministry	Defines the rights and responsibilities of the OMIT (National Flood Defense Committee) and its technical duty		<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=144394.618777">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=144394.618777</a>
flood maps and risk maps	nat.	decree	178/2010. (V. 13.)	Korm. rendelet a vizek többletéből eredő kockázattal érintett területek meghatározásáról, a veszély- és kockázati térképek, valamint a kockázatkezelési tervek készítéséről, tartalmáról	Governmental decree on the determination of areas endangered by inundation, procedure and content of the flood hazard and risk maps, risk management plans	Government	<b>National legislation of the EU Flood Directive, defines the tasks and responsible organizations</b>	Hazard and risk maps: VIZIG, risk management strategies: Government.	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=131612.580744">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=131612.580744</a>
land development and spatial planning	nat.	ministerial decree	18/2003 (XII.9.)	KvVM-BM rendelet a települések ár- és belvíz veszélyeztetettségi alapon történő besorolásáról	Joined ministerial decree of evaluation of settlements in the aspect of threat of flood or inland inundation	Ministry	List of settlement with their flood safety category	A - could be inundated freely (high hazard/risk), B - protected by defense structures but not proper dimensions, C - protected by defense structures with proper dimensions	<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=73145.100121">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=73145.100121</a>

<b>compensatory measures (flood recovery, insurance, reserve funds, ...)</b>	nat.	decree	21/2006. (I. 31.)	Korm. rendelet a nagyvízi medrek, a parti sávok, a vízjárta, valamint a fakadó vizek által veszélyeztetett területek használatáról és hasznosításáról, valamint a nyári gátak által védett területek értékének csökkenésével kapcsolatos eljárásról	Governmental decree on the instructions on the use and utilization of territories endangered by flood and administrative procedures of the deterioration of the lands, protected by summer levees	Government	Defines the rules how to use riverbeds and floodplains or high groundwater level areas		<a href="http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=101236.580456">http://jogszabalyke reso.mhk.hu/cgi_bin/njt_doc.cgi?docid=101236.580456</a>
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## 2.2.8 Applied Legislation of Slovak Republic

**Table 4:** List of applied legislation of Slovak Republic

TOPIC	LEVEL	TYPE	NUMBER	TITLE		RESPONSIBILITY	DESCRIPTION	REMARK	<i>weblink</i>
flood maps and risk maps	nat.	act	Jul.10	Zákon o ochrane pred povodňami	Act on flood protection	government			<a href="http://www.zbierka.sk">www.zbierka.sk</a>
land development and spatial planning	nat.	act	50/1976	Stavebný zákon	Construction Code	government			<a href="http://www.zbierka.sk">www.zbierka.sk</a>
building codes	nat.	act	50/1976	Stavebný zákon	Construction Code	government			<a href="http://www.zbierka.sk">www.zbierka.sk</a>
adapted land use and watercourse restoration	nat.	act	364/2004	Vodný zákon	Water Act	government			<a href="http://www.zbierka.sk">www.zbierka.sk</a>
flood defence measures (dams, walls, retention ponds, ...)	nat.	act	Jul.10	Zákon o ochrane pred povodňami	Act on flood protection	government			<a href="http://www.zbierka.sk">www.zbierka.sk</a>
contingency measures	nat.	act	Jul.10	Zákon o ochrane pred povodňami	Act on flood protection	government			<a href="http://www.zbierka.sk">www.zbierka.sk</a>
compensatory measures (flood recovery, insurance, reserve funds, ...)	nat.	direction		Všeobecné poisťné podmienky	General insurance condition	local			<a href="http://www.poistovne.sk">www.poistovne.sk</a>

## 2.3 Transnational Cooperation

For decades, regional problems of water management in the cross-border regions have been dealt with among the neighbouring states within the framework of water commissions. Along with issues of protective hydraulic engineering and the use of water power, questions of water protection have increasingly gained importance.

### 2.3.1 Border Commissions

All the Project Countries concluded water agreements with its neighbours and established bilateral as well as multilateral water commissions.

- Austrian-Czech Transboundary Water Commission
- Austrian-Slovakian Transboundary Water Commission
- Austrian – Hungarian Transboundary Water Commission
- Trilateral meetings of the border commissions of Austria, Czech Republic and Slovakia
- Cooperation Czech Republic and Slovakian Republik

#### Austrian-Czech and Austrian-Slovakian Transboundary Water Commission

In 1993 the Austrian-Slovakian as well as the Austrian-Czech Transboundary Water Commission were founded. Both are based on the treaty between the Republic of Austria and the Czechoslovak Socialist Republic on the regulation of water resources management of transboundary water bodies, which was signed in 1967 and ratified in 1970 (Federal Law Gazette No. 106/1970 amended by: Federal Law Gazette I No. 1046/1994).

Every member state builds a delegation of four members and designates a permanent representative. On demand experts can be involved. The commission normally meets once a year.

The main emphasis of these meetings are water management, work programmes for flood protection like maintenance activities, billing of services, hydrology, water quality, water supply, groundwater situations, utilization of hydropower, navigation, border issues, studies and multilateral cooperation, organisation or legal topics of water law like discharge of waste water and so on.

#### Austrian – Hungarian Transboundary Water Commission

The Austrian-Hungarian Transboundary Water Commission is based on Article 12 of the treaty between the Republic of Austria and the People's Republic of Hungary on the regulation of water resources management of the border area, which was signed in 1956 and ratified in 1959 (Federal Law Gazette No. 225/1959). In the Hungarian legislation this agreement is recorded in no. 32 law in 1959 (Proper reference: 1959. évi 32. Tvr, BGBl 58-1959). According to Article 13 the commission's tasks comprise among others the development of hydraulic engineering works and maintenance, the supervision of joint works and measures, research and studies.

The Austrian – Hungarian Transboundary Water Commission did not define regulations but the actual agreements are recorded in the minutes of the committee. The collaborative decisions are regarded to water basins. Based on the common agreement the area of interest is the 6 km wide line on both sides of the border directly, but in cases where further locations can cause effect for the other country the Commission involves them to the workflow.

There is one annual meeting every year and one sub-commission meeting before. The experts could have expert meetings in workgroups. The representatives of the countries are Commissioners and they both have 2 plenipotentiaries.

The CEframe project (and its preparatory activities) is a topic of discussion since 2008 in the AHWC.

### Trilateral Cooperation group

–Consists of an Austrian, a Slovakian and a Czech Delegation

Emphasis of the meetings (minimum one/year):

water management, work programmes for flood protection like maintenance activities, billing of services, hydrology, water quality, water supply, groundwater situations, utilization of hydropower, navigation, border issues, studies and multilateral cooperation, organisation, legal topics of water law

### Cooperation Czech Republic and Slovakian Republic

In 1999 the Government of the Czech Republic and Slovak Republic signed the agreement about cooperation in border waters. Bilateral agreement between the Czech and the Slovak Republic is based on the principles of the "Convention on the Protection and Use of Transboundary Watercourses and International Lakes", which was signed in March 1992 in Helsinki.

Cooperation resulting from Article 7 and 9 of agreement between government of Czech Republic and government of Slovak Republic dated 16 December 1999 (Agreement) in area of floods, ice phenomena, extraordinary changes of runoff conditions, caused by water discharging from dams and origin of other risks with regard to boundary rivers are specified by directive.

Regarding force directive relates to forecasting hydrologic service, warning service at risk in emergency situations, warning duty – procedure at reporting of extraordinary (emergency) events in the sense of needed hydrological and meteorological data.

Cooperation on transboundary waters corresponds to the current approaches of the international community and accepts not only the technical and economic aspects, but also the ecological importance of this cooperation.

### 2.3.2 ICDPR

The International Commission for the Protection of the Danube River (ICPDR) is a transnational body, which has been established to implement the Danube River Protection Convention. The ICPDR is formally comprised by the Delegations of all Contracting Parties to the Danube River Protection Convention, but has also established a framework for other organisations to join (all members of Ceframe are members of ICDPR).

*The goals of the ICPDR are*

- *Safeguarding the Danube's Water resources for future generation*
- *Naturally balanced waters free from excess nutrients*
- *No more risk from toxic chemicals*
- *Healthy and sustainable river systems*
- *Damage-free floods*

*Since its creation in 1998 the ICPDR has promoted policy agreements and the setting of joint priorities and strategies for improving the state of the Danube and its tributaries.*

*This includes improving the tools used to manage environmental issues in the Danube basin, such as*

- *the Accident Emergency Warning System,*
- *the Trans-National Monitoring Network for water quality, and*
- *the information system for the Danube (Danubis).*

**Table 5:** Members of ICDPR

Contracting Party	Signature	Entry into force
Austria	29.06.1994	22.10.1998
Czech Republic	10.03.1995	22.10.1998
Hungary	29.06.1994	22.10.1998
Slovakia	29.06.1994	22.10.1998

<http://www.icpdr.org/>

### 2.3.3 Cooperation on Project Level

#### ▪ Program of Cross-Border Cooperation Slovak Republic-Czech Republic 2007-2013 (CZ)

The Operational Program Cross-Border Cooperation CR-Slovakia is intended for the Czech regions of South Moravia, Moravia-Silesia and Zlín, and on the Slovak side, it concerns the regions of Trenčín, Trnava and Žilina. The Operational Program Cross-Border Cooperation CR-Slovakia (OP CR-Slovakia) falls within the regional operational programs of the European Territorial Cooperation objective. It is focused on improvement of transport accessibility of the cross-border region and environmental protection, support of cross-border infrastructure as well as tourism services development, support of improvement of education and social services, support of cooperation of economic entities and transfer of technologies, and support of cross-border cooperation of territorial self-administrations on both sides of the border.

<http://www.sk-cz.eu/>

<http://www.strukturalni-fondy.cz/Programy-2007-2013/Evropska-uzemni-spoluprace/Program-preshranicni-spoluprace-Slovenska-republik?lang=en-GB>

[http://www.mzp.cz/en/international\\_co-operation](http://www.mzp.cz/en/international_co-operation)

#### Current projects SK-CZ

Current bilateral cooperation of Slovak water management enterprise, state enterprise within Morava river is carried out within the framework of transboundary cooperation Slovak republic – Czech republic, namely in these projects:

- Automatization and exchanges of crisis data in hydrological area of Morava and Dyje river catchments (the project is in status of solution)
- The project of confluence Morava river and Myjava river – common flood protection measures on both banks of Morava river (status of the project – under approval process of the application)
- The project Kopčany -Hodonín – common flood protection measures on both banks of Morava river (status of the project – under approval process of the application)
- The project Renaturalisation of Morava from Radějovka up to Myjava - common flood protection measures on both banks of Morava river (status of the project – under approval process of the application)

## Project SK-AT (Project for transboundary cooperation)

The overall strategic objective of the Slovak-Austrian cross-border cooperation programme 2007-2013 is to build a border region with vital, knowledge-based regional economies, socially and environmentally attractive, playing a significant role among European metropolitan regions.

The border region has the potential to become one of the economically fastest growing regions in the European Union, including two capitals at close proximity. With the highest concentration of headquarters, universities and research centres of both countries, the region has the potential and the means to build a knowledge and economic hub for Central Europe. The Programme 2007-2013 for the cross-border region shall contribute to the process of building a cross-border learning region.

### Current projects SK-AT

- **Bilaterales Gesamtprojekt March Phase 1 (bgm1) – bilateral overall project Morava 1**

This project is the preliminary work to develop the action plan for bgm2. It started with an overview of the current situation and ends in a strategy and concept development for bgm2.

- **Bilaterales Gesamtprojekt March Phase 2 (bgm2) – bilateral overall project March/Morava 2**

The project objective is to create an action plan which should be the basis for further bilateral revitalization measures.

- **MreNa - Recreational Navigation** on the river March/Morava (km 0,00 – km 69,30)
- To improve the tourism sector in this border region a feasibility study should examine the possibilities of using the part of the river Morava (km 0,00 – km 69,30) for recreational navigation. The study is built up on a technical, ecological, legislative and socio-economic analysis.
- **MoRe -Revitalisation of March/Morava river**

The project area extends from the confluence of the Morava and Thaya river km 69.00 to the village Sierndorf at river km 53.0. The revitalization of this section is based on a joint Austrian-Slovak Action Plan, which was for the entire cross-border route of the Morava River within the project bgmII created. The main objectives are to restore the original character of the meandering lowland river, to achieve a dynamic equilibrium according to the ecosystem approach and to improve the diversity of natural habitats in the floodplains. These aims are achieved through the gradual restoration of the natural interaction between the river bed and flood plain that are currently isolated from each other. The project objectives are in line with the requirements of the EU Water Framework Directive (achievement of good ecological status) to promote as well the favorable conservation status under the EU-Fauna-Flora-Habitat Directive and support the objectives of the trilateral Ramsar-site "March-Thaya-Auen". <http://www.etc-more.eu>

Primary restoration actions derived from the project:

- Riverbank restoration: restoration of the existing embankment
- Meander integration: full meander integration and connection of selected meanders with the Morava River
- Lateral connectivity: To improve the connectivity of the floodplain with the river-flow dynamics
- Tributaries: Elimination of migration barriers and restoration of estuaries of tributaries (Zaya)
- Local measures to improve the flow capacity: a measure for local flood protection in the area between the existing flood control dams.

<http://www.sk-at.eu>

- Territorial Cross Border Co-operation Austria – Czech Republic 2007-2013
- The programme „Territorial Cross Border Co-operation Austria – Czech Republic 2007-2013“ contains priorities, which are co-financed by the European Regional Development Fund (ERDF).
- The programme aims at the active and offensive continuation and future development of the support of cross border co-operation, which already has a tradition for more than ten years. In this way the regions on both sides of the border should gain effective impulses for dynamic and sustainable cross border development. This should give all partners in the cross border region the possibility to achieve synergies and to be perceived as a model with high socio-economic, ecological and living standards in the border region.
- Specific guidelines for the elaboration of this programme is the Council Regulation 1083/2006 laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and of Regulation (EC) No° 1080/2006 of the European Parliament and of the Council on the European Regional Development Fund.

Cross-border or international cooperation in flood prevention is not only desirable, it is rather necessary. Different actors in the South Moravian Region are preparing or have already implemented various projects co-funded by the European Territorial Cooperation Objective.

- **Polder Soutok – Nearnatural flood protection in the confluence of March/Morava and Thaya/Dyje river**

The objective of this project is the ecological flood protection at the confluence of Morava and Thaya. Therefore Polder Soutok will be improved, a study about flood protection in the triangle Austria, Czech Republic and Slovakia and a concept for restoration measures (Thaya) will be created.

- **Frainer Thaya/Dyje – Common Measures for water conservation**

This project will improve the water protection from the border region of the river Thaya to the dike of Znojmo. This project includes, among others, studies and pilot projects for the improvement of water quality and the possible improvement of passage of fish and other aquatic organisms of the reservoirs Znojmo, a study and a proposal about woody debris in the National Park Podyjí and additional gauges in the project area.

### ▪ **Thaya/Dyje Projekt**

The goal of the INTERREG project "Thaya / Dyje" is to achieve a good ecological status of the river Thaya/Dyje in cooperation of the Federation, the Czech Republic and the State of Lower Austria. This cross-border coordination complies with the requirements of the EU Water Framework Directive, Fauna, Flora and Habitats Directive and the Birds Directive. The project was completed in spring 2008.

[http://www.noe.gv.at/Umwelt/Wasser/Fliessgewaesser/Fliessgewaesser\\_Bilaterales\\_Projekt\\_Thaya.wai.html](http://www.noe.gv.at/Umwelt/Wasser/Fliessgewaesser/Fliessgewaesser_Bilaterales_Projekt_Thaya.wai.html)

### ▪ **Flood forecasting system Morava – Thaya**

An example of successful cross-border cooperation in the extended basin of the Danube River is the Czech-Austrian bilateral [project Morava-Thaya](#) intended to improve the quality of flood forecasting system on both rivers. The project expects to supplement the existing automated monitoring at nine sites along the border parts of the Morava - Thaya rivers with an extension of the rainfall-runoff model to the entire length of the Morava, up to the junction with the Danube.

Akronym: Povodňová prognóza – Hochwasserprognose Projektnummer: M00090

Lead Partner: Povodí Moravy (Südmähren)

Project Partner: Amt der Niederösterreichischen Landesregierung (Niederösterreich)

objectives:

- A meteorological and hydrological forecasting and simulation model for the Czech-Austrian border, which includes all the necessary informations for the flood forecasting and analysis calculations. The system will be integrated into the existing system of CHMI.
- To improve the data base nine additional gauges were installed to collect important flood data for the calculations.
- Based on existing IT-structures (projectpartners and CHMU) a new technical infrastructure was installed. These systems include data transfer, calculation, dissemination of information to managers of flood management and civil protection.
- Accompanying studies should prove the attainable accuracy of the forecasts.
- To improve the proper use of the system the interfaces and lines of communication are clearly defined.
- The improvement of intergovernmental cooperations is based on clear and detailed informations about the integrated institutions.

<http://www.at-cz.eu>

## **Project AT-HU (Project for transboundary cooperation)**

### ▪ **Flood prognosis model for the river Raab/Rába**

To improve floodwater warning systems between Hungary and Austria this project was established. The goal of this project is to develop a floodwater forecasting model for the Raab River. The centrepiece is an international (centralised) forecasting server located in Graz with local systems in each of the partner regions. The important tasks will be among others the development of local and centralised models, the installation and test operation of this models. Very important is the cross-border coordination and calibration including training and exercises and the rising of the public awareness.

Until now are no cross border projects for flood protection at the river Lajta planned.

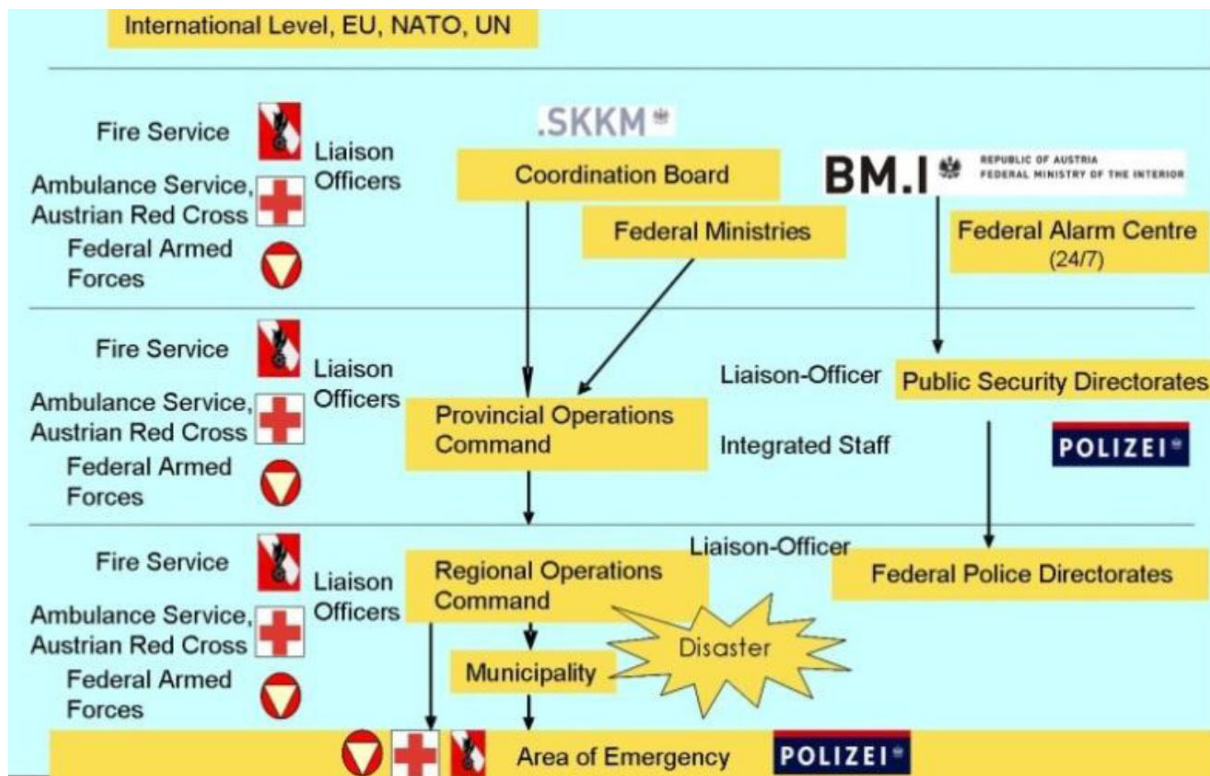
<http://www.at-hu.net/>

## 2.4 Transnational cooperation in case of floods

### 2.4.1 Austria

#### Operational disaster management in Austria and with neighbouring countries

Operational disaster management is done at first level by the communities and at second level by the districts. The district authority can declare the state of disaster and is then the head office for all affected communities in the district. If more districts are affected, the provincial government will organize and coordinate the operations. The national disaster management will usually act as a coordinator if more than one province is affected.



**Figure 6** Illustration of the disaster management system in Austria

Moreover, the public website of the Lower Austrian and Burgenland fire brigades (<http://www.lsz-b.at/seiten/Feuerwehreinsatzkarte/einsatzkarte.php>) shows all fire brigades on duty in a map at district level resolution indicating the reasons for their intervention.

All Austrian provinces practice cross-border cooperation with their neighbouring countries. In this document the focus is on provinces of Lower Austria and Burgenland. Lower Austria has already cooperated with the Czech Republic (Southern Moravia) and Slovakia during flood events on the rivers Dyje (Thaya) and March/Morava (i.e. with the national hydrometeorological services ČHMÚ and SHMÚ). Precipitation data have been exchanged, as well as water levels, water flows, water peaks, power-plant strategies (Plants Vranov and Nové Mlýny) and damages.

Until now there is no permanent cooperation of the command and control centres in Burgenland and Hungary, because there are different technical standards and the language barrier was an

obstacle so far. In recent years, however, attempts were made to achieve an improved cooperation (e.g. the EUREGIO Working Group "Civil protection and disaster relief," the project NEURISK - focal cooperation of Burgenland and Hungary's fire fighters, agreement on cross-border fire fighting and cooperation in emergency services between the State Fire Command of Burgenland and Győr-Moson-Sopron County).

A long-lasting cooperation is in place in the area of the bilateral Austro-Hungarian Water Commission. This commission does not only regulate the water management of the transboundary Lake Neusiedl but also all water related issues in the border area of Austria and Hungary.

### Flood forecast - National level

Hydrological prediction in Austria is a mission of public service and the hydrographic services of the federal states.

#### **Lower Austria: Provincial Government of Lower Austria**

<http://www.noe.gv.at/Externeseiten/wasserstand/htm/wndcms.htm>

#### **Burgenland: Provincial Government of Burgenland**

<http://wasser.bgld.gv.at/hydrographie/online-daten.html>

#### **Upper Austria: Provincial Government of Upper Austria**

[http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/was\\_internethydro\\_Online\\_DEU\\_HTML.htm](http://www.land-oberoesterreich.gv.at/cps/rde/xchg/ooe/hs.xsl/was_internethydro_Online_DEU_HTML.htm)

#### **Via Donau – Österreichische Wasserstraßen Ges.m.b.H.**

<http://www.via-donau.org>

#### **Lebensministerium**

[http://www.lebensministerium.at/wasser/schutz\\_vor\\_naturgefahren/hochwasserprognose/hw\\_prognose\\_at.html](http://www.lebensministerium.at/wasser/schutz_vor_naturgefahren/hochwasserprognose/hw_prognose_at.html)

[http://ehyd.gv.at/?g\\_card=pegelaktuell](http://ehyd.gv.at/?g_card=pegelaktuell)

### Flood forecast - International level

the European Flood Awareness System (EFAS) – increased preparedness for floods

- Flood warning information up to 10 days in advance. The information is designed to be complementary to national operational flood forecasting information and is distributed to the EFAS partner network twice a day through this password protected webpage
- European overview of ongoing and forecasted floods providing the European Commission with useful information for the preparation and management of aid during flood crises
- Application of state of the art weather forecasts and novel methods in probabilistic flood forecasting
- Research applied to practical operations

The European Floods Awareness System (EFAS) is an early flood warning system complimentary to national and regional systems. It provides the national institutes and the European Commission with information on possible river flooding to occur within the next 3 or more days.

Since flood warning is a Member State responsibility, only archived flood warnings can be made publically available.

The realtime warnings are made available to the national partner institutes only.

## 2.4.2 Czech Republic

### Flood forecast - National level

Flood warning system supports the information for flood protection authorities to warn population at the place of awaited flood and places located downstream. It informs flood protection authorities and other participants of the flood protection on the course of the flood, reports all the information necessary for evaluation and management of all the measures necessary to manage the flood. Flood warning system is organized by either municipalities or municipalities with extended responsibility and all other participants of the flood protection are involved. Details on reporting and securing the warning and forecasting flood service is set by Methodical directive of the water protection department of the Ministry of Environment (Bulletin No. 9/2005). Continuous data on selected water courses and reservoirs are available on the telex of the Czech Television 1 (page 183), webpage of CHMI or on the web pages of the River Basins s.e. [www.chmi.cz](http://www.chmi.cz), [www.pla.cz](http://www.pla.cz), [www.pvl.cz](http://www.pvl.cz), [www.poh.cz](http://www.poh.cz), [www.pmo.cz](http://www.pmo.cz), [www.pod.cz](http://www.pod.cz).

Czech Hydrometeorological Institute is responsible for the flood forecast system in the Czech Republic. CHMI keeps a web presentation on its webpage [www.chmi.cz](http://www.chmi.cz), where actual information about water levels and discharges in warning profiles are presented and discharge forecasts in selected profiles are processed in cooperation with river basin management for 24 to 48 hours in advance.

Actual information about water levels, discharges and water precipitation is possible to find in the Czech Republic also on the website [www.voda.gov.cz](http://www.voda.gov.cz).

Forecasting flood service is operated by Czech Hydrometeorological Institute (CHMI) in cooperation with river basin management (River Basins s.e.). Possibilities of the forecasting flood service in the Czech Republic are limited by the run-out time of the flood flows on the main water courses. Typical forecasts are based on progress times and respecting flows measured in the system of stations. These forecasts are limited to one day advance and, on smaller water courses, to several hours. Hydrological models for the main river basins of the Czech Republic were prepared, so the forecasts have greater advance and their results are more relevant. Hydrological models are based on precipitation - runoff characteristics eventually on the models of snow melting. Based on the quantified forecast of the precipitation as an input into the model, the time of forecast for great water courses may be prolonged up to 2 days.

### Flood forecast - International level

Similarly to Austrian side. Information from the European Flood Awareness System (EFAS) are accessible through CHMI.

## 2.4.3 Hungary

### Operational disaster management in Hungary and with neighbouring countries (Lajta)

The head of the flood protection work in Hungary is the National Flood Protection Committee (*OMIT – Országos Műszaki Irányító Törzs*), they have 24h duty. They order the flood alert levels and permit the protective work for the regional head, who is the north-Transdanubian Water Directorate (*ÉDUVIZIG*). In case of a haviaria event nationally the Catastrophy Coordination Committee (*Katasztrófavédelmi Koordinációs Szerv*), locally the County Protection Committee (*Megyei Védelmi Bizottság*) takes the coordination that is leaded by the County Catastrophy Service (*Megyei Katasztrófavédelmi Igazgatóság*)

The Directorate operates with a leading defense engineer (Director) and the water bodies are related to defense sections, those have their own leading group. On both level there are administrators for

duty and engineers with human power for operative measures. Lajta is related to ÉDUVIZIG “01.06 Lajta menti” defence section.

In case of a Leitha/Lajta flood there is no written agreement on continuous info exchange between the nations. The Austrian institutes provide the hydrological data via the internet. The hydrologist colleagues of the Directorate follow the observations of the Austrian institutes and make their own forecast out of that data. The Directorate receives the official international information via the plenipotentiaries of the AHWC directly or through OMIT. The in-situ defence measures are not communicated to the Hungarian party (e.g. reservoir operation). The evaluation of the floods is the subject for the Austrian-Hungarian Border Commission.

### Flood forecast – National level

The official meteorological information of the country is presented by the **National Meteorological Service** (*Országos Meteorológiai Szolgálat*). Link: <http://www.met.hu/en/idojaras/>. Beside the public information they publish special short and mid-term forecasts especially for the water sector in closed lines. On their website different types of warnings are also plotted: <http://www.met.hu/en/idojaras/veszelyjelzes/riasztas/>

The provider of the national flood forecast is the **National Hydroinformation Service** (*Országos Vízjelző Szolgálat*) which is located in the OVF (PP9). The link to their website: <http://www.hydroinfo.hu/>. They provide no information regarding to the Lajta directly.

The present conditions of the water bodies and the warning situation of floods and inland inundations can be followed on the official site of the water sector. The site is called **Webpage of Water Management** (*Vízügyi honlap*). This site integrates the information from the main online gauges (real-time water levels) and indicates the flood defence work nationwide. It is maintained by OVF (PP9). Link: <http://www.vizugy.hu/>

The digital information is summarized for the water sector in another webpage, called **National Water IT Service** (*Országos Vízügyi Informatikai Szolgálat*). This collects the online digital information for the Danube river basin, too, but more or less has the same content for floods as the previously mentioned one. Link: <http://www.ovisz.hu/>

The detailed observed data of the water levels is plotted online **on the website of ÉDUVIZIG** (PP6): <http://www.edukovizig.hu/map/layout.html>

The Directorate publishes forecasts weekly. These reports are released more often in case of floods, but only in Hungarian: [http://eduvizig.hu/hidrometeorologiai\\_tajekoztato](http://eduvizig.hu/hidrometeorologiai_tajekoztato)

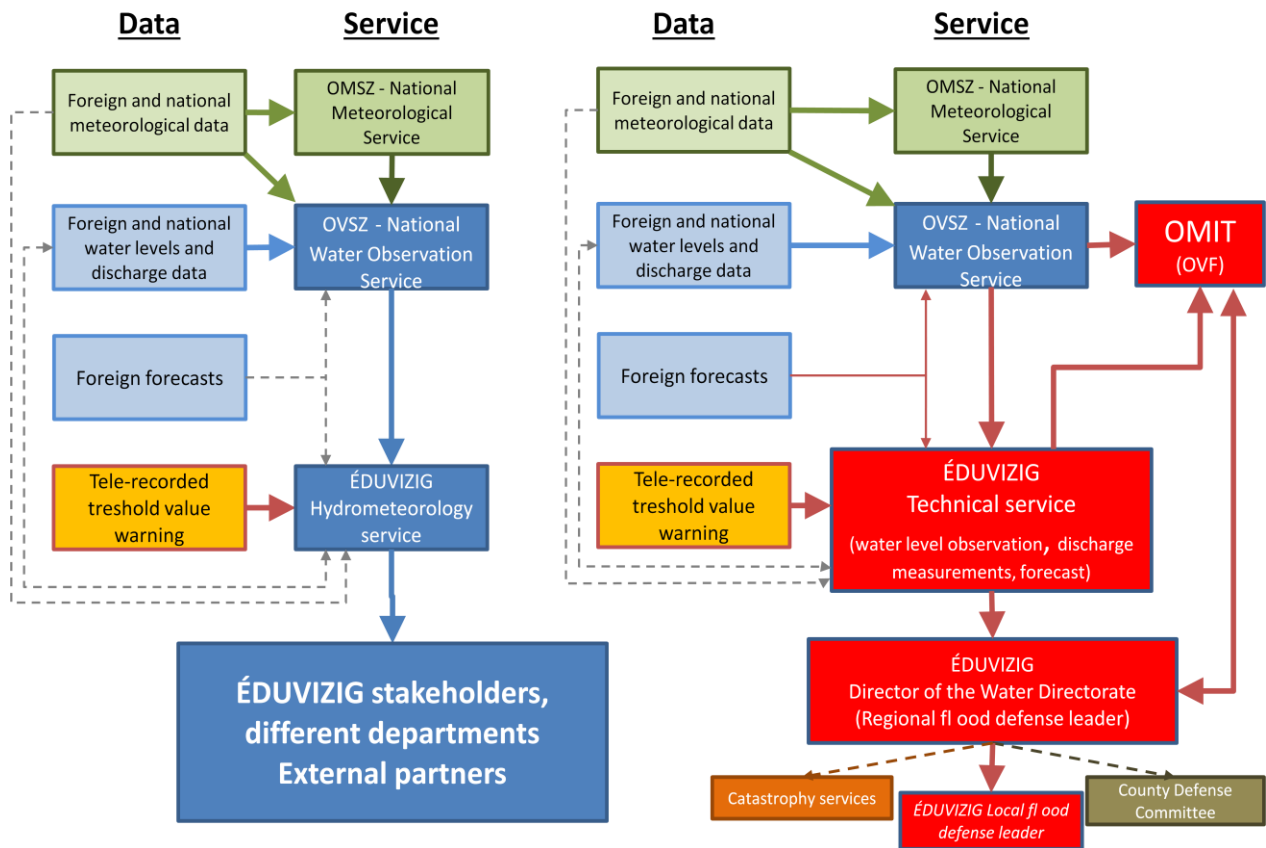


Figure 7 Schematic of the Hungarian floodforecast service

#### 2.4.4 Slovak Republic

##### Operational disaster management in Slovak Republic and with neighbouring countries (including flood forecast)

In order to report danger related to floods, ice events, and other dangers concerning transboundary waters Commission for boundary waters established directives. These directives build up warning and reporting services (at the time of floods and danger of ice movement), exchange of hydrological and meteorological data, warning service at very high pollutions of waters, as well as cooperation of water management authorities.

In case of floods on March/Morava for station Moravský Svätý Ján at exceeding forecast 480 Slovak party sends warning notifications to Austrian party: water level forecast in cm, daily, with tendency forecast by e-mail or by fax. Slovak hydrometeorological institute provides reporting for the Landeswarnzentrale NÖ (e-mail: [post.lwz@noel.gv.at](mailto:post.lwz@noel.gv.at)), via donau – Österreichische Wasserstraßen (e-mail: [hw-dienst@via-donau.org](mailto:hw-dienst@via-donau.org)) and the Bezirkshauptmannschaft Gänserndorf (fax: 0043 2282 9025 24000).

Exchange of hydrological and meteorological data is on daily basis by means of consultation (conference call, e-mail, FTP) at 7:50 on current meteorological and hydrological situation and their development over Slovak and Austrian sections of Danube river between the departments of Slovenský hydrometeorologický ústav (e-mail: [hps@shmu.sk](mailto:hps@shmu.sk), [http://www.shmu.sk/sk/?page=1&id=rak\\_a\\_morava](http://www.shmu.sk/sk/?page=1&id=rak_a_morava)) and Amt der Niederösterreichischen Landesregierung ,Abteilung Hydrologie und Geoinformation, e-mail: [post.wasserstand@noel.gv.at](mailto:post.wasserstand@noel.gv.at)).

Cooperation over the sections of dikes of boundary water courses (Danube and Morava) during the time of flood phenomena occurrence is between water management authorities (Slovak water management enterprise, state enterprise, branch plant Bratislava. ([www.svp.sk](http://www.svp.sk)) and Via donau – Österreichische Wasserstraßen-Gesellschaft mbH which are immediately mutually informed on announcing and cancelling respective stages of flood activity and on reaching peak levels on crucial water gauge stations.

In case of flood event within Morava river basin between Slovakia and Czech republic competent organizations are authorities of water courses Slovak water management enterprise and Povodí Moravy (Morava river basin), Slovak Hydrometeorological Institute (SHMU) and Czech Hydrometeorological institute (CHMU). CHMU sends data reports from station Dyje-Nové Mlýny, Morava- Kroměříž, Strážnice, Olomouc, Dluhonice . Reports are sent in case of exceeding stage of flood activity 1-3 times a day.

Between SHMU and CHMU there is a daily exchange of hydrological data and forecasts for selected stations by means of FTP.

### 2.4.5 Summary

The water management authorities of Czech Republic, Slovak Republic and Austria are cooperating in times of floods. Slovakia and Austria exchange hydrological and meteorological data.

There is no cooperation of flood protection between Hungary and Austria. The forum of exchanging data and experiences is the AHC.

So it would be important to install -as a first step - a warning system for Leitha/Lajta and begin to improve the cooperation between Austria and Hungary.

In this context, a mutual exchange of experiences in contingency planning is of major importance.

## 3 Construction Principles

### 3.1 Legislative backgrounds and technical standards for flood protection on national level

#### 3.1.1 Austria

The “Hydraulic Engineering Assistance Act (Wasserbautenförderungsgesetz) of 1985“ provides the legal background for the technical standard of flood protection measures.

In compliance with the requirements all measures and designs must be in accordance with technical standards, laid out in the document **RIWA-T** (Technische Richtlinien für die Bundeswasserbauverwaltung) and must be examined by technical departments of the local authorities. All measures and designs are to be laid out by the state of the art.

[http://www.lebensministerium.at/wasser/wasser-oesterreich/foerderungen/foerd\\_hochwasserschutz/trl.html](http://www.lebensministerium.at/wasser/wasser-oesterreich/foerderungen/foerd_hochwasserschutz/trl.html)

The **RIWA-T** provides the general guideline for project work and defines the contentual requirements of technical projects (plans, calculations, documents). The technical project of flood protection measures are defined by their different scales and viewpoints and cover a range from national and regional concepts, river developing concepts and general studies to general and detailed construction projects.

### 3.1.2 Czech Republic

In the Czech Republic the construction principles and legislation related to the flood protection arrangements has developed continuously in accordance with increasing demands for the protection against floods. Recently, regulations have become fragmented into a great number of laws, amendments, national technical standards and guidelines. In this report the current system of flood protection legislation in the Czech Republic is briefly described, and some comments are mentioned about the present system.

In the Czech Republic the construction of flood protection measures of modern conception began at the end of the 19th century and practically is not finished until now. The legislation has developed gradually with increasing demands for the safety and reliability of flood protection systems. The legal basis for the monitoring and supervision of related structures was established in seventies of the last century and in some aspects took ICOLD recommendations into account in some areas.

Today, design standards and safety regulations for water structures (including dams and flood protection works) are fragmented into a relatively great number of laws, announcements, technical standards and guidelines. Due to gradual elaboration and abundant changes during this period some minor inconsistency occurs in individual statements and requirements.

#### 3.1.2.1. State administration in water management in the Czech Republic

Water authorities are located in cities of greater importance, where environmental departments are responsible for activities in the field of water management. In the case of larger flood protection schemes this position is held by regional authorities.

The central water authority is the Ministry of Agriculture (MA). The responsibility of the MA extends to water management activities and care for water management infrastructure. According to the Water Act, the Ministry of Environment has a wide range of competence, which covers flood protection or hydrometeorological forecasts.

The principle owners of flood protection facilities are usually the River Board Authorities. Only a minority of flood protection infrastructure belongs to municipalities. Water courses of lower importance and small dams are managed by Forests of the Czech Republic and exceptionally to local municipalities and other owners (water supply companies, etc.).

#### 3.1.2.2. General legislative framework for water management

The two principal legal documents concerning construction, administration and control in water management in the Czech Republic are the Civil Engineering Act and the Water Act.

The Civil Engineering Act (Building Code) defines general rules in landscape and urban planning, development, construction and maintenance of civil structures, including water structures and flood protection measures. The Act regulates preparation procedures and building permits, and defines restrictions, liability and ownership demands in the development of civil structures in general. Since 2007 an amendment of the Civil Engineering Act substituted the original law (1976).

The Water Act deals with the administration, ownership, control, and use of water as a resource. Of great importance is the part dealing with water courses and water structures, the responsibility of their owners and the obligation to carry out the supervision and inspection of hydrotechnical structures. Improved extensive part including numerous paragraphs deals with various aspects of the flood protection. The last amendment of the new Water Act (from 2001) was issued on late summer in 2010 into which the implementation of European directives were done.

Decrees have lower force in the Czech legislation hierarchy than laws; however, their statements are obligatory. The following are closely related to the flood protection:

- Decree concerning technical-safety supervision of water structures.

- Decree concerning particulars of the handling rules and operational rules for water structures
- Decree concerning technical requirements for water structures.
- Decree concerning the delimitation of flood zones.
- The set of laws and decrees concerning emergency activities during floods.

Technical standardisation was organised in Czechoslovakia from the beginning of the 20<sup>th</sup> century. In 1951 the responsibility for technical standardisation was taken over by the state administration through the Institute for Standardisation. The previously voluntary standards became obligatory under the law. New legislation defined technical standards as non-obligatory from 1995 again. The exceptions are the statements of laws and decrees referring to technical standards or the decrees of bodies entrusted by law to order standards to be obligatory.

Technical standards in flood protection structures (namely levees) have been elaborated since the nineteen-sixties. The set of standards dealing with flood protection included topics like river engineering, weirs, calculation of wave effect, construction of embankments, design of outlets and intakes, stability computations for embankments, measurements and observations for water structures, the set of standards for dam engineering, etc.

Over time, most of the standards were improved and transformed into the Czech National Standards, which were periodically updated.

Extensive improvement and updating of standards has been carried out approximately since the year 1987. Some standards have also been issued as “Technical standards for water management”. In accordance with requirements for new types of structures (e.g. dry reservoirs, etc.) some new standards have been issued as well.

Dam standardisation in the Czech Republic has a long tradition with its roots in water management and construction advances from the end of the 19<sup>th</sup> century. On the other hand, from the list shown above, which is not complete (it does not include standards for soil mechanics, hydrology, etc.), it is clear that knowledge and experience are dispersed across a great number of documents.

### 3.1.3 Hungary

The most important laws and decrees are the following:

- 30/2008. (XII. 31.) KVVМ ministerial decree about technical rules for nature waters usage, protection and remediation tasks
- 147/2010. (IV. 29.) Governmental decree on general rules of the activities and structures of use, protection and prevention the damages of water

The most important standards for design work:

- MSZ 15292 / 1999. Safety of Flood Control Levees
- MSZ 15221-69 Hydraulic engineering. Tests for seepage within soil layers bordering building constructions

The long-term development flood protection strategies are defined by the Water Directorate and the development plans are also carried out via this institute. The private activities and measures, that have impact on the flood protection capabilities, have to be authorized by the regional water authority that asks approval from the Directorate. The Directorate is assigned to comment on the regional/county/municipality development plans and harmonize them with the protection activities.

Those primary dikes that protect two or more settlements are exclusively the responsibility of the Water Directorate, but the municipalities have to secure their own inhabitants with local dikes. These

should fit to the technical standards and the Directorate gives technical expertise for the design, realization and maintenance work, too.

The main protection element is the soil dike, but other solutions are possible to build regarding to the above mentioned legislative documents.

In the Leith/Lajta border section the difference of the defence capacity between the Austrian and Hungarian dikes are remarkable. The cross-section and the height differ, too. This is mainly because of the different protection concept.

### 3.1.4 Slovak Republic

In the Slovak republic the most important law (related to water) is Law No. 364/2004.

The basic rule of law within the area of water economy in Slovak republic is Law No. 364/2004 Law digest on waters as amended and it transposes Acquis managements with waters in European union member countries, especially European parliament directives and directives of Committee 2000/60/EC by which it establishes framework for acting of Community within the area of water politics and Guideline of European parliament and Committee 2007/60/EC on Flood Risk Management Plan.

The Law sets the rights and duties of both physical and legal entities to waters and real properties which relate to them when protecting, rational and effective use, authorizations and obligations of State Water Management and responsibility in case of breach of duty.

Concerning the project subject these provisions are crucial:

It is not possible to protect the right for properties which are affected by water structure where river-basin or flood protection structures are changed or established. This is also not achievable by agreements.

At the area of organization and planning of operative and conceptual flood protection the crucial law is the Law No. 7/2010 Law digest on flood protection.

The law regulates:

- measures for flood protection and duties at assessment and management of flood risks
- planning, organization and control of flood protection
- duties and rights of state administrative bodies, flood protection bodies, bigger territorial units, and villages,
- duties and rights of legal entities, physical entities at flood protection.

Costs for new structures, objects or facilities which are permitted in inundation zone in order to protect against floods are paid by builder.

In relation to this law supplementary regulations have been issued, namely:

Regulation of Environment Ministry of Slovak republic No.313/2010 Law Digest by which details on preliminary flood risk assessment and its reassessment and updating are set; it defines flood risk as a potentially important in geographical areas where in the past the flood event had a bad impact on health, environment, cultural heritage or economic activity.

Regulation of Ministry of Agriculture, Environment and Regional Development of Slovak republic No. 419/2010 Law Digest by which following is set: details on working out flood risk maps, details on working out flood danger maps, details on paying costs in order to work them out, reassessment and updating and on designing and displaying the range of inundation area on the maps for geographical areas with potential flood risk or where is a probability of flood occurrence.

Regulation of Environment Ministry of Slovak republic No. 112/2011 Law Digest by which these ones are set: details on contents, reassessment and updating of plans of flood risk management; it sets the contents of flood risk management plan and contents of its updates.

Regulation of Environment Ministry of Slovak republic No. 251/2010 Law Digest dated 17<sup>th</sup> May 2010. by which these ones are set: details on assessment of costs for flood securing activities, flood rescuing activities and flood damage. Law digest No. 101/2010

Regulation of Environment Ministry of Slovak Republic No. 252/2010 Law Digest dated 17<sup>th</sup> May 2010, by which these ones are set: details on submitting continuous reports on flood event and general reports on courses of flood events, their impacts and taken measures. Law Digest, part No.101/2010

Regulation of Environment Ministry of Slovak republic No. 261/2010 Law Digest dated 28<sup>th</sup> May 2010, by which these ones are set: details on contents of flood plans and procedure of their approval. Law Digest, part No 104/2010.

Regulation of Environment Ministry of Slovak republic No. 204/2010 Law Digest dated 28<sup>th</sup> April 2010, by which details on executing flood forecasting service are set. Law Digest part No.80/2010.

## 3.2 Basic Elements

### 3.2.1 Austria

In Austria the main technical construction design in flood protection is the lateral earth dam along rivers and floodplains, the so called dike. Other measures and designs are concrete walls on different forms of foundation, sheet pile walls and mobile flood protection elements on concrete foundations. For protection of single objects there exist a great number of mobile elements of variable designs.

The cross section of a homogeneous dike is described by following elements with the given minimum requirements:

- Width of the dike crest, 3,0 m non trafficable, 3,0 m trafficable + 0,5 m shoulder on both sides
- Height of the dike, 100 years flood + 50 cm
- Gradient of slopes, 1:2 outer surface, 2.3 core slopes

The standard dike cross section is described by a reduced gradient of the slopes (1:3 outer surface, 1:2 core slope). According to the individual situation the dike system must be reached and travelled alongside during the event of a flood.

- Sealing of dikes: impervious walls (vib walls, terra-concrete walls, mixed in place walls, injection-walls), foils on the wet side, mineral sealing, bentonit-mat etc.
- Seepage and drainage (defined by the individual situation): filter and drainage pipes on the dry side, relief of water pressure at the base by filter and drainage
- Protection of the dike surface: earth coverings, humus layer, grassed surfaces, stone settings and pavement
- Overflow sections: pavement of the surfaces, spillways
- Crossing of lines and pipes
- Crossing of channels, gateways, barriers
- Pumping stations

For flood protection walls in Austria there exists no distinctive standard or recommendation. The existing designs must be planned and engineered by the standards of technology and by the state of the art.

### 3.2.2 Czech Republic

Levees are used as an embankment whose primary purpose is to furnish flood protection from high water and which is subject to water loading for periods of only a few days or weeks a year. In the Czech Republic following principles are used at the design of levees:

- the width of levee crest should not be less than 3 m and is governed by the utilization of the levee crest (footpath, service road, public road, etc.),
- the use of soils according the type and structure of the levee is in Tab. 1,
- recommended upstream and downstream slopes according the type of levee and soil used is summarized in Tab. 2.

**Table 6:** Applicability of soils for the types of levees (ČSN 75 2310)

Soil symbol	Soil type	Homogeneous	Sealing	Shoulders
GW	well graded gravel	not suitable	not suitable	excellent
GP	poorly graded gravel	not suitable	not suitable	excellent
GM	silty sandy gravel	excellent	quite suitable	less suitable
GC	clayey sand gravel	excellent	excellent**)	less suitable
SW	well graded sand	not suitable	not suitable	suitable*)
SP	poorly graded sand	not suitable	not suitable	suitable*)
SM	silty sand	suitable	suitable	not suitable
SC	clayey sand	quite suitable	excellent	not suitable
ML	anorganic sandy silt, very fine sand	less suitable	less suitable***)	not suitable
CL	anorganic clay with low to medium plasticity	suitable	quite suitable	not suitable
OL	organic sandy loam	less suitable	less suitable***)	not suitable
MH	anorganic loam	less suitable	less suitable***)	not suitable
CH	anorganic high plasticity clay, fat clay	less suitable	less suitable***)	not suitable
OH	anorganic clay with medium to high plasticity	not suitable	not suitable	not suitable

\*) for gravel soils , \*\*) special care on weathered particles , \*\*\*) not suitable for upstream sealing

**Table 7:** Slopes of individual types of levees (ČSN 75 2410)

Type of soil sealing	Soil classification		Slopes	
	Sealing	Shoulders	upstream	downstream
Thin	GM, GC, SM	rockfill	1 : 1,75	1 : 1,5
	SC, CG, MG	GW, SW	1 : 2,8	1 : 1,75
	ML-MI, CL-CI	GP, SP	1 : 3	1 : 1,75
Wide	GM, SM	rockfill	1 : 3	1 : 2
	GC, SC, MG, CG, MS, CS	rockfill GW, GP	1 : 3 1 : 3,2	1 : 2
	ML-MI, CL-CI	SW, SP	1 : 3,4	1 : 2,2
Homogeneous levee *)	GM, SM		1 : 3	1 : 2
	GC, SC		1 : 3,4	1 : 2
	MG, CG, MS, CS		1 : 3,3	1 : 2
	ML-MI, CL-CI		1 : 3,7	1 : 2,2

\*) For levees smaller than 4 m the slope can be increased to 1 : (x - 0,5)

There are not strict requirements on the design flood (return period) for individual land use categories. However, historically some guidance is anchored in older and also in presently valid (but not obligatory) national standards. In the year 2000 the Strategy for the Flood Protection for the Territory of the Czech Republic was issued, further on the Documentation of the program 129 120 „Support of the prevention against floods II“ was published by the Ministry of Agriculture of the

Czech Republic. According to these documents the following factors should be taken into account when deciding about the design flood return period  $N$ :

- the necessity of flood protection with respect to the lowering of damage and loss on human lives and material property,
- appropriate flood protection level should be determined using the risk based methods with respect to the following criteria:
  - population at risk ,
  - the value of property and potential material losses,
  - occurrence of important structures and strategic facilities in endangered area (principal highway, railway, gas duct, power plants, etc.),
  - the celerity of the flood and warning time available (especially at flash flood prone areas),
  - data about sediment transport,
  - water sources and water supply infrastructure,
  - water pollution sources like waste water treatment plants, industry handling with dangerous toxic substances,
  - general feasibility of flood protection arrangements (agreement of land owners, other conflicts),
- impact on nature, landscape and cultural heritage,
- economic effectiveness of the arrangements.

Resulting recommendations according to the Strategy for the Flood Protection for the Territory of the Czech Republic are shown in table 3.

**Table 8:** Design flood discharges according to the Strategy for the Flood Protection for the Territory of the Czech Republic

Land use	Design discharge
Historical monuments	$\geq Q_{100}$
Public roads	according importance $Q_{20}$ to $Q_{100}$
Continuous urbanisation, important industry area,	$Q_{100}$
Larger built up areas or manufacturing, services	$Q_{50}$ to $Q_{100}$
Smaller urban areas	$Q_{20}$ to $Q_{50}$
On-purpose roads	$Q_{10}$ to $Q_{50}$
Orchards, gardens, hop gardens	$Q_{10}$
Arable land	$Q_5$
Meadows, forests, pastures	$Q_{30d}$ to $Q_1$

Uncertainties related to hydrologic data, inaccuracy of geodetic data, hydraulic model and also importance of the flood protection measure are governing the height of freeboard. According to the Decree 590/2002 Sb. and 367/2005 Sb. it is required to assume the freeboard height 0.3 to 1.0 m at the protection against  $Q_{100}$ , in lower flood protection level the freeboard should be up to 0.5 m.

### 3.2.3 Hungary

The basic element of flood protection in Hungary is the earth dam. Only in exceptional cases flood walls could be used in settlements.

The technical parameters are set in the 30/2008. (XII. 31.) KVM ministerial decree.

Dike-crest minimum netto width:

- Primary dike: 4 m
- Secondary dike: 3 m
- Third-order dike: 2 m

Crest embossing: 5 % towards both sides from the centreline

Slope of the dike body:

- Primary dike: 1:3
- Secondary dike: 1:3
- Third-order dike: 1:2
- If coated: 1:1.5

The material of the dike has to be non-permeable on the wet side. The netto upper width of the non-permeable part has to be minimum 4 m. On the dry side supporting gravel part have to be built. The soil type of the non-permeable part has to fit two threshold distribution curves.

The dikes do have the dike body itself and on both sides 10 m from the dike leg has to secure for safety zone. Additionally +50 meter on the dry side could be kept as watching zone. The defence infrastructure consists of all the elements that are related to the successful prevention of the protected areas.

The driving parameter of the defence capacity is the MÁSZ (design flood level) and the freeboard set in the corresponding decree. As described earlier, the MÁSZ could be considered as 100 year flood level and the freeboard and the defence measures gives additional resistance.

### 3.2.4 Slovak Republic

Slovak technical standard – STN 75 2102 – Adjustments of rivers and creeks recommends to determine main technical parameters of the adjustment by means of technical and economical analysis and also by ecological analysis of values of designed discharge:

- a) which does not have to be along the whole length of adjusted section constant and influence of tributaries has to be taken into account
- b) with respect to determining resistance of single parts of river bed, i.e. to determine resistance of bottom, slopes of banks, berms, dikes etc.

Designed discharge is determined based on analysis of relation of protecting effect of the adjustment, economic parameters, and impact on ecosystem.

## 3.3 Design Level

*Content: (short description of the design + scheme + freeboard) / per country on river*

Source: CEframe Reports 3.3.1 – chapter 2.2; 3.3.2

### 3.3.1 March/Morava

AT:

In Austria the definitive height of any flood protection design is identified by the level of the calculated water level for a determined flood event plus an addition for safety reasons.

As the determined flood event the 100 years flood is relevant and standard for protection of settlement areas. The water level has to be calculated by mathematical methods (1-D, 2D modelling according to the situation) and have to concern all possible deviations and possibilities.

The additional height above the water level is defined as freeboard and is for safety reasons only. The height of the freeboard is normally laid by River March at 70 cm in accordance with the Austrian-Slovakian Transboundary Water Commission).

For walls and mobile elements the freeboard can be reduced to 30 cm. Local overtopping of the construction will not cause any progressive structure failures.

CZ:

The current state of the defense capacity was assessed using the hydraulic calculations. For this purpose the quasi 2D numerical model MIKE 11 was used. Simulations were performed for the unsteady water flow. Computational network considered hydraulic structures (see report 322), geodetically surveyed stream cross sections and the additional data from the digital terrain model and field survey. Hydrological data included in the reports 311 and 313 were used as a boundary conditions and also for model calibration. Results from the hydraulic calculations were processed into the flood hazard maps (see GIS layers of CEframe Report 3.4.2). Sufficiency of the defense capacity will be assessed in more detail using the risk analysis methods during the solution of WP4 of the CEframe project. There is possible to get essential information about the capacity of the mentioned hydraulic structures (i.e. water levels for the selected culmination discharges, dike capacity etc.) The next table 4 provides the basic information about the capacity of the selected sections of the Morava river.

**Table 9:** Approximately dikes capacity along the Morava river

River	Reach description	Approx. capacity
Morava	Polder Soutok - Lanžhot	Q20 - Q100
	Hodonín	Q20 - Q100
	Rohatec	Q20 - Q100
	Vnorovy	Q5 - Q100

SK:

In the Slovak republic following principles are used at the design of levees:

- Depression curve may not get off ascend on downstream face
- Slope should be designed with regard to the economical use of material shear strength of the levee and its sub-base
- levee may never be topped
- the width of levee crest should not be less than 3 m and is governed by the utilisation of the levee crest (footpath, service road, public road, etc.),

Levees of Morava river in the Slovak republic are designed for Q 100 + 70 cm freeboard

In Slovak republic mobile systems have been extensively used in capital city Bratislava as a part of project Bratislava flood protection. Part of the structure was reconstruction of flood protection levees of Morava river in a stretch of Devín suburb.

Design discharge: Peak discharge in Morava  $Q_{30} = 1040 \text{ m}^3\text{s}^{-1}$  with Danube flood backwater at  $Q_{100} = 11\,000 \text{ m}^3\text{s}^{-1}$  plus 0,5 freeboard

### 3.3.2 Thaya/Dyje

AT:

The Austrian section of the flood protection is divided in three sections:

- 1) Section Hardegg has no flood protection and no design level.
- 2) Section Laa was built before the First World War therefore the design level is unknown but Q100 should be no problem. The areas along some tributaries can be flooded.
- 3) Section Bernhardsthal to Hohenau: The top of the embankment corresponds with water level  $500\text{m}^3/\text{s} + 100\text{cm}$  freeboard.

CZ:

The next table provides the basic information about the capacity of the selected sections of the Dyje river. Especially the sections in the locality of Břeclav are mentioned in detail.

**Table 10:** Approximately dikes capacity along the Dyje river

River	Reach description	Approx. capacity
Dyje	Lanžhot - Břeclav	Q20 - Q100
	Břeclav	Q20 - Q100
	Stará Břeclav – Ladná	Q20 - Q100
	Ladná - Bulhary	Q20 - Q100
	Bulhary	Q100
	Nové Mlýny	Q20 - Q100

### 3.3.3 Leitha/Lajta

AT:

The design level is not known for the complete length of the flood protection. Where it is known it is HQ100 + 0,5 m freeboard.

HU:

The design flood water level (MÁSZ) for every river section is defined in the 11/2010. (IV. 28.) KVM Ministerial decree for discreet sections (dike KM). The water level between those points has to be interpolated. The safety height is defined in the decree. In Lajta the necessary freeboard is 1,0 m above the MÁSZ (around 1% probability flood level), only the upper part of the Balparti Csatorna (Left Side Channel) has 0,5 m obligation.

In the inventory and defence master plans also the highest ever recorded flood (LNV) is plotted on the longitudinal profiles, which is actually the 1991 year event in Hungary.

### 3.3.4 Danube

AT:

The height of dikes along the river Danube are based on a 100 year flood event with an additional freeboard (for safety). The exception are dikes which were connected with the construction of hydro power plants -these dikes provides protection for 1000 year floods.

But the primary focus of this study is the section of the river Danube near the border to Slovakia. So we take a closer look on the flood protection systems between the hydro power plant Freudenu and the border. These flood protection system were constructed to stand a discharge of 14,000m<sup>3</sup>/s.

## 3.4 Inspections and Maintenance

### 3.4.1 Austria

In Austria every flood protection project must undergo an approval process by the authorities according Water Act 1959. During this process requirements and orders for construction, application, operation and maintenance of the whole system are determined and fixed.

The functionality of all measures and the structure stability has to be laid out by technical calculation and has to be controlled by quality management during construction. During the construction works quality management plans and surveillance operations have to be executed and supervised by independent organizations and companies which are appointed by the legal authorities.

Before the flood protection system becomes operational the licensee/operating company has to provide an **operational handbook** which must be approved and authorized by the legal authorities.

The operational handbook should contain

- Operation plan and guideline
- Monitoring and surveillance plan
- Emergency plan
- Maintenance plan
- Operation diary

For all these plans and manuals the distinctive periods of inspection, control and maintenance are to be fixed by the licensee/operating and be approved by the authorities.

Regular Inspections and maintenance between floods will includes:

- Cutting of grass and other vegetations
- Regular inspections
- Regular exercises to open and close flood protection
- Repair works and maintenance

In case of flood the dike should be checked in regular intervals by a dam guard. Responsible for the organization is the dam operator or in case of a disaster the head of operations.

For the monitoring it is important that the dike will be divided in sections with a maximal length of 5,0 km. The dam guard consists of two people which works in 2 shifts for 12 hours and monitors and documents the condition of the damm. If parts of the flood protection are in bad condition these parts will be marked and especially observed.

After the flood there will be a detailed evaluation of the condition of the flood protection and the damages. This evaluation is the basis for the next maintenance and the repair work.

### 3.4.2 Czech Republic

According to Water Act 254/2001 Sb. and the decree 471/2001 Sb. levees are subject to inspection and technical surveillance procedures. The extent of inspection is governed by levee category (usually category IV). The owner has to keep following rules:

- to maintain levee in proper condition to protect humal lives and property,

- to specify personnel responsible for technical surveillance, announce its name, address, phone number, etc. to corresponding water authority,
- to invite corresponding water authority to the inspection of the levee, which should proceed at least once in 10 years,
- to report surveillance results to corresponding water authority at least once in 10 years or if exceptional events occurred.

Surveillance activities at levees, floodwalls, polder, etc. are focused on individual phases:

During the preparation of construction it is desirable to:

- classify the structure (levee, polder, dry reservoir) and determine its category,
- take part at design procedures,
- elaborate the proposal for future measurements and observations.

During construction it is important to:

- make supervision at all important construction phases (foundation, crossing with infrastructure, technology) by safety engineer,
- consult all changes when compared to the original design,
- make inspections during the construction,
- document the construction procedures (drawings, photodocumentation, ...).

During the performance after finishing the construction:

- visual inspections,
- during **no flood periods**:
  - visible deformations,
  - methods of maintenance,
  - interventions to the dike body,
  - activities in protective zone,
  - change of parameters of protected area, changes in channel capacity,
  - check of construction activities close to the dike (installation of infrastructure, excavations, demolition and blasting, river treatment),
  - check of appurtenant works like sluices, gates, accessibility for the transport vehicles, etc.
  - check of the vertical alignment using geodetic methods or GPS,
  - check of individual elements of mobile systems, displacements, etc.,
- **during the flood**:
  - the same procedures like during no flood period - with higher frequency,
  - seepage monitoring in relation with stream water level increase,
  - documentation of dike conditions,
- **between floods** - more intensive and detailed inspections, proposal for maintenance and repairs.

Generally the maintenance is focused on the upkeep of vegetation, cutting of grass cover, maintenance and repairs of related structures like sluices, spillways, pumping stations, etc. The

surface of dikes has to be permanently maintained, provided with dense cut (once or twice a year) grass cover. Additional seeding of exposed surfaces is necessary. The damaged uneven places should be repaired. The surface should not be fertilized. The deposited material has to be removed.

Vegetation invading embankments should be removed. Rotten roots must be excavated and removed.

Pasturing at dikes is not strictly forbidden. However it should be performed on the entire surface, cattle should not be fasten up where the dike could be locally damaged.

All related structures must be periodically revised and maintained. Concrete structures have to be inspected visually with respect to cracks or subsidence. Technological equipment has to be tested and periodically manipulated. Missing or damaged pieces must be immediately completed or repaired.

Drainage system must be inspected and maintained in functional conditions. Deposits and roots in drainage ditches or pipes must be removed to maintain capacity of the facility.

The burrows hollowed by rodents must be remediated by excavating and filling. Minor burrows can be treated by compacting of levee crest by vibrating roller. Efficient protection against rodents is about 500 mm thick coarse gravel fill (layer) on the upstream face of the dike or building of vertical barriers (e.g. slurry or sheet pile walls) in the dam body.

### 3.4.3 Hungary

The maintenance and the protection work in case of flood is provided by the local Water Directorate for those dike sections that secure two or more settlements. In the village or city inner areas the local municipality is responsible for these tasks.

The annual inspections of all dike-crossing structures, defence work starting-kit storage rooms and forest belts are done by the Water Directorate. The lead defence engineer has to walk through the system minimum twice a year with its crew to see changes and discuss the capacities. If there were no alert in the last 3 years, exercising is needed (also in the central duty).

The Directorate (VIZIG) possess with resources-plans for all defence lines that define the necessary capacities for certain even. The data is shared with the catastrophic agencies for safe evacuation purposes.

In “peaceful” 2 times the Water Directorates collecting information from the defence-line related actions and improvements, constructions. The recent events are investigated and the inventory and flood protection plans are under continuous update. The Directorates tendering and realizing projects also for the measures to improve safety level.

Practical maintenance issues (depends on budget):

- Mowing and treating vegetation cover (usually 2 times a year)
- Treating forest belts, extirpation of weed
- Painting, replacing used materials, testing structures with an own procedure
- Overview, actualization and development of inventories and technical documentation

### 3.4.4 Slovak Republic

According to Water Act 364/2004 Col. levees are subject to inspection and technical surveillance procedures. The extent of inspection is governed by levee category (usually category IV). The owner has to keep following rules:

to maintain levee in proper condition to protect human lives and property,  
to specify personnel responsible for technical surveillance, announce its name, address, phone number, etc. to corresponding water authority,

Generally the maintenance is focused on the upkeep of vegetation, cutting of grass cover, maintenance and repairs of related structures like sluices, spillways, pumping stations, etc. The surface of dikes has to be permanently maintained, provided with dense cut (once or twice a year) grass cover. Additional seeding of exposed surfaces is necessary. The damaged uneven places should be repaired. The surface should not be fertilized. The deposited material has to be removed.

Vegetation invading embankments should be removed. Rotten roots must be excavated and removed.

Pasturing at dikes is not strictly forbidden. However it should be performed on the entire surface, cattle should not be fasten up where the dike could be locally damaged.

All related structures must be periodically revised and maintained. Concrete structures have to be inspected visually with respect to cracks or subsidence. Technological equipment has to be tested and periodically manipulated. Missing or damaged pieces must be immediately completed or repaired.

Drainage system must be inspected and maintained in functional conditions. Deposits and roots in drainage ditches or pipes must be removed to maintain capacity of the facility.

### 3.5 Summary

All countries have national regulatory for constructions principles. The most important Standards are listed. Basic elements are looking very similar at all countries. More design details should be discussed, especially elements for overtopping. Design levels should be cleared up in definitions of construction height.

Maintenance regulatories are individual made. In every country periodically maintenance is taking place.

It should be discussed, if better information about actual situation of dam maintenance is necessary. Also the information about the construction of the individual dam and the constitution of the dam should be exchanged with the neighbouring countries.

A common training for the case of floods for neighbouring countries is recommended.

## 4 Summary, Conclusion

The Ceframe Project should be the basis for improving the transboundary flood management between Austria, Slovak Republic, Czech Republic and Hungary.

This paper sums up the legislative background the same as technical parameters (like design level) and the cooperation in time of floods.

It is the first time that all this important parameters are pictured in one project and it gives the chance to take a closer look where flood management between these countries works well and where are parts which should be improved.