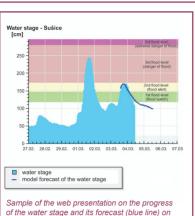




Informing the public and the flood risk sensitization

► The Internet's role in informing the flood authorities and the public was emphasized River Boards state enterprises and the Czech Hydrometeorological Institute (CHMI) use the Internet to give up-todate information on flood danger and flood development. The web presentation of the information by the CHMI's forecast and



the Otava River in the town of Sušice during the

flood warning service underwent an improvement (hydro.chmi.cz/hpps/)

March 2008 flood (CHMI)

- ► The information system IVS VODA (www.voda.gov.cz/portal/cz). that is employed by the central water right authorities to deliver up-todate information to the public (also in languages of the neighboring countries), was modernized and enhanced.
- ► The Flood Plan of the Czech Republic is available to the public on the Internet (www.dppcr.cz) and is linked with progressively processed regional digital flood plans.
- ▶ The German nation-wide early warning and meteorological information services, such as DWD.de, deNIS.de, Unwetterzentrale.de and wetter.ZDF.de. list on their web pages the links to the pages of the central flood offices www.hochwasserzentralen.de.
- ▶ The information on the flood protection in littoral and land-locked regions, on flood prevention, on the flood warning service, and on how to proceed during a flood is available at the Internet pages of the federal states and of the German Water and Navigational Administration (WSV)
- <u>Brandenburg:</u> www.mluv.brandenburg.de
- Lower Saxony: www.nlwkn.niedersachsen.de
- Saxony: www.hochwasserzentrum.sachsen.de: www.umwelt.sachsen.de/lfulg
- Saxony-Anhalt: www.mlu.sachsen-anhalt.de; www.lhw.sachsen-anhalt.de
- Schleswig-Holstein: www.schleswig-holstein.de/mlur/de/mlur_node.html; www.wassersh.de: www.hsi.schleswig-holstein.de
- Thuringia: (www.tlug-jena.de/hnz)
- WSV: www.bafg.de: www.wsa-magdeburg.de.
- ▶ In addition to these links, some federal states prepared web presentations to boost the public flood awareness. These presentations offer different maps that show the preliminary designation of flood-prone areas and maps with the already-designated flood land.

Conclusion

During the 2006 – 2008 period, the effort was aimed at the implementation of the flood protection strategies in the Elbe basin which had been prepared in the first evaluated period of the 2003 – 2005 Action Plan.

The progress that was achieved during this period can be characterized in these three important points

- transition from the analysis and preparation of the strategies to the operative procedures
- adaptation of the Flood Directive (Directive 2007/60/EC of the European Parliament and of the Council on the assessment and management of flood risks) and preparation of its implementation in the Flbe basin
- test of the efficiency of the measures during the spring 2006 flood.

During the spring 2006 flood, the Czech and German institutions involved illustrated how efficiently the flood risk management tools (early warning, operating the reservoir dams, specific flood protection measures) can be used to save lives and property, and avert danger. The change in the approach from flood protection to controlled handling of flood risks was thus tested in practice for the first time. Meeting the provisions of the Flood Directive will be the determining theme in the coming years. The ICPER's contracting parties are well prepared to tackle the task and the Action Plan for the Flood Protection in the Elbe River Basin gives us the instructions on how to proceed when adapting the common European framework. This also includes the fact that the climatic changes' impacts on the occurrence and progress of floods should be taken in account, more than ever, also on the supranational scale. The well-tested cooperation with the research sphere and with NGOs can and must give impulses important also in this area. Involving the public in issues concerning the flood risks management remains a permanent task for the ICPER. Managing the flood risks is not only a generational task, it is a task for all actors of the society and it can permanently succeed only if implemented in the international basin together

In August 2009, the ICPER released the Second Report on the Fulfillment of the Action Plan for the Flood Protection for the Elbe River Basin in the vears 2006 – 2008. The report describes in detail the so-far implemented

measures and is available, in Czech and German language versions, either at the secretariat or, in the digital form, at the ICPER web pages. The next report will be prepared for the December 31, 2011 balancing date.



Publisher: International Commission for the Protection of the Elbe River (ICPER)

Postfach 1647/1648 39006 Magdeburg Fürstenwallstraße 20 39104 Magdeburg

+49 (0)391 400 03-0 +49 (0)391 400 03-13 e-mail: sekretariat@ikse-mkol.org website: www.ikse-mkol.ora

Printed by

Editorial deadline: August 5, 2009 Harzdruckerei Wernigerode Max-Planck-Straße 12/14, 38855 Wernigerode

Action Plan for the Flood Protection in the Elbe River Basin – The implementation results in the years 2006 – 2008



Since 2003, the Action Plan for the Flood Protection by the International Commission for the Protection of the Elbe River (ICPER) has been the cornerstone for the Czech-German cooperation during the implementation of the flood protection and the

flood prevention measures within the Elbe River basin. The preparation of the plan was based on the work that commenced within the ICPER framework in the mid 90's of the last century and included the flood emergence analysis, mapping the existing level of flood protection, and the flood protection strategy. During the compilation of the plan, the knowledge and experience that had been gained from the catastrophic flood of August 2002 was utilized. The first overview of measures implemented under the Action Plan during 2003 – 2005 was published in August 2006.

The adequacy of the implemented measures was tested by the spring 2006 flood whose dimension is comparable with the flood of 2002. The water stages on the Elbe River in Lower Saxony. Schleswig-Holstein. and Mecklenburg-Western Pomerania actually exceeded those of 2002. Long-lasting floods occurred on the Elbe and its bigger tributaries (with the exception of the Black Elster River) and their culmination waves partially overlapped (for instance, the case of the Saale and the Elbe). The concurrence of the culminations of the major tributaries in the upper Elbe basin was prevented by controlling the flows at the reservoirs on the Vltava and Ohře rivers. The causes and the development of the flood are described in detail in another, separate ICPER publication.

The flood of spring 2006 not only tested the functionality of the alreadyimplemented measures but also confirmed the appropriateness of the selected approach and substantiated the necessity to continue in the consistent implementation of the Action Plan measures whose objectives are namely

- enhancing the capability of the landscape to hold water within the basin, in the river channels, and in the flood land areas, and
- protecting the areas at risk of flooding with technical measures.

The flood prevention measures proposal and implementation should help, as much as possible, also in achieving good ecological status/ potential of water bodies as required by the Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, that establishes a framework for Community action in the field of water policy), namely by suitable utilization and engagement of flood land areas (for instance, by moving protective levees farther away from the watercourses).

The possibilities to utilize the natural retention capabilities of the landscape are limited and the technical flood prevention measures can protect the areas in potential jeopardy only to a certain degree (for instance, regarding the composition of the landscape, the floods that occur in a long-term average once in 20, 50, or 100 years). Every year, inhabitants in many regions experience the display of power and the unpredictability

of the hydrological cycle, one of the most changeable thus least predictable natural processes. Therefore, the proposed measures include the following important components

- decreasing the potential of damage in areas at risk, namely by mapning the flood risks
- enhancing the flood forecasting and warning systems.
- informing the public and the flood risk sensitization.

In the event that the flood extent exceeds the flood protection level capabilities, the early warning can prevent the loss of human lives and reduce the material damage.

During the 2006 – 2008 period, a significant progress was achieved in the above-mentioned flood protection spheres within the Elbe River drainage area. The examples listed below give more details:

Enhancing the capability of the landscape to hold water within the basin, in the river channels, and in the flood land areas

▶ The elementary measures within the drainage area consist of the arable land protection from water erosion (by mulching, for example), maintaining (or increasing in size) the ratio of permanent grassland. creating stable mixed forest covers, and increasing the proportional share of woodlands.



▶ In the Flbe Riparian Landscape Biosphere Reservation, areas totaling 2 211 ha in size, those that are being considered for enlarging the flood land forest stand, were analyzed and mapped and 10 011 ha of forests were designated as regional flood protection areas



nature protection principles (SMUL)

- ▶ Within the framework of the riparian belt project in the upper and lower parts of the Spree River Forest, measures to stabilize the water regime will be implemented on 8 450 ha of key areas along the Spree River Forest's watercourses
- ▶ In the Uckermark Lakes Nature Park, measures to remove the drainage made by man and to decrease the surface runoff were implemented in key land area larger than 25 000 ha.
- ▶ The largest project among levee relocations farther away from the Elbe watercourse will be implemented in the Lödderitzer Forst locality and will provide 600 ha of retention area. The implementation should start in 2009
- ▶ 420 ha of functional flood land will be recovered in the Lenzen locality by moving the levee farther away from the watercourse. The new levee was finished in October 2008 (page 2, fig. 1)





manager

Flhe River

Board, s. e.

Vltava River

Board, s. e

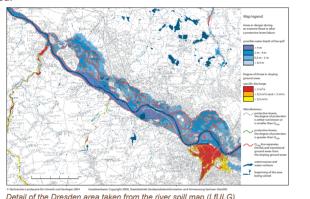
39 mill. m³ to 161 mill. m³.





Decreasing the potential of damage in areas at risk, namely by mapping the flood risks

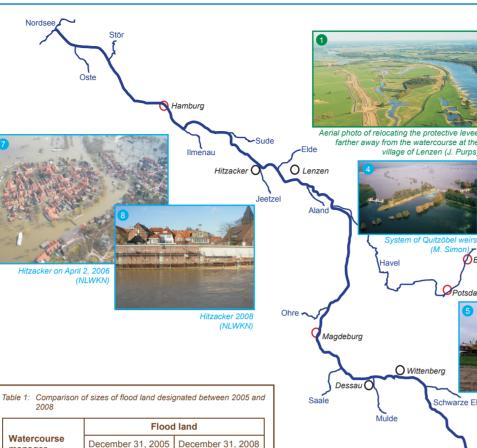
- ► The International Atlas of the Elbe that features the flood risks maps was prepared within the framework of ELLA "Elbe-Labe" project, INTERREG programme http://www.ella-interreg.org/.
- ▶ The flood-prone areas in developed zones along the watercourses, where high risk of flood-induced damage can be expected, were designated. *Table 1* shows the size of the flood-prone areas along the important watercourses in the Czech Republic that were designated as of December 31, 2008.
- ▶ After the 2002 flood, the industrial zone in the city of Lovosice was identified as one of the most significant sources of pollution caused by industrially-made chemical substances. The implementations of the 100-year-flood protection measures will be commenced in 2009 and will be finished in 2012.
- ► As of now, 259 820 ha of flood land was designated in Saxony, Saxony-Anhalt, Brandenburg, and Mecklenburg-Western Pomerania; 13 938 ha of the total number were designated in the 2006 2008 period



Protecting the areas at risk with technical measures

– Decreasing the flood flows by impounding water
in reservoirs and controlled polders –

- ► There are 311 dam reservoirs in the Elbe River basin whose capacities exceed 0.3 mill. m³. The total controlled flood-control storage of these reservoirs was increased by 30.3 (to 603.9) mill. m³ in the winter hydrological season and by 51.6 (to 517.5) mill. m³ in the summer hydrological season
- ▶ The summer hydrological season retention capacity of the Lipno reservoir (*fig.* ②) was increased by 21.1 mill. m³. The Czech Republic and Austria are also making preparations to bring up the maximum retention space water level (the maximum water level allowed in the reservoir) by 40 cm. This will provide for the increase of year-round retention space by additional 19.7 mill. m³.
- ► The retention capacity of the Josefův Důl reservoir (the Kamenice watercourse in the Jizera basin) was increased by 0.8 mill. m³ and of the Les Království reservoir (the Elbe) by 1.2 mill. m³.
- ▶ The reconstruction of the middle spillway at the Nechranice hydraulic structure on the Ohře River significantly improved the potential to use the retention space for transformation of flood waves; this fact was already verified during the 2006 flood.
- ► The new Lauenstein retention reservoir (fig. 3) in the Müglitz River valley with its nearly 5 mill. m³ of retention space was put into service in 2006. After the flood of August 2002, the controlled flood-control



[km]

2 3 1 5

4 107 7

[%]

65.0*

84 2*

* The percentage of the designated flood land is in relation with the total lengths of the managed watercourses in that particular year.

* Storage in the dam reservoirs in Saxony was gradually increased by

48.2

78.6

[km]

1 856.3

3 836 5

- ▶ Flooding the polders on the Havel River: On March 6, 2008, the "State Agreement on Flooding the Havel Polders and on Establishing a Common Arbitration Board" was signed in Potsdam by the states of Saxony-Anhalt, Mecklenburg-Western Pomerania, Lower Saxony, Brandenburg, and by the Water and Navigational Administration of the German Federative Republic (WSV) and, the very same year, the agreement was ratified by the parliaments of all the above-mentioned federal states. This agreement modifies the procedures for the occurrence of a dangerous flood on the Elbe River when it should be first verified that transforming the Elbe flood wave by flooding and holding the water in the Havel lowland polders that are designated to do the job is necessary and, if such step is needed, implement the procedures. The retention capacity at the maximum allowable water level totals nearly 300 mill. m³. During the flood of 2002, the flooding of the Havel polders (fig. 4) enabled lowering the Elbe culmination water levels at the Wittenberge station by 40 cm.
- ▶ The planned controlled polder in the Axien-Mauken section in the Wittenberg County will be able to hold the maximum volume of approximately 44 mill. m³ of water. The first estimates indicate that this polder can lower the maximum peak-water stage by roughly 20 30 cm and, depending on the nature of the flood, the effects of the culmination water stages can be noted all the way to the Dessau area.

Table 2: The "Elbe Levees" upstream the Geesthacht weir

Length of protective levees [km]	1 303.5	
Levees that need reconstruction [km] state as of January 1, 1991 adjusted as of January 1, 2009	893.3	
	[km]	[mill. EUR]
Reconstruction of the levees finished before December 31, 2008:	548.8	513.1
of these in the 2006 – 2008 period	147.0	149.2
Planned reconstructions of the levees		
2009 – 2010 period	101.1	130.7
2011 – 2015 period	243.4	276.8
2009 – 2015 period	344.5	407.5

Saale Schwarze Elster
Mulde

ein retention reservoir on the Müglitz River (LTV Sachsen)

Ohře

Orlice

Praha
Pardubice

Orlice

Protecting the areas at risk of flooding with technical measures

- Construction of protective levees -

Automated snov

- ▶ In addition to other projects, 31.55 km of protective levees were built in the Czech part of the Elbe River basin under the "Flood Prevention Programme" between 2002 and 2007. The Government Decree of November 2006 approved the second phase of the Programme for the years 2007 2012 with investment means in the total amount of CZK 10.3 billion to implement the retention-type flood protection measures, the flood protection measures along the watercourses, the enhancement of the hydraulic structures' safety, and the designation the flood land areas.
- ► The results of the assessment of the proposed flood protection measures' impacts on the Q₁₀₀ flood wave progress in the Porta Bohe-

- mica-state border section show that the flood protection measures considered for this Czech section will neither increase the water levels nor will they increase the flows to the state border profile and thus present no negative impact on the downstream German stretch of the Elbe.
- ▶ The "Elbe Levees" upstream the Geesthacht weir (*fig.* ⑤) restoration programme for the period ending in 2015 is an ongoing process in Germany. The cost of the restoration work, that was carried out on the levees in the total length of 147.0 km between the years 2006 and 2008, amounted to EUR 149.2 mill. (*table 2*). To this day, under the approved technical rules, 60.4% of the damaged levees were repaired at the investment cost of approximately EUR 500 mill.
- ▶ The historic downtowns of Prague and Dresden (*fig.* ⓐ) with their irreplaceable treasures of art are now reliably protected in the event of a Q_{top} flood occurrence.
- ▶ The city of Hitzacker in Lower Saxony was founded 750 years ago, lies in the Elbe flood-prone land, and during floods was exposed to frequent flooding. In August 2002, if it hadn't been for the portable flood protection systems that were installed, the water would have entered the entire Old Town and flooded it completely. This event led to the decision to implement a complex flood protection for the city of Hitzacker. The construction work that commenced in spring of 2005 and ended in October 2008 cost approximately EUR 63 mill. During the flood protection work, in April 2006, Hitzacker and its Old Town suffered yet another flooding that brought about higher water levels than those in 2002 (fig. 7 and 3).

Enhancing the flood forecasting and warning systems

- ▶ Since 2003, the European Commission in close cooperation with the national water right authorities has been developing the European Flood Alert System (EFAS). The EFAS consists of 25 partners that together manage about 80% of all major, international river basins in Europe. Since 2005, the EFAS has been preparing flood forecasts on every-day basis that have been available to the partners in the online regime on the Internet since 2007.
- ▶ The integrating element of the common flood forecasting and warning system in the Czech and German parts of the Elbe River basin is the communication network between the warning and forecasting central offices that make the data and forecasts available. The data and forecast information exchange between the two countries is free of charge.
- ▶ During a flood, the information system can be enhanced with extending the forecast period, increasing the accuracy of the forecasts and their area density, and with better communication between the flood warning and flood forecast centers.
- ► The modernization of the technical equipment of the monitoring networks (*fig.* ③) is a continuing process.
- ▶ To increase the quality of the Elbe and the Saale water stage forecasts, the German Federal Hydrological Institute (BfG), after an agreement with all the federal states along the Elbe, prepared the WAVOS Elbe Model that serves to forecast the water stages. Starting January 2008, the WAVOS Elbe Model has been used by the Water and Navigational Office (WSA) in Magdeburg to process the forecasts for the Ústí nad Labem Geesthacht section.