

The Elbe river and its basin

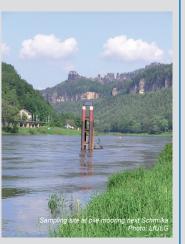
- International Commission for the Protection of the Elbe River
- Flood protection
- Action programmes and Water Framework Directive
- Warning and alarm system
- MONITORING NETWORK, MONITORING PROGRAMME AND WATER QUALITY
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## MONITORING NETWORK, MONITORING PROGRAMME AND WATER QUALITY

At the end of the 1980ies, the Elbe river was one of the most polluted rivers in Europe. By now we can see a markedly positive development of the water quality of the Elbe river and its tributaries. The oxygen concentration in the Elbe has increased, whereas the average concentrations of heavy metals in water as well as the concentrations of organic substances and nutrients have gone down considerably. The number of fish species has increased

considerably, the salmon has returned to the Elbe tributaries and the continuity of the Elbe for migratory fish has also improved significantly.

Since its foundation in 1990, the International Commission for the Protection of the Elbe River (ICPER) has been committed to promoting the water use in the Elbe river basin, mainly the retrieval of drinking water via river bank infiltration and the agricultural use of water and sediments.





#### MONITORING NETWORK AND MONITORING PROGRAMME

The water quality analysis in the Elbe river basin on the basis of an internationally coordinated monitoring programme had already been initiated at the beginning of the 1990ies. This was the cornerstone for the complex and coordinated monitoring of the changes in water quality

of the Elbe and its tributaries. In order to implement a joint monitoring programme, a water quality monitoring network was established and an information network was set up in the Elbe river basin.

The water quality within the framework of the "International Elbe Monitoring Programme" is monitored at 9 monitoring sites in Germany and 6 monitoring sites in the Czech Republic (9 directly at the Elbe and 6 at its tributaries) (see map). These monitoring sites are also places of surveillance monitoring according to the Water Framework Directive and provide a complete overview of the current situation of the Elbe river basin district. At the monitoring sites equipped with monitoring stations, some parameters such as water temperature, pH, electric conductivity, dissolved oxygen and water flow are continuously monitored. In order to determine the other parameters, samples are taken automatically and analysed in laboratories.

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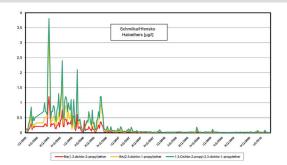
The first international monitoring programme with 63 parameters was set up for the year 1992. The individual parameters are analysed in the components

in which they can be found in relevant concentrations. Apart from the analysis of the water phase, routine tests of suspended solids were introduced in 1996. The "International Elbe Monitoring Programme" currently comprises the

analysis of approximately 160 parameters in the water phase and 70 parameters in suspended solids. Approximately 10 parameters are analysed in the biological part of the monitoring programme.

Comparability is an important requisite for the joint interpretation of the monitored values. This is guaranteed by quality assurance measures on an international level within the ICPER framework such as selecting and adopting identical or comparable measuring methods, performing test or comparison measurements and sampling involving the laboratories as well as the joint assessment of the monitoring results.

The regular analysis of the Elbe water quality based on a coordinated international monitoring programme makes it possible, among other things, to detect conspicuous substance discharges. For example, an increased haloether concentration in the Elbe was detected at the Schmilka/Hřensko monitoring site in 2005. Thanks to the commitment of the ICPER and the constructive cooperation of the regional authorities and the polluter, the load was reduced significantly. The figure shows the development of the haloether concentration in the Elbe between 2005 and 2010.





### DEVELOPMENT OF ELBE WATER QUALITY

Hao The improvement of Elbe water quality in the years 1990 – 1992 was mainly the result of closing factories and reducing production output in the area of the new German federal states. In the following years the water quality continued to improve as a result of rehabilitation measures, mainly by building municipal and industrial wastewater

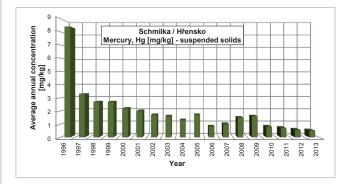
treatment plants and by implementing technological changes in industrial enterprises.

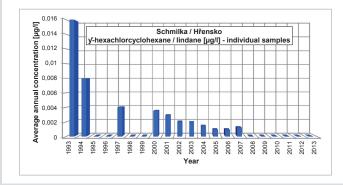
The oxygen concentration required for life in the water has steadily increased. Oxygen concentrations near 3 mg/l, which is critical for fish, have only been measured in the Elbe section affected by tides downstream of Hamburg in the summer months.

The average concentrations of heavy metals in the water phase have gone down considerably since 1990, for some heavy metals they have decreased many times over. These parameters include mercury, among other substances.

The concentrations of organic substances in the water phase have also been reduced significantly.

The positive changes of the Elbe water quality are shown in the two figures below that represent the development of the average annual concentration for the parameters mercury and y-hexachlorocyclohexane/lindane on the basis of the samples taken at the Schmilka/Hřensko monitoring site.

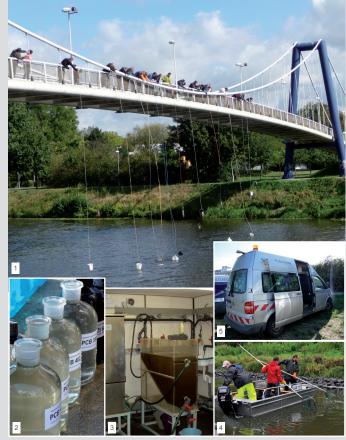




# ASSESSMENT OF THE CHEMICAL STATUS OF THE ELBE

The Water Framework Directive assesses the chemical status of the surface waters in view of the presence of priority substances for which the daughter directive on environmental quality standards stipulates maximum values for the annual average substance

concentration and for some of them also the maximum allowable concentration. These priority substances have been a part of the "International Elbe Monitoring Programme" since 2009. Within the framework of assessing the chemical status of the waters according to the Water Framework Directive, bad values for one single parameter are sufficient to provide a bad overall assessment.



1, 2, 5: L. Běhounek; 3: Povodí Labe, státní podnik; 4: LfULG

#### OUTLOOK

Even though large progress has been made, the nutrient load in the water phase (nitrogen and phosphorus compounds) mainly originating from diffuse sources (particularly from agriculture) is still high. A part of the pollutants is also bound to suspended solids and to sediments. These are mainly heavy metals (mercury, cadmium, lead, zinc), specific organic substances (chlorinated benzenes, chlorinated pesticides, polychlorinated biphenyls, polycyclic aromatic carbohydrates) as well as tributyltin. These pollutants can be remobilised from sediments when the water level rises.

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