

Abstracts of the projects 2010

Branch of Hydraulics, Hydrology and Hydrogeology

Anthropogenic pressures on soils, water resources and water ecosystems in the Czech part of the transboundary Elbe Catchment

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Duration: 2007–2011

The project represents the fifth phase of the Czech national project Elbe, which is coordinated by the TGM WRI, together with the Czech Geological Survey, the Faculty of Civil Engineering of the Czech Technical University in Prague and the Research Institute of Fish Farming and Hydrobiology in Vodňany. It is focused mainly on basic research on transport of nutrients in the basin, uncertainties in flow simulation, the use of stable isotopes for examination of the hydrological regime in the basin including water quality, radionuclide monitoring in rivers, impacts of pollutant on fish species, fish behaviour in rivers and fish species natural reproduction.

In 2010 a statistically significant difference in the concentrations of N-NH₄, N-NO₃ and total phosphorus between periods 1996–1999 and 2006–2009 in the monitored sites on the Elbe has been found (i.e. an important decrease). Nevertheless, no significant change occurred in the biomass of phytoplankton, which is to a large degree dependent on the flow conditions.

In cooperation with BfG Koblenz hydraulic and water quality computations of the year 2003 have been carried out for the whole Elbe starting from Srnojedy in the Czech Republic.

The effect of nitrogen and phosphorus on selected experimental catchments is monitored, especially leaching and erosion during high flows. On the Oleska River the campaign of sampling has been done during several flood situations in a number of sites, including microbiology. Often the effect of pollution from small settlements is larger than the effect of agriculture.

Using the SWIM model nitrogen pollution has been modelled in the Jizera catchment according to various scenarios of fertiliser application (amount and the date of application).

A dataset describing the effect of eutrofication on the communities of juvenile fish has been collected. In cooperation with Envisystem two fish ladder designs have been worked out on the Vltava River (at the weir Troja and Modrany).

A draft of the table of recommended values of concentration of the natural background of selected metals for individual lithological groups has been proposed to the Ministry of the Environment.

Modelling of pollution plumes in pollution incidents is being done on the whole Elbe River and for comparison also Rhine and Colorado River based on tracer experiments and the monitoring stations of the Elbe River Basin, s.e. (cooperation with Lancaster Environment Centre).

A conception proposal for emergency scenarios caused by draughts and water shortage within the Czech Republic

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Duration: 2010–2014

The objective of this project is to develop methodology and procedures to manage emergency scenarios caused by draughts and water shortage similar to those already introduced and adopted by the law for flood scenarios. The project aims at determination of draught levels (similar to flood levels) based on threshold values of draught indicators and overall consensus resulting from a constructive discussion of representatives of water law bodies, statutory bodies and organisations present at the meeting. The debate included issues of disposable water sources and water demand during draught periods. The concept aims not only at definition of draught levels, but also at a clear definition of authorities given to state bodies that are in the position of decision makers for water and water sources management during draught periods including prioritizing individual water usages.

In 2010 the project focused on research of indices of meteorological, hydrological and agronomic draught to determine and select those indices suitable for use within the warning system. The research was partly dedicated to models applicable for climate scenarios simulations, for various structural and non-structural measures and/or elements needed for determination of more complex indices. Another part of the research was aimed at intra- and extrapolation of point measurement in area.

Refining of current estimates of impacts of climate change in water management, agriculture and forestry sectors and proposals of adaptation measures

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Duration: 2007–2011

The project is aimed at precision and actualisation of climate development scenarios for the area of the Czech republic within the periods of 2011–2040, 2041–2070 and 2071–2100, precision of expected climate change impacts to the water management, agriculture and forestry sectors. Another goal of the project is to propose suitable adaptation measures and to support the National Programme for Reduction of Climate Change Impact in the Czech Republic.

In 2010, the project was focused on analysis of newly available regional climate model ALADIN-CLIMATE/CZ simulations and their comparison with the ENSEMBLES project simulations (this project is financed by the EU). To do this, an extensive modelling of climate change influence on hydrological balance was done for 250 river basins according to approx 20 climate change scenarios for three time-periods. Attention was given namely to change scale assessment according to the ALADIN-CLIMATE/CZ model in relation to other scenarios. Although there are significant uncertainties and differences in absolute values of outflow according to various climate change scenarios, phenomena common to all simulations, at least to some extent, can be identified. Firstly, all of the models show a decrease in summer and namely spring flow rates most importantly in south Moravia. On the other hand, most of the models show an increased outflow in northern and north-eastern parts of the republic in winter season. According to more than 50% of the models the southern part of the country will witness a decrease of more than 20% in outflow rates as to 2055 and 2085. An outflow increase of more than 20% is improbable for all seasons and time-periods, with the exception of few river basins of higher altitudes in winter.

The project also focused on discussion of adaptation measures for water management. An assessment of adaptation for climate change in draught periods through usage of areas suitable

for ground water accumulation was presented as a pilot study. The projected deficit increase is substantial and for the Elbe River basin even the use of all potential water reservoir capacity would not be sufficient to cover for such an increase. It is therefore evident that apart from increasing the number of water sources it is necessary to take into account for the future (in case the climate change scenarios come true) the necessity to decrease water sources demand and to rationalize the use of water sources in draught periods.

Temporal and spatial variability of hydrological draught in climate change conditions on the territory of the Czech Republic

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Duration: 2008–2010

The project was focused on temporal and spatial extent of hydrological draught, namely by using lines of overall outflow. Climate factors were also taken into account for the assessment. The threshold level method was used to analyse time-lines of outflow in 118 water reading stations for the period of 1931–2007. Deficient volumes and their duration constitute the output of this project.

In 2010, the project focused on classification and unification of partial project segments. According to the Q70 limit the most significant draught episodes were identified in the following years (according to their severity): 1953, 1947, 2003, 1992, 1983, 1962, 1950, 1990, 1951 and adjoining years. Maximal standardized volumes were at level 7 or 8 with the maximal duration up to 20 months. According to the Q95 limit the most significant draught episodes were identified in the following years: 1947, 1953, 2003, 1992 and also 1950, 1983, 1990, 1962, 2004, 1951 and adjoining years. Maximal standardized volumes were at levels 2,8 to 3,0 with the maximal duration up to 7 months.

Significant draught episodes occur in cycles of approximately 10 years. Hydrogram analysis in the Děčín station (the River Elbe) – data available since 1851 – shows, that draughts reaching standardized levels of deficit volumes of 3,0 to 3,2 (according to the Q95 limit) are not exceptional in the long term and that similar episodes can be expected within every few decades. The following draught levels were designed (expressed through standardized deficit volume intervals according to the Q95 limit): moderate (0,2–0,8), serious (0,8–1,5), very serious (1,5–2,5) and extreme (> 2,5).

Positive effect of water reservoirs was detected. The reservoirs help to moderate the seriousness of draughts episodes in the vast majority of cases. Comparison of standardized deficit volumes and their duration in daily and monthly time-lines confirmed their good correspondence. Monthly time-lines mostly underline the draught in comparison with the daily time-lines. From the point of view of the warning system preparation, it is important to distinguish the outflow lines according to time.

Climate development simulation according to emission scenarios A1B, A2 and B2 showed, that we may expect an increase in seriousness and frequency of draughts in the near future with the outflows often under ecological limits, even though both increasing and decreasing tendencies in draughts occurrence were found in current time-lines. Basins with bedrock formed by claystone show statistically significant increased tendency to draught occurrence.

The correlation between the outflow according to Q70 and water quality indicators proved a positive correlation for N-NO₃, dissolved substances and Mg₂ a O₂, while a negative correlation was proved for temperature, Cl⁻, inorganic salts, chemical oxygen consumption, biological oxygen consumption, N-NH₄ and P-PO₄. Non-point sources influence proved to be significant.

Interactions between water, rock medium and landscape and their use in groundwater protection in the Czech Republic

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The part of the project addressed by the TGM WRI, p.r.i., is concentrated on methodology proposal for threshold levels for groundwater interacting with surface water, on methodology proposal for groundwater regime determination for individual hydro-geological regions/groundwater bodies in the Czech Republic and on creation of an Internet application including documents for river basin district plans creation. The first methodology is intended to serve as part of the basis for assessment of chemical state of groundwater formations for second river basin district plans, the second methodology will form an additional material for hydrological balance processing.

In 2010, the methodology for threshold levels determination for groundwater interacting with surface water was finished. As opposed to the version from the previous year, the methodology was slightly restructured, comments were added on connections between individual steps in the process and a brief summary on approaches adopted by some other member states of the EU was added. The methodology includes identification of flows with a significant proportion of groundwater supplementation (based on the Base Flow Index analysis), identification of groundwater bodies with significant relation to surface waters on the basis of the same data and the procedure proposal for determining threshold levels of groundwater for the surface water receptor. The threshold levels determination is differentiated according to pollutant substances and according to input data. These have varying levels due to changing legislative and development in pollution knowledge.

The unfinished methodology for determining groundwater regimes for individual hydro-geological regions/groundwater bodies in the Czech Republic was changed significantly in terms of arrangement. At the same time the missing information resources were analysed in deeper detail this year, resulting in a delay in completion of the aforesaid methodology. A layout change for individual chapters proved necessary mainly with regard to determining representativeness of examined subjects and due to some problematic points in primary data processing (the analysis proved for example an unusually big variation of groundwater levels in deeper collectors of Eastern-Bohemian chalk). To verify the representativeness of monitoring network subject it will be necessary to supplement data on flow direction in hydroisohypses or hydroisopiezas in deep structures and to determine the zone, in which the subject is located with regard to groundwater circulation.

Regarding the draft of the Internet application with data and results related to groundwater, in 2010 the project outputs suitable for publication for a restricted group of users or for the general public were selected. For this database to be made public it is, however, necessary to ensure the consent of all institutions taking part in creation of the outputs and the consent of the client, taking into account, at the same time, the technical and financial capacity.

Anthropogenic impacts in the Bílina River basin (the Czech Republic)

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Duration: 2008–2010

The project is focused on assessment of the Bílina river ecosystem as a whole. It includes three main areas: the ecological assessment of surface waters in the Bílina River basin, the eco-hydro-morphological assessment of habitat quality for the Bílina River flow and the hydro-geological assessment of the area of interest. The aim of the project is mainly to identify the main risk areas for the ecosystem in the area of interest, to define their impact on the ecosystem, to monitor the habitat quality and to select reference methodology, to make mathematical models of groundwater flow in the area of interest and to assess and propose adjustment of the currently used tools for the Bílina ecosystem protection.

The ecological assessment of surface water in the Bílina River basin includes the following fields of interest: water quality in the Bílina River and its effluents, substance wash in selected profiles of the Bílina River, water quality development in the period of 1967–2008, pollution production from point sources, impact of petrochemical emergencies on water quality in the Bílina River, the load of the Bílina River ecosystem by extraneous substances in two trophic levels (*Dreissena polymorpha*, fish), the load of the Bílina River sediments by extraneous substances and legal issues for protection of flowing surface waters.

Eco-hydro-morphological assessment of habitat quality for the Bílina River flow includes the descriptions of anthropogenic influence on the Bílina River according to three methodologies (EcoRivHab, HEM, LAWA – OS), their comparison and possibilities for their application for river habitat quality assessment in a substantially anthropogenously transformed landscape.

Hydrogeological assessment of the area of interest provides information on groundwater flow in the past period of maximal exploitation of mines and quarries and the flow under current conditions. A prognosis of flow ratios for groundwater flow after hydric reclamation of all quarries (including termination of groundwater pumping from underground mines) was processed. "Methodology for complex assessment of collectors in industrialized areas" was drafted on the basis of the data gathered.

Watch project

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Duration: 2007–2011

The Integrated Project (WATCH – Water and Global Change) which brings together the hydrological, water resources and climate communities to analyse, quantify and predict the components of the current and future global water cycles and related water resources states, evaluate their uncertainties and clarify the overall vulnerability of global water resources related to the main societal and economic sectors.

The Czech participation in the project which will bring together the hydrological, water resources and climate communities consists in running climate scenarios on the Czech test basins both having in view possible more severe droughts and floods.

Continuous simulation for the estimation of flood frequency within the framework of the GLUE methodology (COST)

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Duration: 2010–2012

The project supports action COST European procedures for flood frequency estimation (FloodFreq), coordinated by Dr Kjeldsen from CEH Wallingford.

A collection of simulated continuous series of flow for the current climate of the length of 100 thousand years for the site Skalka on the Ohre (Eger) River has been modelled. It contains hydrographs caused by various meteorological phenomena: long rainfall, very short intensive rainfall on a part of the catchment, snowmelt, snowmelt with rain and those on the catchment of various antecedent wetness.

Technical assistance for the Ministry of the Environment of the Czech Republic in solving the issues of water shortage and draught as a possible consequence of climate change

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Duration: 2010

The project is focused on providing technical support for the water protection department of the Ministry of the Environment, including continuous assessment of the EU documents on water shortage and draught issues, issuing of expert opinions on these documents and participation on meetings of working groups established for solution of water shortage and draught issues and climate change within the framework of the common implementation strategy of the Framework Directive on Water Policy.

In 2010 the project included, apart from the above mentioned, the preparation of texts for the proposal of the Strategy for Climate Change Adaptation within the Conditions in the Czech Republic. Furthermore, the project included preparation of a project focused on draught and water shortage management in the CR. The project proposal followed the schedule of works related to the preparation of scenarios for water shortage and draught management. The schedule is formed on the outputs of activities carried out in 2009. The project proposal was selected for the assistance within a public tender in research and experimental development invited for by the Ministry of the Interior and it was initiated in 2010.

Transposition of Council Directive 2006/118/EC on the protection of groundwater against pollution and deterioration in the Czech Republic

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Duration: 2007–2011

Directive 2006/118/EC on the protection of groundwater against pollution and deterioration was adopted at the end of 2006. In harmony with paragraph 17 of the Water Framework Directive, it defines the criteria of a good chemical status of groundwater bodies evaluation, the criteria for detection of significant and long term increasing trends and for identification of the beginning of change in trends. Directive 2006/118/EC also complements statements about the prevention or limitation of polluting substances entering a groundwater body given in directive 2000/60/EC. The objective of the directive is to prevent deterioration of the ecological status of all groundwater bodies. All member states are obligated to adopt regulations which are necessary for achieving harmony with the directive by 16th January 2009 and to determine threshold limits according to the Directive by 22nd December 2008.

In 2010 the project was focused on the issue of protected groundwater areas for human consumption – the first proposal of the approach in the CR. Furthermore, the project addressed

comprehensive texts drafts for the use of WFD on groundwater issues and the proposal for changes in assessment of groundwater conditions, significant influences and exception detection for second district plans of basin areas. The tasks included processing of documents for methodical instruction for permissions to drain ground waste waters, summary of activities of work group C Groundwater for common implementation of the Water Framework Directive and preparation of government regulation on the manners to demarcate hydro-geological regions, to demarcate groundwater bodies, to assess the condition of groundwater and all requirements of detection and condition assessment of groundwater.

Technical assistance in the activities of the Ministry of the Environment of CR in the implementation of Convention on the Protection and Use of Transboundary Watercourses and International Lakes and Protocol on Water and Health to this Convention in relation to the preparedness of the contracting parties on climate changes

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Duration: 2010

The project is dedicated to providing technical assistance to the Czech central point for climate change which is acting within the framework of Convention on the Protection and Use of Transboundary Watercourses and International Lakes and Protocol on Water and Health to this Convention. The Project includes technical assistance for documentation and recommendations of the Convention and the Protocol for climate change adaptation, participation within workshop dedicated to this issue and presentation of the Czech approach, technical preparation for the aforesaid meeting and fulfilling tasks arising from it, processing of opinions on documents sent by the secretary of the Convention, preparation of required documents on national level and support for implementation within the Czech Republic.

Main output for the year 2010 consists of a presentation for the workshop, called "Water and Climate Change: How to develop an adaptation strategy in Transboundary Basins". The workshop took place in Geneva, 10–11 May 2010. The most important objectives of the meeting were the sharing of experience on technical and strategic aspects of climate change adaptation, analysis of adaptation issues specific for water management on transboundary level, transboundary cooperation within individual partial steps of adaptation strategy preparation – from impact and vulnerability assessment to proposed measures, assistance to individual states during preparation of national adaptation strategy and presentation of implementation of methodology "Guidance on Water and Adaptation to Climate Change".

Revision of vulnerable zones for the Nitrate Directive including support for reporting

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Duration: permanent activity

To fulfil the requirements of the Nitrate Directive, vulnerable zones were delineated, where water drained from the surface is polluted or is at risk of nitrate from agricultural sources. Within these zones, measures for decreasing concentrations of nitrates in the water have to be adopted. The objective of the project is to update the borders of these vulnerable zones periodically to meet the requirements of the Nitrate Directive in regular four-year cycles. The first review of these borders was elaborated in 2007.

The second review will take place in 2011. This project is a permanent activity, the TGM WRI is the expert body authorised by the Ministry of the Environment.

All activities in 2010 aimed at preparation of the second review of vulnerable areas in 2011. The project consisted of three main parts. Firstly it was the technical assistance on both national and international levels and active participation on the Nitrate Committee meeting in Brussels. The technical assistance on international level included mainly preparation of documents and filling in the questionnaire of the European Commission aiming at optimisation of reporting for the Nitrate Directive, the Framework Directive and the SOE Directive. Furthermore, meetings with the European Commission took part in Prague. These were focused on the Nitrate Directive implementation and namely on fulfilling the action program. The second and the third part of the project consisted of processing of data on nitrate concentrations based on monitoring of groundwater and surface water quality. Concentrations of nitrates were assessed on the basis of groundwater quality measurement done by the Czech Hydro-meteorological Institute within the new monitoring network for the period of 2009 and on the nitrate concentration levels gathered within the surface water monitoring network for the Nitrate Directive (originally the AWMA network). In 2011, the second review of vulnerable areas will take place, followed by the mandatory reporting for the European Commission.

Development of methodology for artificial infiltration assessment in the CR

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Duration: 2010

The project, carried out by the T. G. Masaryk Water Research Institute, p.r.i. (in cooperation with the following institutions: the Czech Geological Survey, AQUATEST a.s., Geotest a.s., Envigeo s.r.o., and Progeo s.r.o.), forms a part of a strategy aiming at an increase of adaptation ability of our society for the ongoing climate change. The objective of the project is to create methodology for development of an activity that has a long tradition in Bohemia, however it has been practically forgotten in the past decades.

During the eight months of its duration, the project addressed the following issues:

1. providing translations of information materials on the issue, namely for the use of institutions concerned with water legislative and organisations focused on retention, treatment and distribution of water,
2. assessment of current homeland and worldwide experience with groundwater absorption – the main sources of information were taken from the states of south Europe and regions with semiarid climate type,
3. development of methodology for assessment of the whole area of the Czech Republic from the point of view of possible application of absorption, determination of areas suitable for artificial infiltration,
4. proposal for work schemes for selected pilot areas,
5. assessment, unification and recommendation of methods for mathematical modelling of the issue,
6. ensuring information for the relevant institutions concerned with water legislative and water management institutions, municipalities, regions, associations of municipalities and organisations concerned with searching, retention, distribution and treatment of groundwater.

Research on adaptation measures to eliminate the impacts of climate change in regions of the Czech Republic

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The project aims at designing and verification through pilot applications of procedures for draft effective adaptation measures for elimination of climate change impact on water sources in the CR. The focus of the project lies within simulation modelling of technical adaptation measures for reservoirs and water management systems. Methodology resulting from the simulations will be usable within the next cycle of river basin district plans preparations according to the Framework Directive on Water Policy.

In 2010 the project focused on application of the designed methodology for assessment of impacts of climate change and for adaptation measures proposals for the watercourses within the pilot basins. The River Orlice basin was selected for the purposes of this project. This basin witnesses water shortage problems already – drinking water supplies for the population are problematic, namely due to the conflict of interests of protection of the environment and water management. Within the project, both hydrological and meteorological indicator data time-lines were assessed in great detail to determine current trends. The assessment of expected climate change impacts on the basin with the use of up-to-date climate change scenarios was performed, too. An analysis of water usage within the basin was carried out, as well as a risk analysis linked to the expected climate change impacts on the basin. On the basis of the risk analysis, measures were designed for groundwater and surface water sources. Finally, the project also compared adaptation strategy alternatives for the basin through risk management methodology.

Possibilities of mitigation of current consequences of the climate change by improved accumulation capacity of the Rakovnický Brook catchment (a pilot project)

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Duration: 2009–2011

This project assesses the significance of climate change impact on water sources with the focus on pilot application within the Rakovnický Brook catchment. This region represents an area already very sensitive to climate change due to unfavourable combination of local conditions. Manifested water shortage is a cause of problems for water management organisations. The purpose of this project is to design and assess the effectiveness of adaptation measures to mitigate the consequences of climate change. By adjustment of hydrological regime the water accumulation in the catchment will be increased and so will the disposable amount of water in the region.

In 2010 the hydrological balance was assessed for the current climate conditions and for the conditions of ongoing climate change. On the basis of this assessment, a basic water management solution was carried out for accumulation function of seven potential small reservoirs, selected for further research on the basis of previous examinations. For the current conditions, the selection was narrowed to four reservoirs capable of securing a significant flow increase in the Rakovnický Brook for the periods of minimal flows. For further warming, the increase in flows would diminish, for warming of approximately 2 °C the increase would still be significant, for a warming of 4 °C all areas would have to be used. Another possibility for increase in the water management balance in the Rakovnický Brook catchment is to use water from another basin.

For the majority of selected areas basic morphological characteristics of reservoirs and dams were designed.

Groundwater bodies were inspected and their natural reserves proved to be smaller than showed by previous estimates. This can be caused to a small extent by the impacts of terminated mining.

By examination of historical catchments it was discovered, that during the last five hundred years there were two floods with a flow significantly higher than a hundred year flow on the Rakovník Brook.

Examination of agro-technical measures to diminish maximal flows leads to a conclusion that the measures themselves, taking into consideration their real potential extent, show a relatively small impact and it is recommended to combine them with the retention potential of the designed reservoirs.

Mathematical models of influence of the Vltava River Cascade on floods on the River Elbe

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Duration: 2010–2011

This project assesses the influence of the Vltava River Cascade on floods on the River Elbe both for the Czech and German part of the river. The objective of the project is to evaluate transformation effects of the Vltava River Cascade during several types of floods and to assess the influence of the cascade on culmination flows on selected profiles within the Czech Republic and the Federal Republic of Germany. The project is based on an agreement between the T. G. Masaryk Water Research Institute, p.r.i., and the Federal Hydrological Institute in Koblenz.

For the year 2010, the project focused on data gathering, selection of suitable modelling tools and selection of flood types for calculation. The multifunctional modelling tool Aqualog was selected for simulation of manipulation within the Vltava River Cascade during a flood. The tool is currently used for prognostic modelling of precipitation and flow phenomena in the River Elbe basin. For calculation outside the Vltava River Cascade the hydrodynamic model HEC-RAS commonly used for Czech conditions was used. The following four control profiles were selected within the project for presentation of results: Prague (Chuchle), Ústí nad Labem, Dresden and Barby. The Ústí nad Labem profile is where the HEC-RAS model stops as well as calculations carried out by the TGM WRI in close cooperation with the Aqualog company. From this profile on, the calculations are carried out by the German partners through the SOBEK simulation model. The calculation includes the Nechanice reservoir, which plays an important role in the flood transformation on the Ohře River. The calculation was carried out for a regime influenced and not influenced by the cascade and for two flood types for the whole of the assessed area. The summer flood of 2002 was selected as the first flood type and the winter flood of 2006 was selected as the second. Each control profile is assessed for five calculation scenarios: Q_{10} , Q_{50} , Q_{100} , Q_{200} , Q_{500} .

The Děčín weir – Alternative 1a: the hydraulic research of the bio-corridor – a feasibility study and solution methodology

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Duration: November 2009 to February 2010

The existing bio-corridor model in geometrical reduction scale of 1 : 70 was not sufficient for exact research of the hydraulic regime for the whole length of the bio-corridor and of the flow in the main and side flow beds of the fish pass, for verification of credibility of the flows estimated for the project, the division of the flow into side streams, the flow speed in individual sections etc. The objective of this study

was to verify optimization possibility of the original proposal and of another two bio-corridor alternatives on a special and sufficiently big hydraulic model. To implement potential adjustments to an already finished bio-corridor would be very complicated and significant in costs.

The study includes results of an analysis of possibilities for bio-corridor research for the Děčín weir on a hydraulic model of a sufficient reduction scale. It comprises a brief description of the bio-corridor, research work specification according to the client's requirements, analysis of mechanical similarity conditions and an analysis of research feasibility. Furthermore, the study includes a proposal of scale for the hydraulic model, its placement in a big hydraulic laboratory in the TGM WRI, p.r.i., and a construction design of the model with the manipulation and measurement equipment. Anticipated solution methodology and research work schedule are also included.

The Děčín weir – Alternative 1a: the hydraulic research of the bio-corridor on a model in the scale of 1 : 20

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Duration: May to December 2010

The aim of the hydraulic research was to optimize the two basic solution options – the bifurcation bio-corridor (option 1a) and no-bifurcation bio-corridor (option 1b). To optimize these two options, a research was carried out on a hydraulic model with the scale of 1 : 20 using the results of the research using the model of a scale of 1 : 70 and the experience of similar project already built and operating.

The research on the hydraulic model of the weir in the scale of 1 : 70 was dedicated namely to finding an optimal arrangement of the entrance and exit parts of the bio-corridor. In other words to find a way to link the upper and lower hold to ensure the prerequisite of migration possibility for fish and other animals through the lock chamber. For a hydraulic regime research of the full length of the bio-corridor, of the flow in the main and side beds of the fish pass, verification of the route of the pass, its branching, parameters, roughening etc. a special hydraulic model was made in the scale of 1 : 20. The research enabled optimisation of both the options – with and without bifurcations. As a result, the bio-corridor option with a fish pass bed without bifurcations was recommended. The results of the research are summarized in the final research report.

The Suchomasty reservoir – securing the reservoir from flood impacts: a physical model of safety overflow

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Duration: July to December 2010

The Vltava River Basin, s.e., is about to reconstruct the Suchomasty reservoir. The security level will be increased to endure a flood of repetitiveness of $N = 1000$ years with a culmination flow of $Q_{1000} = 94,2 \text{ m}^3 \cdot \text{s}^{-1}$. A very complex flow occurs on the side safety overflow with a drop reservoir and a connected slide during high flows. This complex flow can be described through basic hydraulic calculations only with a great difficulty. Therefore, a research on a hydraulic model of the safety overflow and slide was built in a scale of 1 : 18 in the big hall of the hydraulic laboratory of the institute.

A three-phase research was carried out on the hydraulic model of the safety overflow of the Suchomasty reservoir in a scale of 1 : 18 in the big laboratory of the T. G. Masaryk Water Research Institute, p.r.i., to assess the security of the reservoir against flood impacts. The first phase of the

research addressed flood flows of Q_1 to Q_{1000} through a model simulating an increased capacity of the current overflow (enlargement of the right bank of the original slide, heightening of the left bank wall). The consumption curve of the overflow was created. Capacity of the overflow and other indicators were assessed.

The second part included a consumption curve determination on a model of the current overflow up to a flow rate of Q_{100} . The results of the two phases were compared and in the third phase of the project an optimisation research for the original project was carried out under similar conditions to those during the first two phases.

Elaboration of principles for hydro-technical assessment of culverts

Project managers: Ing. Pavel Balvín, Ing. Miroslava Benešová

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Duration: 2010

The project was focused on elaboration of principles for designing and hydraulic assessment of culverts and bridges with a short span. The project was carried out on the basis of an agreement between the TGM WRI, p.r.i., and the Road and Motorway Directorate of the Czech Republic.

The objective of the project was to elaborate the principles for design and hydraulic assessment of culverts and bridges with a short span in the form of technical requirements of the Ministry of Transport of the Czech Republic. The technical requirements include detailed example cases as well as technical measures for prevention of blocking the culverts by debris and manners to moderate the energy at the outflow of the culvert.

Operation of Czech Calibration Station for Current Meters

Project manager: Ing. Libuše Ramešová

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Duration: permanent project included in statutory activities of the institute

The main objective of the project is the calibration of water measurement tools for all their owners, mainly and with the highest priority for the Czech Hydrometeorological Institute, state enterprises Povodí and other organisations. Furthermore, the project operates the Czech Calibration Station for Current Meters, which is a unique site for this type in the Czech Republic and is an authorised workplace.

The laboratory is certified according to the updated norm ČSN EN ISO/IEC 17025 : 2005. In 2010, the Czech Accreditation Institute, Public Service Company, renewed its certification of our laboratory and the certificate is valid through 15th June 2015. The laboratory can be found in the register of certified laboratories under the *calibration station no. 2278*.

Accurate data on flow measurements, depending on the accuracy of current meters calibration, provide basis for all systematic water management programmes and therefore contribute directly to a better environment in the Czech Republic. Individual measuring instruments of water discharge can be calibrated either by being fastened to a pole or fastened on a rope with torpedoes of 5–100 kg, according to their actual use in nature. The calibration speed varies from 0.02 to 7.00 m/s.

The workplace designed the methodology for calibration of the atypical water measurement device that can be calibrated according to the aforesaid standard (Sigmas, Flo-Mate, micro propellers etc.)

Apart from the certification, a publication on the calibration station was released in 2010: The Czech Calibration Station for Current Meters – undesirable phenomena during the calibration process and their elimination.

Balance assessment of average monthly flows on selected water measurement stations in the Vltava River basin under current conditions and under conditions affected by the climate change

Project managers: Ing. Adam Vizina, Ing. Ladislav Kašpárek, CSc.
tel.: 220 197 404, e-mail: adam_vizina@vuv.cz

Duration: 2010

This project follows a study called Assessment of Climate Change Impact on Water Management System in the Vltava River Basin for the Ministry of Agriculture of the Czech Republic, published in 2007. This study addressed hydrological and water management part under conditions influenced by the climate change.

In 2010 the focus of the project consisted of hydrological balance assessment through the BILAN model under current conditions and under conditions influenced by the climate change for the following referential periods: the present (1980–2006), 2025 (2011–2040), 2055 (2041–2070) and 2085 (2071–2100). The emission scenario A1B was used for calculations and the length of input and output lines of climatological and hydrological quantities was 27 years. The outputs were then used as basis for the consequent water management solution.

Update of water management study on possible out-take of unprocessed water from the Jihlava River and from the Dalešice - Mohelno reservoir for enlargement of the Dukovany Power Plant by a new nuclear source EDU 5

Project managers: Ing. Adam Vizina, Ing. Jan Brabec, Ing. Ladislav Kašpárek, CSc., Ing. Petr Vyskoč, Ing. Martin Hanel, Ph.D., Ing. Jiří Pícek
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Duration: 2010–2011

The study assesses the simultaneous course of current water out-takes for the nuclear power plant performance of 4 x 500 MW and the prospect enlargement of performance in the area on the basis of water management possibility for out-takes from the basin. The assessment also counts with reinforcing the source with water from other basins. This study follows previous works, draws from hydrological and meteorological data published in them and includes hydrological material preparation for conditions influenced by the climate change and the water management solution based on the aforesaid materials.

In 2010, hydrological materials for water management solution were prepared and the 1st phase was simulated. An assessment and evaluation of two climate change scenarios (ALADIN-CLIMATE/CZ, average values from approximately 20 regional climate models covering the Czech Republic) was made for the Dalešice – Mohelno reservoir as a source of unprocessed water for the Dukovany area. The impact of climate change scenarios and of the potential enlargement by EDU5 were also assessed. For the case of water shortage in the current out-take area, a water transfer from the Oslava River to reinforce the unprocessed water out-take was evaluated. The calculations were made for various alternatives: for the enlargement of the current EDU 1–4 by a new nuclear power source of a small performance line – 1x approximately 1200 Mwe(3415 Mwt) – and of a big performance line – 1x approximately 1700 Mwe (4590 Mwt) – and for reference years 2025, 2035, 2045 and 2085.

Evaluation of average monthly flow in two water measurement stations

Project manager: Ing. Adam Vizina
tel.: 220 197 404, e-mail: adam_vizina@vuv.cz

Duration: 2010

The project is aimed at hydrological balance under current conditions and under conditions influenced by the climate change.

In 2010, hydrological balance was assessed through the BILAN model in a monthly time step for the Liběchovka River and the Divoká Orlice River basins for current conditions, in other words for the period between 1960 and 2007, and for conditions influenced by the climate change for the following partial referential periods: the present, 2025 (2011–2040), 2055 (2041–2070) and 2085 (2071–2100). The emission scenario A1B was used for the calculations.

Reference Laboratory of Environment Components and Wastes

Monitoring of the Temelín nuclear power plant impact on the hydrosphere

Project manager: Ing. Eduard Hanslík, CSc.
tel.: 220 197 269, e-mail: eduard_hanslik@vuv.cz

Duration: 2003–2010

The aim of the project is to ensure independent monitoring of the Temelín nuclear power plant the impacts on the hydrosphere and other components of the environment and specification of baseline levels for the purposes of a prospective enlargement of the power plant.

The Temelín plant impacts have been monitored pursuant to an assignment from the Ministry of the Environment. Field surveys indicate that the wastewater recipient watercourse – the Vltava River – does not manifest any increase in concentrations of artificial radionuclides when compared to reference (unaffected) profiles, with the exception of volume activity of tritium. The increased tritium volume activity corresponds with tritium activity balance data valid for the released wastewater as reported by the plant's operator ČEZ, a. s. Thermal pollution causes an increase in water temperature in the Vltava below the wastewater, and/or cooling tower condensate, outlet. The relevant thresholds, as specified in the Government Decree No. 61/2003 Coll., as amended, and the Government Decree No. 71/2003 Coll., have not been transgressed.

Operation of a continuous and emergency monitoring unit of the radiation monitoring network

Project manager: RNDr. Diana Marešová, Ph.D.
tel.: 220 197 335, e-mail: diana_maresova@vuv.cz

Duration: continuous activity

The project is concerned with monitoring of radionuclide concentrations in the hydrosphere under both normal and emergency conditions, in collaboration with relevant laboratories of the respective River Basin Authorities.

Pursuant to the Frame Agreement on the operation of the nationwide radiation monitoring network (RMN) concluded between the Ministry of the Environment and the State Office for Nuclear Safety, the Reference Laboratory of the TGM WRI operates a unit for continuous and emergency monitoring under the RMN, in collaboration with the relevant River Basin Authorities. During the monitoring period in 2010, under normal radiation conditions, the concentration levels of radioactive substances were monitored in surface and potable waters, sediments, activated sludge and fish biomass across selected profiles. Increased levels of tritium, compared to reference baseline, have been detected on the Vltava at Prague-Podolí, and at terminal sections of the Elbe and Morava rivers due to the releasing of wastewaters from the nuclear power plants Temelín and Dukovany. The monitoring results are continuously submitted to the RMN information system operated by the State Office for Nuclear Safety.

Monitoring and assessment of surface and groundwater quality and changes related to the operation and impacts of the Temelín nuclear power plant

Project manager: Ing. Eduard Hanslík, CSc.
tel.: 220 197 269, e-mail: eduard_hanslik@vuv.cz

Duration: 2000–2010

The task subject matter is defined in its title.

The Reference Laboratory has provided monitoring and assessment of the Temelín nuclear power plant impacts on the environment, pursuant to an assignment from the plant's operator ČEZ, a. s., in relation to conclusions of EIA on constructional modifications within the plant.

Comprehensive monitoring of radioactive content in groundwater sources and in treated water

Project managers: Ing. Eduard Hanslík, CSc., Ing. Irena Pohlová
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Duration: 2010

The project has been concerned with monitoring and assessment of radioactive content in groundwater sources.

The project included monitoring and evaluation of the presence of radioactive substances (including radon 222) in water sources and changes to concentrations as a consequence of water purification technology designed to reduce the concentrations in bottled potable and natural mineral waters, as assigned by Eco-Aqua-Servis, s. r. o.

The content of radioactive substances in the Orlick reservoir and its tributaries following the commissioning of the Temelín nuclear power plant – year 2010

Project managers: Ing. Eduard Hanslík, CSc., RNDr. Diana Marešová, Ph.D.
tel.: 220 197 269, 220 197 335, e-mail: eduard_hanslik@vuv.cz, diana_maresova@vuv.cz

Duration: 2010

The task is concerned with monitoring and analysing the contents of radioactive substances in the Orlik reservoir and its tributaries for the purposes of the watercourse administrator.

The project investigators monitored the tritium volume activity in surface waters below the wastewater outlet from the Temelín nuclear power plant, including the vertical stratification of tritium in the Orlik reservoir, and at reference (unaffected) sites. The monitoring was conducted for purposes of the state enterprise Vltava River Basin.

Monitoring evaluation of dose rates of gamma radiation and radioactive substance content in the vicinity of sites included in decontamination projects of the Nuclear Research Institute in Řež

Project managers: Ing. Eduard Hanslík, CSc., Michal Novák
tel.: 220 197 269, 220 197 256, e-mail: eduard_hanslik@vuv.cz, michal_novak@vuv.cz

Duration: 2010

This project was concerned with monitoring and evaluation of the impacts of previous radioactive contamination on the environment.

The task included monitoring of the effects of decontamination of previously contaminated sites by the Nuclear Research Institute [ÚJV Řež, a. s.] on the hydrosphere and other environmental constituents, as a part of the input information for the evaluation of corrective measures carried out under the Implementation project of decontamination activities.

New nuclear power source at ETE – EIA supporting study

Project manager: Ing. Eduard Hanslík, CSc.
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Duration: 2010

The task was concerned with implementing comments to a previous EIA study.

Comments were provided on the impacts assessment for a new nuclear power source at ETE, with special focus on the hydrosphere.

Inorganic analyses of soil samples

Project manager: Ing. Věra Očenášková
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Duration: 2010

The project was concerned with conducting analyses for the purposes of the Crop Research Institute.

The core of the project rested in the performance of inorganic analyses of soil samples for the purposes of an international project investigated as a part of cross-border collaboration under Objective 3 Czech Republic–the Independent State of Bavaria 2007–2013, titled “Acidification effects on soil and water sources”. As per requirement, analytic assays were conducted for soil samples, determining metal and anion contents in water extract (water leaching assay), combined

with determining of effective cation exchange capacity, and subsequent assays for selected metals and anions.

Gamma-spectrometric analyses of sediment samples

Project manager: Ing. Věra Očenášková
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Duration: 2010

The task subject matter is defined in its title.

The project was concerned with gamma spectrometric analyses of sediment samples collected from selected sites and performed for the purposes of the Czech Hydrometeorological Institute.

Branch of Water Protection and Informatics

Accuracy classification for existing specification of inundation areas in the Czech Republic, and implementation of results in the specification methodology

Project manager: Ing. Kateřina Uhlířová, Ph.D., et al.
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Duration: 2010–2014

The main objective of the project is the creation of a comparison study determining the accuracy of delimitation of inundation areas in selected reference locations (watercourse sections), with specific features in terms of various parameters. The project will compare the existing delimitation of these areas specified with the use of available vertical surveying technologies of varying accuracy (photogrammetry, geodetic surveys, vertical surveying ZABAGED®) with the results of a new hydrodynamic modelling (1D or 2D) and delimitation of inundation areas using new elevation data for the territory of the Czech Republic acquired by aerial laser scanning, commenced towards the end of 2009.

Conclusions ensuing from the results comparison for the reference sites will be used to devise a classification method for the inundation area delimitation accuracy, subsequently to be applied by analogy on any section of any watercourse in the Czech Republic. This approach will enable delimitation accuracy classification for the rest of inundation areas in the country. The project will conclude with the development of a methodology for delimitation of inundation areas according to the requirements placed on inputs, hydraulic aspects of modelling and desired outputs.

In 2010, the project included collection of the necessary input data and their preliminary processing (specification of properties of the potential reference sites), including the selection of reference sites in the Central zone: two locations selected for 2D modelling and four locations selected for 1D modelling.

Determination of parameters affecting bathing water profiles in terms of environmental aspects

Project manager: Ing. Marie Kalinová, TGM WRI
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Collaborating project manager: Mgr. Petr Pumann, National Health Institute
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Duration: 2008–2010

The aim of the project had been to create and process bathing water profiles, i.e. create data and information flows on bathing waters and to evaluate the data as the essential elements in informing the public as well as in developing recommendations for improving the quality of these waters. The most important task within the project had been to determine a reasonable and efficient scope and manner of information processing in relation to the requirements of the Directive 2006/7/EC of the European Parliament and of the Council of 15 February 2006 concerning the management of bathing water quality and repealing Directive 76/160/EEC.

In 2010, data processing and bathing water profile development were conducted for the selected model sites. The project also included investigation of several related issues: evaluation of the cercarial dermatitis risk levels, influence of the medium on determination of enterococci counts, influence of sample collection on chlorophyll assays, short-term pollution determination. The outputs had been used to develop a guideline for defining bathing water profiles, discussed with the catchment area administrators as the future creators of bathing water profiles, and with the representatives of the Ministry of the Environment, Ministry of Agriculture, and Ministry of Health. The project concluded with the creation of sample maps attached to bathing water profiles.

Administration and development of the DIBAVOD tool

Project manager: Bc. Tomáš Fojtík
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Duration: 2008–2012 (continuous activity)

The assignment is concerned with the administration and updating of the selected layers of the DIBAVOD database.

In 2010, the project was concerned primarily with updating of the watercourse and watershed layers. These activities are founded in the requested collaboration with the Czech Hydrometeorological Institute in the updating of the watershed layer – supporting the transition to watershed charts in the 1 : 10 000 scale. The process was completed in 2010 for all seven branch offices of the Czech Hydrometeorological Institute. The degree of updating varies between the seven regions depending on the degree of complexity and the numbers of investigated situations.

Operation of designated Public Administration Information Systems – Water, and data support for combined emission limit determination application

Project manager: Ing. Pavel Richter, et al.
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Duration: 2010

The task is concerned primarily with fulfilling obligations of the TGM WRI specified in the Decree No 391/2004 Coll., the Government Decree No 229/2007 Coll., and the Guideline to the above

Government Decree issued by the Department of Water Protection of the Ministry of the Environment. The specified duties are fulfilled by means of the Hydrological and Environmental Information System of the TGM WRI (HEIS VÚV), operated as the central information system of the individual specialised branches of the Research Institute. The key purpose of the system is to maintain, process and make available relevant information, in particular on watercourses in terms of water use, as well as information provided as a component of active support of the government at the national level, namely the Ministry of Environment, as well as at other levels of administration.

In 2010, the Branch operated a system of updating data for various registers and ensured availability of services provided by the Public Administration Information Systems – Water at the web address <http://www.voda.gov.cz/portal/>. The task was concerned with maintaining and updating those registers of the information system that fall within the scope of the TGM WRI in line with the applicable legislation. In 2010, the Branch updated records on water bodies, including strongly influenced and artificial bodies, records of water bodies conditions, records of environmental potential of strongly influenced and artificial bodies of water, records of inundation areas, and provided a partial update to the records of protection zones of water sources (upon request from their relevant administrators).

Another key output of the assignment was a functional application for the combined determination of emission limits, including the relevant information support. The information support included 15 user training sessions organised for water administration authorities acting at individual Regional Authorities and the Ministry of the Environment. An essential component of the work was the continuous information and technical support for the application for the combined determination of emission limits, including the provision of an installation CD and provision of non-public data as a part of the licensing policy. In the period from January to the end of November, 124 licence agreements were concluded with nine Regional Authorities, 88 municipal authorities (including separate city districts) and 14 other institutions (catchment area administrators, project design offices, etc.). Updating of data in the combined determination of emission limits system took place in the course of 2010, in accordance with information available from the water management balances and from registers of industrial sources of pollution.

System services are available on the TGM WRI intranet at <http://prgheisv> (internal users only) to Senior Investigators working on projects assigned by the Ministry of the Environment. System services available directly to the Ministry, professional and lay public are available at <http://heis.vuv.cz>.

Management, sharing and publication of geo-spatial data

Project manager: Ing. Viktor Levitus
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Duration: long-term activity

The task is concerned with the management, sharing and publication of geo-spatial data.

In 2010, the task included administration and updating of data in the data warehouse of the GIS and Cartography Department (forming one of the basic data platforms for the investigation of research projects at the WRI in support of the government), and activities of technical support to users at the WRI in investigating projects in the environments of geographic information systems.

Summary information on water bodies in the Czech Republic

Project manager: Ing. Arnošt Kult
tel.: 220 197 246, e-mail: arnost_kult@vuv.cz

Duration: ongoing activity

This task is concerned with the collection, analysing and publishing of summary information on water bodies in the Czech Republic obtained from investigation of projects at the TGM WRI and collection of relevant data outside the Research Institute. The data is managed and published in forms as required by the Ministry of the Environment.

At the beginning of 2010, material and graphic aspects were completed for the Master Water Management Plan No 58 (published in 2008 Bulletin). The plan included evaluations of data on natural circumstances, water sources, quality of water in watercourses, sample collection and wastewater releases in the years 1995, 2000, 2005, 2006, 2007 and 2008. Also provided were data and information on public water supply networks and public sewerage systems, waterways, utilisation of hydroenergy and summary water balance results.

In close collaboration with the Department of Water Protection of the Ministry of the Environment, the Czech Hydrometeorological Institute, state enterprises of river basins, State Environmental Fund, Czech Statistical Office, Czech Environmental Inspectorate, and the relevant sections of the Research Institute, the Branch provided the necessary input information for the 2009 Report on the Water Management in the Czech Republic (section developed by the Ministry of the Environment). TGM WRI provided to the Department of Water Protection of the Ministry of the Environment 2009 data on water management, developments in produced and released pollution from spot pollution sources, development in pollution from aggregated sources, pollution spills, quality of surface water and its development since 1990, water protection constructions (an overview of new constructions and reconstructions of municipal and industrial water purification plants in 2009), and other required information.

Furthermore, the project was concerned in 2010 with processing data for the chapter "Water" in the 2010 statistical yearbook on the Czech Republic environment, as well as other documentation requested throughout the year by the Ministry of the Environment.

Towards the end of 2010, material aspects were provided for the 2009 Water Management Bulletin. The publication was structured in to relevant chapters and presented data for the years 1995, 2000, 2005, 2006, 2007, 2008 and 2009.

Specialised support in preparation of legislation updates in the area of water protection

Project managers: Ing. Arnošt Kult, Ing. Pavel Balvín, Ing. Jiří Dlabal, Ing. Karel Drbal, Ph.D., Ing. Věra Kladivová, Ing. Tomáš Mičaník, RNDr Hana Prchalová, Ing. Petr Tušil, Ph.D.
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Duration: ongoing activity

The objective of the task was to provide legal and expert support to the Ministry of the Environment in supplementing and developing implementing regulations. Correct implementation of legal provisions in practice often requires finding a consensus in deliberating legal amendments and proposals for implementing regulations. This demands researches and analyses, often based on extensive volumes of specific data from both laboratory research and field investigations, including available foreign literature.

The task included provision of expert documentation and statements on the legal update to the Government Decree No 61/2003 Coll., including collaboration and participation of TGM WRI experts in all related negotiations.

The Ministry of the Environment also received technical input documentation and statements on the draft decree defining conditions for granting exceptions as per Section 39, paragraph 7, letters b), d) and e) of the Water Act update for the purposes of fish farming, including proposals for dealing with objections arising in remark proceedings.

Another separate section of the task was concerned with provision of input documentation and statements on the regulations related to the implementation of the Directive 2006/118/EC, discussion of proposals and evaluation of remarks from affected entities. Work conducted in 2010 focused on the development of government resolution on indicators and permissible values for wastewater pollution and the requirements of permits for wastewater release into groundwater.

Another area of work covered input documentation and statements on updates to regulations related to the implementation of the Directive 2007/60/EC, and initiation of processing of component documentation for the government decree on residual flow rates as per Section 36 of the update to the Act No 254/2001 Coll.

The Branch also provided component documentation for the draft bylaw on water monitoring, including implementation of requirements ensuing from a formal alert from the European Commission. Expert documentation and statements were also provided on the proposal for possible modifications of the Decree No 431/2001 Coll., on the water balance contents and manner of its creation, and the data reported, including relevant collaboration from and participation of TGM WRI experts.

Support to activities of the Czech Republic in the International Commission for the Protection of the Elbe

Project manager: Ing. Marie Kalinová

tel.: 220 197 213, e-mail: marie_kalinova@vuv.cz

Collaborating project managers: RNDr. Hana Prchalová, Ing. Michael Jakš

Duration: long-term activity

The objective pursued is to provide expert support to the International Commission for the Protection of the Elbe in specific areas, prepare input documentation and participate in expert teams of the International Commission: Surface Waters (SW), Groundwaters (GW), Data Management (DATA), as well as in other specialised activities. TGM WRI experts are joined in the activities by specialists from other institutions (catchment area administrations, Czech Hydrometeorological Institute, and others).

The key tasks for 2010 included the continuous monitoring of fulfilment of objectives of the international plan for the Elbe River basin, informing the public and the preparation of the upcoming planning cycle, in particular the updating of the international Elbe River measurement programme, specification of methodology for the calculations of matter removal, information exchange related to the methods of groundwater assessment, preparation for filling in the updated data templates WasserBLiCK, investigation of nationally specific parameters in guidelines in relation to cartographic outputs, and other assignments.

Support to activities of the Czech Republic in the activities of the Permanent Committee Saxony and Permanent Committee Bavaria of the Czech-German Transboundary Waters Commission

Project manager: Ing. Marie Kalinová

tel.: 220 197 213, e-mail: marie_kalinova@vuv.cz

Collaborating project managers: Ing. Věra Kladivová, Mgr. Pavel Eckhard

Duration: long-term assignment

The objective of the task is to provide expert input documentation for the collaboration in transboundary waters and to support the activities of both Permanent Committees. Issues of transboundary waters are investigated in combined Czech-German expert teams or by direct collaboration between Czech and German specialists. The outputs include expert input documentation

for the expert teams and higher organisational units participating in the transboundary waters cooperation. The pursued tasks include concept and methodology designs as well as investigation of specific issues related to particular locations. The project has included application of the EU Water Framework Directive on transboundary waters. Activities under this assignment are pursued by experts of the TGM WRI as well as specialists from other institutions (catchment area administrations, Czech Hydrometeorological Institute, and others). Mutual consensus among the participating specialists over the proposed solutions forms an integral aspect of the work.

In 2010, TGM WRI experts participated directly in collaborations between Czech and German specialist laboratories in investigating the issues of quality of surface and groundwaters, development of constituent input documentation for the draft record as well as in the actual meeting of the Permanent Committee Saxony. They have also participated over the long term in the protection of the freshwater pearl mussel and the thick-shelled river mussel, protection and quality improvement of transboundary waters in general, protection of the Dragon Lake (Drachensee in Germany) in the catchment area of the Kouba (Chamb) prior to eutrophication, finding solutions to the mercury pollution stresses on the Ohře, Reslava and the Skalka reservoir coming from German territory. In 2010, TGM WRI experts also participated in the preparation of the Permanent Committee Bavaria meeting.

Bathing waters in the transitional period – reporting support in accordance with Directives 76/160/EEC, 2006/7/EC

Project manager: Ing. Helena Grünwaldová, CSc.
tel.: 220 197 376, e-mail: helena_grunwaldova@vuv.cz

Duration: 2010 (with a view of a long-term activity)

The project was concerned with provision of requested information and outputs from monitoring necessary for reporting under the Directives 76/160/EEC and 2006/7/EC, in collaboration with the Ministry of Health.

Tasks pursued in 2010 included checking of monitoring documentation obtained from Health Ministry necessary for reporting in accordance with the Directive 76/160/EEC and the new Directive 2006/7/EC. Also performed were verifications and reviews of data processed by the European Commission as a part of quality evaluation of bathing waters in the Czech Republic. Simultaneously, expert discussions took place over the new reporting templates Reporting Sheets for the Bathing Water Directive 2006/7/EC.

A register of surface waters used for bathing in the Czech Republic is available to users from the public administration as well as the general public on the Internet at <http://heis.vuv.cz>.

Balance, verification and assessment in the field of protection of water quantity and quality

Project manager: Ing. Jiří Dlabal, et al.
tel.: 220 197 283, e-mail: jiri_dlabal@vuv.cz

Duration: ongoing activity

The project is concerned with the development of a Summary Water Balance for the main river basins in the Czech Republic as per Section 1, paragraph 2 of the Ministry of Agriculture Decree No 431/2001 Coll., on the contents of the water balance, manner of its compilation and water balance data reported.

The following outputs were prepared as an output from analyses of water sources utilisation and water quantity and quality requirements for the year 2009:

- A register of data on water consumption and release, submitted to the catchment area administrators in accordance with the Decree No 431/2001 Coll. (updated files on consumption and release for 2009, and data transformed for the purposes of calculations in database files, plus other outputs);
- Check balance calculations corresponding to the former summary water management balance and/or the Ministry of Agriculture guideline on processing of water management balances for individual catchment areas;
- Summary hydrological balance;
- Overall Water Balance Assessment – quantity and quality of surface waters and groundwater quantity.

Socio-economic analysis of climate change impacts on water management in the Czech Republic

Project managers: Ing. Šárka Blažková, DrSc., Ing. Lubomír Petružela, CSc., Ing. Jiří Dlabal, Ing. Arnošt Kult (TGM WRI), prof. Ing. Jiřina Jílková, CSc., Ing. Lenka Slavíková, Ph.D., Mgr. Viktor Květoň, doc. Ing. Jan Pavel, Ph.D., Ing. Jan Slavík, Ph.D. (Institute for Economic and Environmental Policy of the Prague University of Economics)
tel.: 220 197 538, e-mail: lubomir_petruzela@vuv.cz

Duration: 2009–2011

The project is concerned with social and economic impacts of the climate change in water management as well as economic instruments designed to mitigate these impacts. The outputs include creation of documentation on proposed measures designed as a prevention and mitigation of climate change impacts on water and water management, including planning instruments, and application of basic findings in draft guidelines and legislative modifications.

In the second year of the project (2010), research focused on the economic dimension of climate change impacts, economic and market relationships in water use, outcomes and effects of the climate change, and changes in water management at the macro-, mezzo- and microeconomic levels.

It has become apparent that the outcomes occur in a combined fashion, at environmental, economic, social and financial aspects of sustainable water use. The desired targets for each of the areas are also mutually interrelated.

The water usage processes have come under the influence of market forces. The special nature of water as a commodity limits the development of traditional market conditions in water supply and distribution, with related effects, yet the market parameters of these processes (cost, price) have a significant bearing on the link between the supply side (and the economic efficiencies on the supply side) and the demand side (appreciation of water in production, services and fulfilling social needs of households).

The above reasons make it imperative that water management services manifest good returns on investment (including costs of adaptation measures) and returns in segments where the mechanisms include complete costs (economic price) of water-related services.

2010 outcomes of the project, included in the periodical report, have been summaries in three articles published in vocational press, in a contribution to a conference collection of abstracts and three working papers (Analysis of factors affecting the condition and outlook for sources in the Ohře River basin, Influence of temperature and precipitation on the potable water demand, Pricing regulation in water supply and sewerage systems).

Support for data and map reporting outputs

Project manager: Ing. Michael Jakš
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Duration: 2010

The objective of the project was to present plans designed for catchment areas in the form of maps.

The core task of the project is to create maps of catchment areas in the PDF format, for both the whole of the Czech Republic and individual major river basins. A total of 68 map sheets were created. The maps format was adjusted to the design of the map outputs of the International Commission for the Protection of the Elbe. The necessary data were sourced from a database of information reported to the respective international commissions.

Also provided were corrections to reported data as demanded by the International Commission for the Protection of the Elbe and the International Commission for the Protection of the Oder, as well as support to expert teams active in international committees.

EEA Reporting

Project managers: Ing. Petr Vyskoč, Ing. Jiří Dlabal
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Duration: October to December 2010

The objective of the project was to prepare regular reports for the European Environmental Agency (EEA) related to emissions to aquatic habitats: WISE SoE Reporting – Water Emissions. In digital form, the reported data are integrated into the (Water Information System for Europe).

Investigation of the project included processing of data related to spot and blanket surface water pollution sources. The data were sourced primarily from the register of industrial pollution sources (maintained by the TGM WRI) and registers of releases into surface waters monitored as an integral part of water balances (catchment areas administrations). The data were statistically evaluated and processed into the desired structure and format.

Data changes register for the simulation model of the reservoir function of the water management system in the basins of the upper Vltava, Berounka and lower Vltava

Project managers: Ing. Jiří Píček, Ing. Petr Vyskoč, Ing. Jan Brabec
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Duration: 2010

When using simulated modelling in investigating water management systems, usually a set of tasks, instead of a single one, or their various alternatives are solved. These alternatives are usually based on a single task modified for the purposes of separate calculations. The results of the modified tasks are then used in deriving specific conclusions. Individual alternatives then vary in their input as well as output data. Since it can become difficult to keep track of the differences in investigations of larger sets of alternatives, it is fitting to use a suitable instrument to keep track of the differences.

This assignment included the development of extended functions of a simulation model for surface water quantity developed in TGM WRI, adding the "Changes register for the simulation model of water management system storage function" ("changes register") with special emphasis on water management system data related to the basins of the upper Vltava, Berounka and lower Vltava. The changes register is a purpose-built instrument designed to maintain track of all used

alternatives used in simulated model calculations. It takes the form of specialised extensions of the storage function simulation model for the water management system (software developed by TGM WRI, software system name "VSTOOLS.VHBMN"). The changes register tracks and identifies changes to data on water utilisation objects and related requirements.

Outlook study of water needs and water resources in the basins of the Ohře and lower Elbe rivers – eastern part

Project managers: Ing. Petr Vyskoč, Ing. Adam Vizina, Ing. Ladislav Kašpárek, CSc., Ing. Jiří Pícek, Ing. Jan Brabec, Ing. Hana Nováková
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Duration: 2008–2010

The project was concerned with the evaluation of existing water sources with a view of meeting the water management needs (water supply in particular) under the conditions of an anticipated climate change.

The study included modelling hydrological progressions as affected by the climate change, using the hydrological chronological balance model "Bilan". Subsequently, a simulation model for the storage function of the water management system was used to estimate the degree of provision for water needs while maintaining minimum flow rates. The study also evaluated the option of flooding excavation pits. By way of conclusion, the study identified potentially problematic locations and proposed suitable measures to mitigate negative effects of the climate change. The study also included an analysis of current and future demands for water use, including compilation of necessary demographic and economic data. TGM WRI collaborated in investigation of the study with the water management, development and construction company Vodohospodářský rozvoj a výstavba. Final tasks of the study were completed in 2010.

Provisions for the needs of water consumption in the catchment areas of upper and middle Elbe

Project managers: Ing. Jan Brabec, Ing. Petr Vyskoč, Ing. Jiří Pícek, Ing. Adam Vizina
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Duration: May to June 2010

The project was concerned with a water management study evaluating the provisions for existing water consumption needs (namely in view of meeting water consumption requirements and maintaining minimum flow rates) with respect to capacities of water sources under the existing hydrological conditions.

The study assessed existing reserves or deficits in the water management system in the specified catchment areas with respect to the storage function. The study was supplementary to a previous study by the TGM WRI, *Evaluation of the climate change impacts on the water management system in the Elbe River basin* (Kašpárek, L., et al., 2008), concerned with evaluation of the water consumption safety and minimum flow rates under the conditions of the climate change over the long term (reference year 2085). The evaluation of existing capacities of water sources under the current hydrological conditions facilitates more accurate specification of the climate change impacts on the water management system.

Safety assessment of emergency infrastructure components – drinking water

Project managers: Ing. Václav Šťastný, Ing. Lubomír Petružela, CSc., Ing. Jana Hubáčková, CSc.
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Duration: 2010–2014

The project strives to propose and optimise methods of resolving emergency events (pollution spills and natural disasters) in drinking water supply. The outputs of the research will be used by government authorities in development of comprehensive emergency plans and securing drinking and utility water under emergencies.

The project, pursued in collaboration with several other specialised organisations and coordinated by CITYPLAN Prague, is financed by the Ministry of the Interior of the Czech Republic, and commenced at the end of October 2010.

In the first year, the investigation of the project was concerned with preparatory works and researches into the issue – team of investigators of the TGM WRI focused on the issues of securing water supply networks and tank towers.

Possibilities of removal of specific pollutants (PPCPs) on wastewater treatment plants

Project managers: Ing. Miroslav Váňa, RNDr. Josef K. Fuksa, CSc., Ing. Roman Jobánek, Ing. Jiří Kučera, Ing. Pavla Martinková, Ing. Lenka Matoušová, Ing. Danica Pospíchalová, Ing. Filip Wanner
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Duration: 2009–2013

The project aims to describe and verify the most suitable technologies and/or adjustments and supplementations to existing wastewater treatment technologies in order to achieve maximum possible degree of removal of selected pharmaceuticals and personal care products (PPCPs) (especially important pharmaceuticals) from wastewater.

Knowledge obtained from the research will be applied by project designers, WWTP operators and water management authorities in designing wastewater treatment plant restoration projects. It will also serve as a base for application of verified elements of the treatment technology line to eliminate selected PPCPs from wastewater. Investigation of the issues is co-financed by the National Agency for Agricultural Research of the Ministry of Agriculture.

The objective of 2010 investigation programme was, besides continuous updating of vocational literature research into the issues of PPCPs removal from wastewater by biological treatment, detailed monitoring of selected wastewater treatment plants. Wastewater samples were collected at key points in these plants and from the activated sludge, and tested for the presence of specific pollutants (salicylic acid, clofibric acid, carbamazepine, ibuprofen, diclofenac, estrone, 17 β -estradiol, 17 α -ethynyl estradiol) as well as basic chemical indicators significant for biological treatment of wastewater (pH, conductivity, COD_{Cr}, BOD₅, SS₁₀₅, N-NH₄⁺, N-NO₂⁻, N-NO₃⁻, N_{org.}, N_{tot.}, P-PO₄³⁻, P_{tot.}). The concentrations determined were used as a base for preliminary assessments of efficiency in removal of the monitored substances at separate stages of the technological line.

The results of the research project indicate that specific arrangements of the technological line and the technologies applied in wastewater treatment may not exert as significant effects on the overall efficiency in the removal of the individual examined substances as previously expected. The

concentrations of examined substances as determined in the project and the efficiencies in their removal at water purification plants correspond with findings published in vocational literature.

Fungal biofilms in wastewater bioremediation complementary to wastewater treatment plants

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Duration: 2009–2013

Fungal biofilms possess a considerable degradation potential that has not been satisfactorily tapped into in wastewater treatment. Immobilised cultures of ligninolytic fungi utilising nonspecific enzyme mechanisms to degrade pollutants can be applied alongside activated sludge technologies in the decomposition of recalcitrant substances that are not normally degraded in traditional water treatment plants. The project focuses on the research of fungal biofilms colonising inert or lignocellulosic materials, acting over an extended period under conditions of bacterial stress, and on investigation of the structural, biological and biochemical qualities of the biofilms. Furthermore, the project will measure the biofilm capacity in degradation of selected pollutants and removal of heavy metals, and determine the potential for “trickling-bed” and “rotating disc” type purification reactors. Functioning of constructed biological reactors will be subject to analyses, optimisation and tests in combination with traditional activated sludge processes in treatment of wastewater contaminated with heavy metals and other pollutants.

In 2010, the WRI installed and commissioned a fungal treatment reactor designed by the Institute of Chemical Technology, Prague. The semioperational model is designed as a sprinkled biological column. Municipal wastewater, used for efficacy testing for household wastewater treatment plants, was applied during the initial stage of the model operation. Good adaptability of fungal cultures to municipal-grade wastewater was demonstrated during two months of operation. The model was operated under optimum conditions for the two-month period. Towards the end of the year, a sample of dyed wastewater was collected from a textile dyeing plant. The sample was taken directly from a dyeing tank. Decolourisation tests have begun in the semioperational model. The initial results indicate partial capability of decolourisation on the sample, with tests ongoing.

Registers of spot pollution sources and databases of Water Protection Projects 2010

Project managers: Ing. Eva Mlejnská, Ing. Elzbieta Čejka, Mgr. Halka Beldová
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Duration: ongoing activity

The task is concerned with acquisition, collection, processing and provision of information on municipal and industrial pollution sources.

The task is concerned with updating, evaluation and forwarding of information on removal of wastewater via public service sewerage systems and on the degree and manner of treatment of such wastewater. Other activities include processing of data to be submitted to the European Commission regarding the Council Directive 91/271/EEC in the Czech Republic as per Article 15 of the Directive, acquisition and processing of data on industrial sources of pollution released into watercourses or public service sewerage system, as well as provision of information to the Ministry of the Environment and both professional and lay public.

Outputs from the project are provided in the MS Excel format for the UWWTP 2009 Questionnaire, guidelines relevant for the task, final report for the task, database Register of Municipal Pollution Sources and the database Register of Industrial Pollution Sources – excluding hazardous substances.

Activities of the Testing Laboratory of Water Management Facilities

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Duration: ongoing activity

The task is concerned with execution of tests in accordance with defined test procedures in order to determine functional parameters of water management facilities.

The ongoing activity of the Testing Laboratory includes the performance of tests to determine functional parameters of small water treatment plants, light liquid separators and grease traps. In 2010, the Testing Laboratory of Water Management Facilities completed two tests of cleaning efficacy of household water treatment plants as per testing procedure SOPC1 (standard CSN EN 12566-3, Annex B). The Testing Laboratory also performed six non-accredited efficacy tests of water treatment plants, two tests to determine residual oil level for light liquid separators under maximum outflow in accordance with testing procedure SOPC2 (standard CSN EN 858-1, Chapter 8.3.3 + Modification A1) and an assessment of a water purification plant by Testing Laboratory experts. The outputs from the tests are test protocols issued by the Testing Laboratory of Water Management Facilities, accredited by the Czech Accreditation Institute under registration number 1492. Test protocol for small water treatment plants are supplemented with a report interpreting the tests results and findings. Only a test result report is issued for any tests performed in accordance with a different method, not the prescribed standard, as per customer requirements.

Methodology for the assessment of EU funding impact on the quality of wastewater released in the catchment areas of the upper Vltava, Berounka and lower Vltava

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Duration: 2009–2010

The project was concerned with processing input data for the assessment of measures subsidised by EU funds in the operation programme period 2004–2006 and their impact on the water management balance of surface water in three catchment areas administered by the state enterprise Vltava River Basin, and with developing relevant assessment methodology.

A database was created containing a list of measures implemented in the three catchment areas (upper Vltava, Berounka and lower Vltava), aimed at improving the quality of wastewater released. The intention was to process the results by the relevant catchment area, type of subsidy programme, degree of completion and the resultant impact on the quality of surface water in order to enable separate assessment for individual subsidy programmes, and EU funding in particular.

Another objective of the project was to develop a suitable methodology for the assessment of EU subsidy programmes impact on the quality of wastewater release, with a particular emphasis on the quality of water in the catchment areas of the upper Vltava, Berounka and lower Vltava, and the application of the methods to assess the impacts of measures implemented with a support from various subsidy programmes over the course of the operation programme period 2004–2006. This second part of the task has not been completed and will be performed as a separate task.

Identification of anthropogenic pressures on the status of water quality and aquatic ecosystems in the Morava and Dyje (Thaya) River basin districts

Project managers: Ing. Zdeněk Šunka (the head project manager), Mgr. Pavla Štěpánková, Ph.D., doc. Ing. Miroslav Dumbrovský, CSc., Ing. Milena Forejtníková, Ing. Miloš Rozkošný, Ph.D., doc. RNDr. Zdeněk Adámek, CSc., Ing. Danuše Beránková, Ing. Stanislav Juráň, Ing. Magdalena Karberová, Ing. Ilja Bernardová, Ing. Hana Hudcová.
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Duration: 2008–2010

The objective of the project is to identify anthropogenic pressures on the status of soil, quality of water sources and on change of habitats of aquatic ecosystems with eventual prediction or proof of a specific impact on a biological component of aquatic ecosystem.

The project is aimed at the following areas: determination of efficiency and effectiveness of flood protection measures which are close to nature, analysis of areal and diffusion sources on overall water pollution including the efficiency of selected measures, monitoring and assessment of the impact of fish farming intensification (fish management) from the point of view of water quality together with the flood protection measures, clarification of the effects of harmful substances discharged into surface waters used for elimination of water eutrophication impacts, determination of parameters affecting bathing waters profile (Directive 2006/7/EC) from the point of view of the environment, determination of anthropogenic pressure in the Morava and Dyje (Thaya) River basins and preparation of materials for the Ministry of the Environment participants in international commissions for the protection of the Danube River. The project concerns the following priorities of the Ministry of the Environment: water sources protection and the protection of surface and ground waters, nature and landscape protection, rock environment protection with the focus on ground water protection, assessment of the impacts of activities and their results on the environment, changes in the environmental factors in regard to their impact and interaction of living organisms including human and rational use of natural resources.

In individual years of the project, the solutions of all technical problems focused on issues in the Morava River and the Dyje (Thaya) River basins according to partial tasks. The year 2010 was the final year of the project. After the on-site research was finished, outputs of individual issue areas were processed and final synthetic reports for partial tasks were drawn for the period of 2008–2010. "The Final Comprehensive Report on the Project in the Years of 2008–2010" was drawn and the project was successfully finished by the final opponency on 8th December 2010.

Flood risk maps of the Czech Republic

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Duration: 2007–2011

The aim of the project SP/1c2/121/07 is to work on numerous partial issues that will complement the existing or newly designed methods for flood risk analyses of flood plain areas.

The project is focused on verification of many partial procedures of risk analysis in flood areas. Most procedures have already been designed and tested. Objectification of individual methods or partial procedures, recommended for risk evaluation and estimate of potential flood damage have

to be complemented by sensitivity analysis for new, completed data sets. The project covers a wide range of issue areas corresponding to several science fields. The list of issues selected for the project has not been closed.

For the 2010 period, the flood scenarios were completed for the pilot basins and the actual flood risk was expressed through potential damage. In the pilot area of the Kyjovka River basin the flood risk was established on the basis of potential damage for flood scenarios of potential repetitiveness of 5, 20, 100, 300 and 1 000 years. A comparative analysis was carried out with a valuable result: the quantitative and semi-quantitative risk expression methods do reach a logical consent. In 2010, the 2D numeric model selected for the project was changed (models CCHE 2D and TELEMAC) due to namely the extensive time needs of the calculation and numeric instability. The attention was given to sensibility analysis of the influence of the used hydrodynamic model on the level of flood emergency and risk. Works in 2010 were dedicated to comparison of 1D (1,5D) and 2D models output. An important part of the project focused on risk estimates based on public endangerment during floods. Factors influencing casualties can be divided into groups according to the main components of the risk – danger, exposition, vulnerability. The relation between flood risk and the amount of material damage was also studied, in other words the existence of regressive dependency between the amount of material damage and number of casualties per one damage unit. Testing suitable functional dependencies was carried out with the aid of relevant data from real floods. The possibility for multiple criteria flood risk assessment including economical damage and casualties was looked into and divided the risk into three levels. A very valuable experiment was the risk assessment based on public endangerment during flood by semi-quantitative method principles resulting in a functional dependency based on principles of assessment of flood risk impact on population. The issues connected to updating of financial standards based on the new development were addressed. The new values are designed in alternative versions. The alternative in the interval of 0,7 to 0,9 per mil of the GDP seems optimal for common prices. Furthermore, the participation of individual levels of public administration was assessed for the area of interest and new proposals for increasing the role of the administration in financing the flood control measures through redefining budgetary tax assignment were added. Another financial tool proposed was an introduction of risk coefficient into the property tax construction, a new flood control fee and the creation of relevant financial funds of municipalities and regions. The phase report includes an analysis of European and national legislative on flood risk and flood control. New formulations or completion of some provisions in selected laws with relevant comments are drawn on the basis of the results of the project.

Transposition of EU Directive on the assessment and management of flood risks

Project manager: Ing. Karel Drbal, Ph.D.
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Duration: 2007–2011

The objective of the project is to propose procedure and suitable tools for implementation of the EU Directive on the assessment and management of flood risks (2007/60/EC) into legislation of the Czech Republic.

The preparation of the transposition was based on a detailed analysis of stipulations of Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks and relevant legislation of the Czech Republic. On the basis of the analysis a detailed proposal for transposition of the Directive into the Czech conditions was presented as well as the latest version of the implementation plan which shall enable fulfilment of all requirements of the Directive. In 2009, the project reached a proposal for the first methodological draft for the preliminary flood risk assessment as the basic input activity for a new, qualitatively higher manner of processing the whole flood protection issue. In 2010, the project

inspected approaches aiming at setting the danger level by expressing the conditions in a manner that enables to better incorporate the issue of torrential flood into the preliminary flood risk assessment and to maintain the surveyed level of objectivity.

To reach the above stated goal and using available data it was necessary to address two main areas – the development of assessment procedures of “critical conditions density in the basins” with a link to outflow regimes in hydrological areas and the selection of parameters for critical conditions classification with a link to the level of urbanisation of the hydrological area. Data for the whole area of the CR were processed by a partial methodological procedure. Hydrological areas with a surface smaller than 150 km² were defined. For these areas, the reduced values of weighted average of the indicator of critical conditions of flood occurrence caused by torrential rain with a negative impact of urbanized areas were determined.

Within the outputs of the project section a proposal of the necessary extent of a plan to contain flood risks was drawn on the basis of application of consistent procedures according to general principles for drawing the content of strategic plans.

Technical support of the Czech Republic’s participation in the International Commission for the Danube River Protection

Project manager: Ing. Ilja Bernardová
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Duration: 2010 (permanent activity)

The goal of this project consists of technical support for a wide range of activities resulting from the participation of the Czech Republic in the International Commission for the Danube River Protection. Appointed representatives of the TGM WRI, p.r.i., participate actively on the work of the commission within four expert groups and sub-groups. Within their participation they continuously fulfil all requirements of the activity plan and current requirements formulated on individual expert group and sub-group meetings, including harmonisation and coordination of technical support and the group activities on both national and international level.

The activities falling under this project in 2010 focused namely on requirements for drawing national materials necessary for documents under preparation within activities of individual expert groups of the commission. Crucial activities in 2010 were the provision and securing of required data on pollution emitted by wastewater treatment stations, materials for finalizing proposals for patterns and the proposal for identification procedures of spring sections in bordering areas, consultation of the Annual Review 2008 draft and the draft report on invasive species in the Danube River. Furthermore, the activities included completion and check of national materials and completion and commentary of compilation documents drawn within individual expert groups and processing of expert comments on distributed strategic materials of the commission. As a part of their work, the Czech delegates to the commission were testing the meta-data editor for the Danube GIS.

Cooperation with Slovakia on transboundary waters

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Duration: 2008–2012

In 2010, the project was aimed at fulfilling tasks coming out from sessions of the Czech-Slovak Commission for Transboundary Waters, the support of activities of the working group for water protection and the working group “Water Framework Directive” operating within the Czech-Slovak

Commission for Transboundary Waters, common sampling and analysing of water from water bodies at the state borders.

The project included assessment of monitoring outputs for 2009 in permanent profiles of transboundary waters according to the agreed limits of prospective condition of physical-chemical indicators influencing the ecological condition and of some priority and priority dangerous substances. Furthermore, the surface water quality was assessed in rotating control spots on transboundary rivers, thus completing the information on water quality in transboundary water bodies. Several joint Czech-Slovak meetings of the group for water protection were held for the purpose of fulfilling the tasks set by the meeting of the Czech-Slovak Commission on Transboundary Waters. Monitoring of transboundary water bodies for 2011 was set.

Cooperation with Austria on transboundary waters

Project manager: RNDr. Hana Mlejnková, Ph.D.
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Duration: 2010 (a prospective permanent activity)

The activities of the project result from the tasks given by the Protocol of the Czech-Austrian Commission for Transboundary Waters and are focused on monitoring and control of water quality in transboundary rivers.

In 2010 activities focused on control of water quality in the Czech-Austrian transboundary waters continued. On the basis of the updated Monitoring Program for the Czech-Austrian Transboundary Waters regular water quality monitoring was carried out on important rivers – the Dyje (Thaya) River, the Pulkava River, the Lužnice River, the Malše River, the Dračice River and the Větší Vltavice River. Analysis results created the basis for assessment of impact of pollution passing through the state borders and for determination of the overall quality trend. Important issues addressed in 2010 included the permanent pollution brought to the CR by the Austrian Pulkava River and the new issue of mouthing sewage waters from the Austrian factory Agrana into the Lužnice River. Furthermore, the changes in sewage treatment plants construction in the boundary area were monitored as well as other activities connected to water quality in proximity of the state borders. All the information was included in the protocol of the 18th meeting of the Czech-Austrian Commission for Transboundary Waters and subsequently authorised by the minister.

Assistance to activities of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes

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Duration: 2010

In 2010, the project focused on activities resulting from the 11th meeting of the Monitoring and Assessment group, namely on assessment of conditions of transboundary watercourses and international lakes in the subregions of Caucasus, central Asia and South-east Europe as a part of 2nd assessment report. Preparation for meetings and gathering of necessary materials were performed within the project and new incentives for the assessment system in given subregions were gathered. These incentives will be used for a planned further assessment of transboundary water bodies in Western and Central Europe, including the Czech Republic.

The content of the project included securing all required activities linked to assistance to the state administration in fulfilling the requirements resulting from the meeting of the Monitoring and Assessment work group. Apart from securing the participation on the group meeting, the project includes commentary on materials for the 2nd assessment report on conditions of transboundary waters in the UNECE region, completion of materials for the meta-database of transboundary waters and proposal for pilot projects on the transboundary water issues in given regions.

Technical assistance in nutrient load simulation and Czech participation in the activities of International Commission for the Protection of the Danube River (ICPDR)

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Duration: 2008–2012

The project is focused on issues of diffuse pollution by nutrients. A wide range of calculations are being prepared, divided according to individual significant pressures (components) contributing to the final nutrient pollution of water. On the basis of the final pollution extent, definition and reassessment of measures taken to reach a good conditions of water and water ecosystems will be performed.

In 2010 calculations of emission nutrient load were performed for nutrients originating from drained agricultural areas. A grid layer of overall summer and winter precipitations was designed within the project and drained areas were selected for calculation. The calculations were performed in two alternatives for 31 partial basins covering the areas of the Morava River and the Dyje (Thaya) River basins and in harmony with methodological procedures used by the International Commission for the Protection of the Danube River (ICPDR)

Draft methodology for preliminary assessment of flood risks in the CR

Project manager: Ing. Karel Drbal, Ph.D.
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Duration: 2010

The objective of the project is to design methodology of preliminary determination of flood risks, including the level of dangerousness of floods caused by regional precipitations.

The objective of the project was to fulfil one of the closest obligations of the European Parliament Directive 2007/60/EC (the Flood Directive) imposed on the EU Member States – the preliminary flood risk assessment. This task, aiming at determination of areas with potentially high flood risk levels, is secured by the Ministry of the Environment of the Czech Republic in close cooperation with the Ministry for Agriculture of the CR. In the present, the materials available consist mainly of data on established flood areas and of information given in the basin district plans. Nevertheless, the need to distinguish the level of flood danger or to identify those parts of the Czech Republic that are exposed to a significant flood risk requires a proposal for transparent procedures and development and application of other tools. A spatial analysis of potential impacts of flood danger in flood areas on the basis of selected viewpoints represents a possibility of a comprehensive view of the whole area of the Czech Republic while maintaining a relatively easy data set and tools actualisation possibility. The viewpoint selection is strictly conditioned by the data available from the databases made and managed in the CR. The data selected could aid the approximation of the danger level for citizens, property and the environment by flood spills or other forms of flooding.

A working stay for experts of the Moldavian State Meteorological Service

Project managers: Ing. Ilja Bernardová, RNDr. Denisa Němejcová
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Duration: 2010

The objective of the project was to secure the work stay of Moldavian experts – hydrobiologists – from the State Meteorological Service in Kishinev (the Republic of Moldova) in the TGM Water Research Institute, p.r.i., in Brno both organisationally and expertly. The Republic of Moldova represents one of the priority countries supported from the Czech part according to possibilities and importance of individual issues in selected areas of interest including protection of the environment. At the same time the Republic of Moldova lies within the Danube River basin. For this area, a relatively detailed observation and surface flowing waters assessment is required by the International Commission for the Protection of the Danube River (ICPDR). The work stay helped the Moldavian biologists to acquire further and deeper expert knowledge and skills.

The work stay was focused on sampling and determination of selected components of macrozoobenthos and phytobenthos in flowing surface waters. The course program included a part on work organisation and quality management system in a biological laboratory including the system of practical biomonitoring. Furthermore, the introduction to diverse manners of preparation and processing of biological samples in a laboratory took place as well as an on-site course of sampling and a practical determination course for the two key components of flowing water ecosystems.

Flood evaluation

Project managers: Ing. Zdeněk Šunka (Head Project Manager), Mgr. Pavla Štěpánková, Ph.D., Ing. Helena Brtníková (TGM WRI), subsuppliers: the Czech Hydrometeorological Institute – Ing. Jan Kubát, the Czech Geological Survey – Ing. Jan Šikula, Ph.D., the Odra River Basin, s.e. – Ing. Petr Březina
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Duration: 2010–2011

The project will evaluate the causes and impact of flood events taking place in May and June 2010 within the Czech Republic and will prepare proposals for measures for the government of the CR.

In 2010, the objective of the project was to elaborate information for the government of the CR on the basis of primary outputs on the following issues:

1. Meteorological causes of floods
2. Hydrological course of floods
3. The impact of water reservoirs on the course of floods
4. The flood forecast service
5. Local information and warning systems
6. Landslides
7. Activity if watercourse management, flood commissions and the Integrated Rescue System components
8. Economic and social impacts of floods
9. Comprehensive summary and proposals for measures

The objective was fulfilled by handing over of the report to the Ministry of the Environment.

Further work was concentrated on writing of reports for individual partial tasks and of the comprehensive report for the whole project divided in the same manner as the information for the government of the CR.

Economical and social impacts of floods

Project managers: Mgr. Pavla Štěpánková, Ph.D., et al.
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Duration: 2010–2011

On the basis of extraordinary flood damages in August 2010, the Ministry of the Environment initiated a project Evaluation of Flood in August 2010. The main project manager and coordinator is the Czech Hydrometeorological Institute, the Brno branch of the TGM WRI, p.r.i., contributes by processing of two partial tasks.

The partial task called Economical and social impacts of floods is focused on calculation of flood damages for the area of the Liberecky and Ustecky Regions (basins of the Lužická Nisa River, the Smědá River, the Ploučnice River, the Kamenice River and the Mandava River). An overall assessment of information on the extent of the affected area, the number of affected and damaged residential buildings and other objects was carried out. The partial task was also focused on the assessment of flood impacts on transport and transport infrastructure (damages of roads and railway, the extent of traffic closures). An integral part of the project consists of processing the information on the number of casualties and overviews of planned and actual people evacuation.

Assessment of flood service and components of the Integrated Rescue System

Project managers: Ing. Helena Brtníková et al.
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Duration: 2010–2011

On the basis of extraordinary flood damages in August 2010, the Ministry of the Environment initiated a project Evaluation of flood in August 2010. The main project manager and coordinator is the Czech Hydrometeorological Institute, the Brno branch of the TGM WRI, p.r.i., contributes by processing of two partial tasks.

The partial task called Assessment of flood service and components of the Integrated Rescue System processes an overview of activities of flood institutions and emergency management institutions, components of the Integrated Rescue system and other participants of flood protection in the affected area. The materials will be processed for the areas of the Liberecky and Ustecky Regions with the focus on areas where the emergency state was declared. The information will serve for proposal of measures for amelioration of the flood service system.

Information platform for a cultural landscape

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Duration: 2010–2012

This project promotes cooperation between institutions engaged in research, development and education in the area of cultural landscape. Many subjects address the landscape from different points of view, a wider synthesising approach and interdisciplinary connections are, however, missing. The target group of the project consists of employees and applying students (the Mendel University in Brno) and partner organisations (the Masaryk University, the Institute of Geonics AS CR, p.r.i., the Global Change Research Centre AS CR, p.r.i., the Palacký University in Olomouc, the Horticultural College and

Horticultural Secondary School in Mělník and the TGM Water Research Institute, p.r.i.). Amelioration of cooperation between the subjects will have a positive impact on research and tertiary education and the current knowledge will be more easily accessible for the target group. Another objective of the project is to create or to develop existing partnership networks for a common approach to win and work on international projects and involvement in international networks.

The objectives of the project are fulfilled through four key activities covering the creation of contact points at individual institutions, the creation of information portal (www.krajinnasit.cz), good practices study (work stays in foreign networks) and creation of professional contact centre (intern student exchange, communication courses in English and German). Apart from these activities, open days were organised for individual institutions as well as over thirty popularisation lectures and a landscape dictionary was created for the information portal in the year 2010.

Research in self-cleaning processes of small, heavily degraded water courses in Weinviertel and South Moravian regions: methodology development for sustainable measures for better water quality

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tel.: 541 126 324, e-mail: milena_forejtnikova@vuv.cz

Co-managers: Ing. Danuše Beránková, Ing. Helena Brtníková, Ing. Miloš Rozkošný, Ph.D.

Duration: 2009–2011

The aim of the project is to determine possible measures for amelioration of ecological conditions or potential in harmony with the Framework Directive on Heavily Affected Currents of a Low Order according to Strahler. The project is focused on relations between the water bed morphology, anthropogenic impacts and self-cleaning. The project includes modelling of relations between the basin and the watercourse and monitoring of dynamics of processes in the flow bound to supply and diffusion of nutrients.

The regions of the South Moravia and Weinviertel share similar natural conditions and face similar problems in small water courses management in rural area. A joint project was therefore created for the period of 2007–2011, supported from the European Fund for Regional Development and from the programme of European Regional Cooperation Austria – the Czech Republic for the period of 2007–2013. The main partner of the project is the Lower Austria Government Office. The only Czech partner is the TGM Water Research Institute.

In 2010, the on-site work outputs were processed and the work on mathematical emission scenarios was carried out. The project was presented by a poster on the Magdeburg seminar in Teplice and a conference was organised for the expert public in Mušov with presentations of both Czech and Austrian project managers. The course of and other information on the project are available on the following webpage: www.profor.eu.com.

The Nové Mlýny Reservoir – expert assessment of impacts of permanent surface lowering – assessment of potential cyanide emissions

Project managers: RNDr. Michal Pavonič, RNDr. Hana Mlejnková, Ph.D.
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Duration: 2008–2010

The objective is to perform an expert assessment of impacts of the permanent lowering of the water surface in the middle and lower reservoirs of the Nové Mlýny Reservoir, resulting from the Decision no. JMK 22381/2007 of the Regional Authority of the Jihomoravský Region, Department for the

environment, issued on 27th February 2007 on the preliminary measure of lowering the water surface of the aforesaid reservoir.

Within the project an assessment was made for potential cyanide emission from sediments brought in by waste waters discharged in Pernhofen for the lowered water surface (from original 170,0 m s. l. to 169,5 m s. l.) in the Nové Mlýny Reservoir with a relation to higher temperature, lightening and pH changes. The assessment was carried out on the basis of cyanide content in sediment samples and other parameters for the period of 2008–2010 at our disposal.

The results and acknowledgements for the surveyed period of 2008–2010 can be summarised into the following conclusions:

- the Pulkava River mouthing causes a moderate increase in cyanide content in the Dyje (Thaya) River; however, the content of all cyanides, including easily releasable cyanides, still lies within the limits of the government decree no. 229/2007
- the Pulkava River mouthing causes an increase in content of cyanides and some metals (namely Cu and Zn) in the Dyje (Thaya) River sediments and sediments in the Nové Mlýny Reservoir
- the Svatka River represents an important source of cyanides for the Nové Mlýny Reservoir
- Due to low cyanide content in sediments in the Nové Mlýny Reservoir, to the easy degradability of cyanides and physical, chemical and biological conditions in the reservoirs, the risks from potential cyanide emission for a changed water surface level in the reservoirs of Nové Mlýny in the interval between 169,5–170,35 m s. l. are under current conditions insignificant.

Monitoring of the impact of Dukovany Nuclear Power Plant on quality of water in the Jihlava River in 2010

Project manager: RNDr. Hana Mlejnková, Ph.D.
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Duration: 2009–2011

On the basis of a contract with ČEZ, a.s., monitoring was continuously carried and focused on the impact of waste waters from the Dukovany Nuclear Power Plant on the quality of water in the Jihlava River and in the Dalešice-Mohelno water reservoir.

In 2010 the regular monitoring of the impact of waste waters brought in by the Skryje Brook into the Mohelno reservoir on the Jihlava River and the Dalešice-Mohelno water reservoir was carried out. The monitoring of chemical, physical-chemical, radiological, biological and microbiological analysis was assessed in the longitudinal profile from the inflow of the Jihlava River into the Dalešice reservoir (the Vladislav profile) to the profile under the Mohelno reservoir. Similarly to previous years, no significant water deterioration caused directly by waste waters from the Dukovany nuclear power plant was detected this year. An impact of specifically burdened waste waters (tritium, increased salt content) on water environment was again detected this year. In 2010, an overall tendency of water quality development in the period of 2007-2010 was carried out as well as a comparison with the period before the introduction of the 1st block of the nuclear power plant.

Identification of anthropogenic pressures in the Czech part of the Odra River basin

Project manager: RNDr. Přemysl Soldán, Ph.D.
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Duration: 2008–2010

The project was concerned with the identification of anthropogenic pressures and the definition of priorities in terms of measures proposed to alleviate negative impacts of anthropogenic pressures on water quality and aquatic habitats in the Czech part of the Odra River basin.

This multidisciplinary project was pursued by five prominent scientific institutions under the leadership of the TGM Water Research Institute. Senior Investigators of the project worked on five areas – surface water pollution balance for the Odra River basin, demonstration and prediction of anthropogenic pressures on biological components of aquatic ecosystems, impacts of intensification of fish farming on water quality, publication of project results and coordination of solutions, and summary of anthropogenic pressures in the river basin. The project was designed to provide generally applicable outputs valid in environmental protection as well as specific proposals immediately applicable in public administration (input documentation for conceptual documents, legislative bills, decisions and guidelines for the determination of anthropogenic pressures, etc.).

Investigation of the project concluded in 2010. All constituent tasks included sampling campaigns and summary evaluation of results for the duration of the project investigation. The assessment results indicated that the most complicated parameters from the pool of shared relevant pollutants valid for the Czech part of the Odra River basin, in terms of national limiting standards, include polycyclic aromatic hydrocarbons (PAHs), and at the level of European standards PAU and heavy metals: mercury and cadmium. Negative impacts are significantly amplified below larger urban agglomerations. This situation demonstrates in long-term pollution of aquatic habitats, and river sediments in particular. That contributes to an increased risk of persistent pollution effects with eventual impact on the condition of aquatic ecosystems, as demonstrated by ichthyofauna investigations. An undesirable situation persists in the river basin also in terms of the possibilities of rapid detection of emergency deterioration of biological quality of surface waters.

Research into waste materials as a replacement for primary raw materials

Project manager: Ing. Tomáš Sezima, Ph.D.
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Duration: 2007–2011

The core objective of the project is the research into utilisation of waste materials (in particular sludge from wastewater treatment plants) in the production of alternative solid fuels, minimisation of the number of cases when unsuitable types of materials are used in the production of alternative solid fuels, and verification of new procedures for checking of waste management processes with the aim of identifying potentially hazardous qualities of fuel charges and combustion products with respect to their further utilisation, e.g. for landscaping, reclamations, etc. Project investigation aims to provide solutions for maximum utilisation of waste materials as a replacement for primary raw materials.

The project has been investigated primarily by the Water and Waste Management Departments, Hydrochemistry and Hydrobiology Departments (TGM WRI, Ostrava Branch), laboratory for the research of waste materials suitable for the production of alternative fuels

(VÚHU, a. s., Most), laboratory for the reduction of hazardous properties of waste materials (Mining University – Technical Institute Ostrava – HGF-Environmental Engineering Institute).

Emphasis was placed in 2010 on the research into combined physical, chemical and biochemical preliminary treatment of purification plant sludge in order to reduce their selected hazardous qualities. A significant component of the investigation has been the development of proposals and verification of formulas for composite alternative solid fuels, including analytic and toxicological monitoring. Also performed were supplementary researches into related topics. Substantial emphasis was also placed on presentation of the project outputs to professional public.

Support to the Ministry of the Environment in the area of water protection with emphasis on the issue of hazardous substances

Project manager: Ing. František Sýkora
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Duration: 2008–2011

The project has been designed to provide support in implementation of the Directive 2008/105/EC of European Parliament and Council on environmental quality standards in the field of water policy, amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/419/EEC, 86/280/EEC and amending Directive 2000/60/EC, support regarding the activities of the European Commission Working Group E DG Environment and expert support for external activities of the CMPE Working Group under the Common Implementation Strategy for the EU Water Framework Directive.

In 2010, the expert support focused on the preparation of the following legal regulations:

- An update to the Government Decree No 61/2003 Coll., on indicators and values of permissible pollution of surface waters and wastewaters, requirements for permits to release wastewater into surface waters and wastewater systems, and on sensitive areas, as amended;
- Draft decree on the manner of assessment of the surface water body conditions, manner of assessment of ecological potential of strongly affected and artificial water bodies, and requirements for programmes of assessment and evaluation of surface waters condition;
- An update to the Decree No 142/2005 Coll., on planning in water management, to be replaced by a decree on “river basin plans and plans for flood risks management”.

This project has also included tasks immediately related to the transposition of the Directive 2008/105/EC, in particular the Article 3 – Environmental quality standards, Article 4 – Mixing zones, and Article 5 – Inventory of emissions, discharges and losses.

Support provided to the European Commission Group E DG Environment included filling in forms on priority substances for the Czech Republic, testing of a software instrument for screening models of Ni bioavailability in watercourses, and processing of a questionnaire on three specific substances: heptachlor, PCB and benzene.

Expert support provided for external activities of the CMA working group (now CMPE – Chemical Monitoring and Emerging Pollutants) included participation in workshops and meetings of the CMPE group.

Registry of industrial sources of pollution – hazardous substances

Project manager: Ing. Alena Kristová
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Duration: since 1998

The core task of the project is the annual updating of data on management of selected hazardous substances and their release to water environments. The scope of the database is adjusted to the requirements ensuing from legislative regulations and demands of the preparation of input documentation and specific outputs requested by the Ministry of the Environment (data pro the International Commission for the Protection of the Elbe, International Commission for the Protection of the Danube, International Commission for the Protection of the Odra, Programme for the reduction of surface water pollution with hazardous and especially hazardous pollutants, reporting reports to the European Commission in the particular area, etc.).

The inventory is concerned with 17 especially hazardous substances and 66 hazardous substances or groups thereof, having accepted substances listed in the Lists I and II of the Council Directive 76/464/EEC, including 32 priority substances listed in the Annex X of the EU Water Framework Directive 2000/60/EC. The data collection processes are concerned primarily with information on actual release data (quantity and quality of released wastewaters) and management of hazardous substances (utilisation and consumption). In 2010, the task included evaluation of emissions of especially hazardous substances from industrial sources as per requirements stipulated in the Government Decree No 61/2003 Coll., as amended (Annex No 1, Part C, Table 3) and emissions of selected priority substances (PAHs).

Transboundary waters cooperation with Poland

Project managers: Ing. Luděk Trdlica, RNDr. Jaroslava Procházková
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Duration: 2010 – ongoing activity

The main objective of the project is to collect and provide requested water-management-related data and information necessary in the activities of government transboundary waters envoys of the Czech Republic and Poland, channelled via the relevant working groups. Other tasks include fulfilment of requirements related to the issues of transboundary waters between the Czech Republic and Poland.

The water management planning group for transboundary waters has investigated issues of flood protection measures on the border sections of the rivers Petrůvka and Opava, and the preparatory works for the Nové Heřmínovy water reservoir. It has been concluded that execution of flood protection measures and preparations for the Nové Heřmínovy water reservoir are on schedule and require implementation of no further measures.

Utilising documentation received from the Polish side, the working group tasked with the implementation of the Water Framework Directive 2000/60/EC created an updated table of cross-border and border-zone water bodies, subsequently submitted to the Polish side. Results for the Czech-Polish-German monitoring on the Lusatian Neisse for 2009 have also been processed. The group also pursued the issues of impacts on the hydrological regime on the Czech side of the border of mining processes at the Turów mine in Poland. An expert examination has also been completed for the changes in the hydrological regime in the area, with the results applied in all subsequent decisions and conclusions made at the level of the government envoys.

The hydrologists and hydrogeologists working group conducted joint field measurements on the Czech and Polish sides in the basin of Polická pánev and the Stěnava river. Selected projects are in place for long-term systematic monitoring of the groundwater levels and flow rates at surface watercourses across specified hydrological profiles. A development trend has been determined for the water content of the Polická pánev for purposes of the HyP group, based on flow rates evolution, as well as trends in groundwater levels and stores.

Support to Czech participation in the activities of the International Commission for the Protection of the Odra against pollution

Project managers: Ing. Luděk Trdlica, Ing. Petr Tušil, Ph.D., MBA, Ing. Martin Durčák
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Duration: 2010 – ongoing activity

The project aims to provide expert support to the implementation of the Convention on the International Commission for the Protection of the Odra and the Convention on the Protection of the Marine Environment of the Baltic Sea Area. Other tasks include performance of activities and provision of documentation for Czech members of working groups under the International Commission for the Protection of the Odra, including documentation for meetings of heads of delegations and for the sessions of the International Commission for the Protection of the Odra.

The governing group G1 (WFD) has been focusing in the first half of the year on the completion of the Plan for the International Oder Catchment Area. The plan was submitted to the European Commission after approval by the individual parties within the International Odra Catchment Area, and published on the website of the organisation. In the second half of the year, a timetable for the “Tasks of the G1 group and its subgroups for the period 2010–2015”, approved by heads of delegations as well as the plenary session of the International Odra Catchment Area. Also commenced was the preparation of a strategy for shared tasks in water management.

The Working Group Planning (GP) was primarily concerned with the development of a timetable and a programme of works for further implementation of the Water Framework Directive in the second planning period. Other tasks performed included identification of differences and shortcomings in individual assessments and specifications of border, and border-zone water bodies.

The Working Group Monitoring (GM) commenced its work in the harmonisation of methods for the assessment of the ecological status of water bodies. The following will be processed gradually:

- Tabular overview of all existing methods applied in the assessment of the ecological status of water bodies;
- An overview of reference conditions definition;
- An overview of approaches to the boundaries of individual status classes.

In the initial step, a table “Identification of boundary and boundary-zone water bodies” was created, including identification of water bodies and data on individual parameters of ecological status assessment.

Monitoring methodological control and condition assessment of surface water bodies

Project managers: Ing. Petr Tušil, Ph.D., MBA, Ing. Pavel Horký, Ph.D., Mgr. Aleš Zbořil, RNDr. Jakub Langhammer, Ph.D. (Faculty of Science, Charles University in Prague), Mgr. Libuše Opatřilová, RNDr. Denisa Němejcová, Ing. Martin Durčák, Mgr. Pavel Rosendorf, Ing. Tomáš Mičaník
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Duration: 2010–2011

The project financed by the Czech State Environmental Fund focuses on a proposal of a comprehensive assessment system for running watercourses respecting the requirements of the Water Framework Directive 2000/60/EC. The project includes processing of specific outputs and activities related to the proposed watercourse assessment system, and a proposal for a monitoring network for the identification and assessment of watercourse conditions, alongside guidelines for the selection of monitoring sites suitable for the assessment of chemical and ecological status. An indispensable part

of the project is support to the Czech participation in intercalibration exercises for individual biological components of the ecological status assessed by individual working groups.

In 2010, the project was concerned with processing outputs related to the "Methodology for the identification of watercourses" along with updating of information on watercourses, including the GIS layer. Another output of the project was the report on participation in intercalibration exercises in 2010.

Development of the "Methodology for the identification of watercourses" included in particular the issues of guidelines for updated identification of watercourses, verification of the proposed methods on a selected piloting river basin section, and the development of a final draft guideline for the updated identification of watercourses.

Another output of the investigation was the GIS layer for watercourses based on the above methodology. Simultaneously with the GIS layer, a database code convertor was developed for the conversion from the existing bodies of water to newly identified watercourses.

A summary report was made to the Czech participation in the intercalibration exercises in 2010, including specification of activities performed during the exercises in the intercalibration group Eastern Continental, in particular the preparation of data sets containing biological and environmental data for biological constituents macrozoobenthos, phytobenthos and macrophytes, plus a selection of suitable statistical methods for subsequent processing of measurement results. This task also included the preparation of documentation necessary for the participation in meetings of the intercalibration groups under the geographic group Central Baltic, in working subgroups focusing on biological constituents of macrophytes, fish and intercalibration for large rivers.

Review and expert activities

Project managers: Ing. Ivana Truxová, RNDr. Přemysl Soldán, Ph.D.
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Duration: 2010

The objective of the project is to provide comprehensive support in fulfilling orders received from external customers, including acquisition of new contacts and new orders for the task.

In 2010, a total of 20 orders were pursued. In majority of cases, the performances included sample collection with subsequent chemical and eco-toxicological analyses. The samples collected were mostly industrial wastewaters and samples of waste materials. The Hydrochemistry Department continued in the performance of an order for ongoing monitoring of industrial wastewaters with expert consultancy, provided to the company Lakum – KTL, a. s., in Frýdlant nad Ostravicí. This order was expanded in 2010 by collection of sludge material from physical and chemical processing units, from the phosphating (parkerising) process and from the enamelling shop sludge, with subsequent analyses as specified in Annex No 2 to the Decree No 294/2005 Coll., on the conditions for the deposition of waste materials at dump sites, utilisation of waste materials in landscaping, and amending the Decree No 383/2001 Coll., on the specific requirements of waste management. Another ongoing order pursued was concerned with the monitoring of industrial wastewaters for the company ČEZ Energetické služby, s. r. o., Ostrava, and analyses of wastewaters released from small water purification plants for municipal sewerage systems, for example for the companies VVÚU, a. s., Ostrava, Ragastra, s. r. o., Ostrava-Radvanice and Stavební bytové družstvo Frýdlant nad Ostravicí.

A new and significant order was pursued on behalf of the Municipal Authority of Frýdlant nad Ostravicí: collection and analysis of sediment samples from the head race "Tichá voda" and subsequent analyses as per the Annex No 9 to the Waste Management Act No 185/2001 Coll., as amended. Other orders were smaller in extent. The Hydrobiology Department fulfilled ten orders. They included primarily determination of eco-toxicity levels for the companies Pemit, s. r. o.,

Paskov, Laboratoře Morava in Studénka, and determination of the wastewater toxicity for the company Vodárenská, a. s., Ostrava. Due attention was directed at participation in announced tenders and acquisition of new contacts.

The fact that the financial volume of orders pursued for external customers remains unchanged in 2010 was hailed as a success, as well as preliminary agreements on orders in 2011 amounting to a similar financial value.

Centre for Waste Management

Expert support to the Waste Management Department of the Ministry of the Environment in the area of PCB-containing installations and substances inventory

Project managers: Ing. Dagmar Sirotková, Ing. Kateřina Poláková, Ing. Světlá Pavlová
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Duration: 2010

This task is concerned with collection and processing of registration data and other activities related to creation of PCB-containing installations and substances inventory, as stipulated in the Waste Management Act No 185/2001 Coll., as amended

A project investigated since 2001 focused on acquisition, validation and processing of hardcopy and digital registers of PCB-containing installations and substances, as stipulated in the Waste Management Act No 185/2001 Coll., as amended (Section 39, paragraph 8), and the related execution Decree No 384/2001 Coll., on PCB management. Other continuous activities include certification training provided to sample collectors, so-called sampling managers involved in registration of PCB-containing installations and substances, registration of laboratories performing PCB analyses in mineral oils and other matrixes, distribution of unique sampling labels, consulting services and updating of information on PCB/PCT at the website <http://ceho.vuv.cz>.

In 2010, articulated wording was submitted for the planned legal update to the Waste Management Act, dealing with PCBs and POPs. The project also included the development of a guideline for the record keeping for PCB-containing installations and substances, and training provided to employees of the agency CENIA in matters relating to record keeping. In addition to record sheets, lists of installations that are not subject to record keeping (Section 27, paragraph 5 of the Waste Management Act) were collected and processed, as were plans for removal and/or decontamination of PCB-containing installations and substances (Section 27, paragraph 8 of the Waste Management Act).

Education in waste management

Project managers: Ing. Eva Kajanová, Ing. Dagmar Sirotková, Ing. Martina Záleská, Ing. Pavel Vejnar, Ing. Věra Hudáková
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Duration: 2009–2011

The project is concerned with ensuring the necessary levels of education and awareness in the area of waste management, improved public administration as a result of acquisition of reliable data on the

production and management of waste materials in the decision-making and control activities in the area of waste management. The project also provides support to businesses in terms of implementation of technologies and systems promoting minimisation of waste production, waste material utilisation, as well as informing the relevant stakeholders on new procedures in eco-toxicity assessments and causes of developments in the area.

There was a considerable demand in 2010 for a seminar on records keeping and reporting in accordance with the Waste Management Act No 185/2001 Coll., as amended. Other activities pursued as a part of this project in 2010 related to the proposed modifications to the processes of waste materials eco-toxicity assessments. Various workshops were held during the year on the topics of new proposed methods for eco-toxicity assessment, designed for employees of relevant laboratories. There were also proficiency tests of laboratories in the area of solid waste materials eco-toxicity assessments.

Branch of Applied Ecology

The brown bullhead and the black bullhead in Czech and Slovak waters

Project managers: Ing. Jiří Musil, Ph.D., PaedDr. Ján Koščo, PhD. (the Prešov University, the SR) et al.
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Duration: 2010–2011

*The objective of the project is to create a taxonomic revision of two non-indigenous north American bullheads (*Ameiurus melas* and *Ameiurus nebulosus*) registered in free waters within both the Czech and the Slovak Republic on the basis of their external morphology, to determine their current expansion area and to prepare a joint international project.*

With the aid of the Kontakt project a research expedition of two Czech project managers to Eastern Slovakia was made in 2010. The expedition focused on sampling of non-indigenous fish communities in the Bodrog River basin (borders of Slovakia, Ukraine and Hungary) and included sampling in 14 localities on the following rivers: Ošva, Latorica, Laborec, Duša, Ondava Trnavka, Uh and the Brehovsky Canal. A rich biological material was gathered comprising five non-indigenous fish species which very often constituted a dominant part of the water ichthyofauna in the Slovak waters; the black bullhead was present in 70% of the sampled localities. The other bullhead species, the brown bullhead (*Ameiurus nebulosus*), was not detected in the researched localities. At the same time, a visit of Slovak project managers was made, this year with the focus namely on processing of the gathered biological material.

Water quality monitoring in crucial sites of presence of specifically protected species

Project managers: Mgr. Michal Bílý, Ph.D., et al.
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Duration: 2010

The objective of this long-term project is to secure a continuous overview of the chemism of water in the aforesaid priority sites through up-to-date information on the chemism conditions and through creation of multiple year time-lines showing tendencies in chemism changes, necessary for the

management planning in the given specifically protected areas. The outputs of the project are intended namely as a background material for the activities of the high state authorities of nature protection or other state subjects managing some of the sites (nature protection departments of regional authorities, for example).

In 2010, the regular monitoring primarily focused on the freshwater pearl mussel *Margaritifera margaritifera* localities. The freshwater pearl mussel is included in the rescue programme for endangered species and the protection of its localities is at the same time the protection of the most preserved oligotrophous watercourses and their species diversity. Localities where the freshwater pearl mussels are present in the CR and which are included in the NATURA 2000 system are covered by the monitoring by their largest part. Localities of another highly endangered species, the thick shelled river mussel (*Unio crassus*), are also included in the NATURA 2000 system. The stone crayfish (*Austropotamobius torrentium*) is the significantly more endangered of the two Czech indigenous crayfish species. The locality chosen for chemical monitoring represents a typical environment for this species. Furthermore, the only locality of the Ukrainian brook lamprey (*Eudontomyzon mariae*) in the CR (Račinka near Velké Losiny) was monitored as well. The locality of the golden tadpole shrimp (*Lepidurus apus*) in Libický luh was selected for monitoring due to its endangerment by highway washings.

Analysis of long term time-lines was carried out in 2010 namely for the freshwater pearl mussel localities in the Blanice River. A positive tendency in the water chemism changes was detected on the crucial profiles in that area.

Development of approaches for improving migration conditions in rivers

Project managers: Ing. Jiří Musil, Ph.D., Mgr. Aleš Zbořil, Ing. Pavel Horký, Ph.D., Mgr. Ondřej Slavík, Ph.D.

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Duration: 2010

The possibility for free migration of species is the basic condition of their natural behaviour, strategy for life-cycle maintenance and preservation in time and space. When migrating among diverse types of water ecosystems and their environments the species are limited by artificial barriers such as weirs and dams. The objective of the project therefore is to create a systemic solution for the problematic fragmentation of watercourses through continuous renewal of river continuity, which is required by many legislative frameworks and protection activities on both national and international levels (for example the Water Framework Directive 200/60/EC, EC Council Decision 1100/2001 and other).

Previous outputs of the project consisted of basic data characterising conditions and relations between transverse obstructions and the ichthyofauna in the Czech Republic. The data was subsequently used for a strategic document "Concept for improved passability of rivers in the Czech Republic" (Ministry of the Environment, 2010). This material is intended to create a significant legislative framework for renewal of longitudinal passability of watercourses and for identification of priority objectives and sections of the Czech watercourses where fish crossings will be constructed in connection with the ministerial operation program. To fulfil these objectives, the project focused in 2010 on determining the impacts of planned construction of fish crossings that will be constructed with the aid of the Operation Program of the Ministry of the Environment of the Czech Republic to the year 2015.

Salmonid and cyprinid waters and support to reporting

Project manager: Ing. Věra Kladivová

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Duration: 1999–2012

The objective of the project is a complex implementation of the Directive 2006/44/EC (codified wording) on Freshwaters. This includes mainly quality assessment of surface waters suitable for life and reproduction of indigenous fish species and other water organisms – the declared salmonid and cyprinid waters.

In 2010 the quality of salmonid and cyprinid waters was assessed for the period of 2008–2009 as a part of the Report on Water Management Condition in the Czech Republic for the Year 2009 created for the government purposes. The assessment was carried out with regard to the changes in the codified wording of the Directive 2006/44/EC.

For the purposes of the assessment data for the period of January 2008 to March 2009 were available and the maximal measure value was taken into account for the assessment (the Government Decree No 71/2003 Coll.)

Fulfilment of admissible fish water limits (I-values) was processed as well as all target limits (G-values) for individual declared fish waters. The full assessment is available on the www.vuv.cz web page in the section HEIS – salmonid and cyprinid waters.

On part of the outputs included expert activities focused on preparation for amendment to the Government Decree No 71/2003 Coll.

A study of fish migration through brush fish passes on the Sázava River

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Duration: 2009–2010

The project assessed the study of fish migration through brush fish passes on the Sázava River. The passes were installed into existing weir sluices.

Monitoring was carried out for four weirs – Pyskočely, Černé Budy, Kavalier and Budín – from the half of March to the half of June by passive integrators and bioscanner made by VAKI, Iceland. A variable effectiveness was found for individual passes as well as different reactions of the migrating fish on the environment factors. One of the most significant findings was that the tested passes are not sufficiently efficient and are partially selective from the point of view of species and size. On the basis of hydraulic modelling it can be stated that the main problem of the restricted functionality of passes lies within the unsuitable localisation in relation to the streamline of the river. The tracks of the passes themselves are satisfactory in parameters such as the speed of the current.

The brush technology cannot be applied for all weir sluices to make the flow passable. This manner can be, however, used in cases where the weir sluices meet the requirements for a standard fish pass (slope, capacity etc.). The brush technology can also be used for construction of a new fish pass or to enhance hydraulic conditions in existing types of passes (for example the interstice passes). When a brush pass is constructed, it is necessary to consider its short lifespan (5–10 years). The brush blocks have to be changed after this period; otherwise the pass becomes completely non-functional.

Fragmentation of the river network in the Czech Republic

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Duration: 2010

The objective of the project was to determine the indicator No14 – fragmentation of the river network in the Czech Republic of the SEBI 2010 indicator set for publication purposed of the Ministry of the Environment of the CR.

Fragmentation of the river network in the Czech Republic represents a significant anthropogenic impact with a negative effect on biodiversity of river ecosystems. Up until the present, more than 6000 transverse obstacles are in evidence, including weirs higher than 1 metre and water reservoirs larger than 50 ha. The watercourse fragmentation influences water environment by a series of abiotic and biotic changes which have a complex and fundamental impact on water ecosystems and structuring and organisation of water biota – the key factors for retention of biodiversity.

Importance and management of wood debris in watercourses

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Duration: 2010–2011

The purpose of the project assigned by the Ministry of the Environment is to create a methodological document proposing procedures for use of wood debris for revitalisation, watercourse management and monitoring of wood debris occurrence. Large wood debris, such as uprooted and broken trees, branches or stubs, represent structures significantly influencing the morphology of a watercourse and subsequently also biodiversity within this course. Therefore the attention has been given to the use of wood debris to enhance morphology of revitalised watercourses, to stabilise river beds and to ensure diversity of habitat for water vertebrates and invertebrates. The aforesaid is of significance for example to reach a good condition and potential of water bodies in the sense of the Water Framework Directive (200/60/EC). The objective of the methodology in creation is to offer instructions for practical use and management of wood debris in watercourses.

In 2010 the input part was carried out – the research into available knowledge on wood debris importance for watercourses, on principles of its classification and description, on the importance of wood debris for revival of the watercourse and its surroundings and on an overview of current monitoring. Experience with wood usage in watercourses and legislative issues linked to watercourse management were also studied.

Determination of erosion phosphorus share on eutrophication of endangered bodies of stagnant surface water

Project managers: Ing. Josef Krása, Ph.D. (CTU in Prague), Mgr. Pavel Rosendorf (TGM WRI), doc. Ing. Josef Hejzlar, CSc. (BC AS CR), RNDr. Jindřich Duras, Ph.D. (Vltava River Basin, state enterprise) et al.
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Duration: 2010–2013

The objective of the project is to design effective water management measures to secure sustainable water quality in important water reservoirs namely with the regard to eutrophication while maintaining their full functionality. By defining source areas of sediments within the basins and their actual effect on clogging and possible eutrophication of reservoirs suitable places for retention elements and anti-erosion measures will be localised and transported sediment volumes will be calculated for the basins of interest. For all high-risk reservoirs the overall phosphorus burden from the basin will be determined at the same time and the share of individual sources on eutrophication will be evaluated.

The objective of the project, within which the TGM WRI represents one of the co-managers, was for the year 2010 mainly to critically assess the selection of high-risk bodies of stagnant surface water and to define in harmony with the EU Framework Directive on Water Policy criteria the list of water bodies and related basins to be included into the project. New environmental objectives were defined for this purpose for phosphorus concentrations in flowing water bodies and on the basis of these objectives target values for individual reservoirs were determined through empirical models. Comparing the target values with the actual condition in individual reservoirs enabled creation of a new list of reservoirs threatened by eutrophication. In the first year of the project duration a detailed methodology was designed and an analysis of necessary data sources was made. A gradual data gathering and analysis of available data was done for the area of the Czech Republic as well as for parts of basins surpassing the state borders. Methodological procedures and extent of the data needed were tested in the pilot basin of the water management reservoir Římov and in the pilot basin of the Orlík reservoir.

Monitoring of macrophytes community in the Teplá Vltava endangered by navigation and of selected chemical and physical parametres

Project managers: Ing. Věra Kladivová, Mgr. Ondřej Simon, Mgr. Matúš Maciak, M.Sc.

Duration: 2010

*The project is aimed at the monitoring of coastal vegetation of macrophytes belonging to the *Myriophylletum alterniflori* Steusloff community and at the assessment of the effect of water tourism on this most fragile part of the unique ecosystem of the Teplá Vltava River bed in the area of the Šumava National Park. Attention is also given to biotope demands of another part of the ecosystem – the critically endangered species *Margaritifera margaritifera* L.*

The TGM WRI has been dedicating a part of its capacity to the analysis of impact of excessive navigation in this part of the river on a long-term basis. The excessive navigation seasons with 10,000 boats per season (2005–2006) as well as the time periods, when water tourism started to be regulated and the years 2009–2010, when an effective navigation regulation was established are all monitored and registered.

Long-term changes in macrophytes coverage in selected profiles for the whole part of the flow are assessed together with seasonal changes dynamics. To assess the direct impact of passing boats, the project uses methods to measure the volume of plant parts that are broken off in connection with the number of passing boats and the water level. From the data gathered a prediction model explaining 70% of the data variability was designed.

Chemical parameters such as water quality in the longitudinal profile of the main current and inflows were measured. Monitoring of yearly temperature development with the aid of continuous probes was used for comparison of temperature conditions in selected localities from the point of view of the freshwater pearl mussel.

Information leaflet on the critically endangered species freshwater pearl mussel (*Margaritifera margaritifera*) and other big molluscs living in the Czech Republic

Project managers: Mgr. Ing. Lucie Kubíková, Mgr. Ondřej Simon, Ing. Karel Douda, Mgr. Michal Bílý, Ph.D.

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Duration: 2010

*There are several species of so called big molluscs living in the waters of the Czech Republic, the best known being the freshwater pearl mussel (*Margaritifera margaritifera*). Among other indigenous*

species you may find three species of river mussels and three species of mussels. In the past years one species of mussels has been permeating from Asia. The leaflet will provide information on the critically endangered species of the freshwater pearl mussel and on other big molluscs living within the Czech Republic.

The leaflet is intended for general public as well as the expert public, mainly to fishermen, water managers and employees of the protection of nature departments in state administration and local authorities. The readers will learn in an entertaining manner about distribution, nurture, life cycle and demands of the freshwater pearl mussel on the quality of the environment. The leaflet furthermore provides information on the rescue program for the freshwater pearl mussel and how to help to protect big molluscs in the CR. On the inside of the leaflet information on diffusion of other individual species of big molluscs are provided including the category of their protection by law. The project was supported financially from Financial Mechanisms of the EEA/Norway.



A short-term work stay of experts in Norway to establish cooperation in the area of protection of the freshwater pearl mussel (*Margaritifera margaritifera*)

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Duration: 2010

*The freshwater pearl mussel (*Margaritifera margaritifera*) is one of the critically endangered species not only within the Czech Republic but also in the whole of Europe. With the aid of Financial Mechanisms of EEA/Norway two short term work stays were made into the Norwegian science institution NINA in Trondheim. These stays aimed at experience exchange (including visiting of intact localities) and establishing of long term cooperation on the issue of protection of the freshwater pearl mussel.*

During the first work stay (June 2010) count and population monitoring of the freshwater pearl mussel was carried out for two localities in central Norway (the Mosa and Aursunda Rivers), and the presence of larvae of the pearl mussel was detected on branchiae of host fish – salmon and brown trout – within the laboratories of the NINA institution in Trondheim. The second work-stay (August 2010) was in the outdoor station of the NINA institution in Ims and in its surroundings in south Norway. Several experiments were carried out, the results of which formed basis for a description of reaction of the freshwater pearl mussel on stagnation of water conditions. Samples of detritus were taken from two rivers with freshwater pearl mussel occurrence (Hå, Ognå) and samples of water from interstitial flow environment. The project was supported financially from the Block Grant CZ 0001 of the Technical Assistance Fund within Financial Mechanisms of EEA/Norway. Mr. Bjorn M. Larsen is the contact person within the NINA institution.



<http://eeagrants.org/>

Creation of the proposal part of the keeping plan for the NNM and NNM Blanice Spring-head

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Duration: 2010

The contract, made by the Management of the Šumava National Park and Protected Landscape Area, was focused on the preparation of the proposal part of the keeping plan for the National natural monument of Blanice and of the National natural monument of Blanice Springhead for the period of 2011–2020. The keeping plans are prepared in the form of expert and conception documents based on development and current condition data of the specifically protected area and proposing measures for conservation or amelioration of the condition of the protected area to keep the specifically protected area from external adverse effects.

The National natural monument Blanice and Blanice Springhead are situated in the upper part of Blanice Vodňanská in the areas of the Šumava Protected Landscape Area. Both the specifically protected areas have a joint protection zone of almost 6 000 ha. Water and peat bog ecosystems are protected in these areas, both providing a biotope for the critically endangered pearl mussel (*Margaritifera margaritifera*). The content of the proposal part of the keeping plan consists of a set of measures aiming at preservation of suitable conditions for the subject of protection and their potential amelioration. The intervention and measure plan proposes for both the national natural monuments several revitalisation interventions for small watercourses, recommendations for management of breeding elements in the basin and forestry measures aiming at maintaining forest-less area and lightening of surrounding watercourses. The keeping plan was drawn up in accordance with the outline prescribed by the Ministry of the Environment in harmony with the Decree of the Ministry of the Environment No 60/2008 Coll. and after authorisation it will be valid for management in both the Specially Protected Areas for the period of 2011–2020.