

Abstracts of the Projects 2012

Branch of Hydraulics, Hydrology and Hydrogeology

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

Project manager: Ing. Šárka Blažková, DrSc., et al.
tel.: 220 197 222, e-mail: sarka_blazkova@vuv.cz

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 a various antecedent wetness.

Hydrographs have been selected from 19 series with the length of 100 years in hourly timestep. The approach is compared with other European procedures for flood frequency estimation.

Critical source areas of Phosphorus in watersheds

Project manager: Ing. Šárka Blažková, DrSc.
tel.: 220 197 222, e-mail: sarka_blazkova@vuv.cz

Duration: 2012–2015

P-pathways is a project of the American-Czech cooperation on the leaching of phosphorus from agricultural land and/or diffuse pollution leaching from small municipalities and buildings with insufficient removal of sewage.

We work on four agricultural catchments with a different intensity of agricultural production. In 2012 we have constructed a device for artificial rain in order to be able to work with intensities which occur only very rarely. The absence of the pesticides with phosphorus on one catchment was checked and a preliminary trial with sprinkling on two catchments was carried out.

Proposal of a system for managing emergency situations associated with drought and water scarcity in the Czech Republic

Project manager: Ing. Radek Vlnas
tel.: (+420) 220 197 253, e-mail: radek_vlnas@vuv.cz

Research team: Ing. Ladislav Kašpárek, CSc., RNDr. Tomáš Hrdinka, Ing. Magdalena Mrkvičková, Ing. Martin Hanel, Ing. Adam Vizina, Ing. Renata Fridrichová, Ing. Oldřich Novický, Mgr. Pavel Tremel,

Mgr. Marta Martínková (TGM WRI), prof. Ing. Pavel Pech, CSc., Ing. Petr Máca, Ph.D., Ing. Jiří Pavlásek, Ph.D., Ing. Lukáš Jačka, Ing. Petr Bašta (Czech University of Life Sciences).

Duration: 2010–2014

The objective of the project is to develop a methodology and procedures to manage emergency situations caused by drought similarly as methodology that have been implemented and stipulated in Czech legislation for protection against floods. The solution lies in defining degrees of drought (similarly to those defined for floods) selected according to the thresholds of indicators of drought and the general consensus agreed by representatives of water authorities, state institutions and other stakeholders involved in availability of water resources and water demands, particularly in dry seasons. The strategy should define not only the degrees of drought but also powers of the authorities of public administration, involved in water management and water use priorities, particularly in drought periods.

In 2012, the other theoretical distributions suitable for determination of indexes were tested. The simplified version of the snow water equivalent index was tested. The distribution function of this version cannot be evaluated because of short time series. The integrated methodology was prepared for meteorological drought (SPI, DMPI, API indexes), hydrological drought in surface waters (SRI, DMRI indexes) and in groundwaters (SGI, DMGI indexes). The derived simplified procedure is designed also for water reserve in snow and reservoirs. The relations between indexes of meteorological and hydrological drought were investigated using genetic algorithms.

The model BILAN adjusted previously to week time step for needs of early warning system was adjusted in 2012 in such way that it was possible to fix the parameters calibrated on a one-time basis and to run the model repeatedly to predict.

The correlation between yields of agriculture crops and status of drought expressed by chosen indexes was discovered while evaluating importance of agronomic drought. The limit values of indicators were determined on the base of statistical analysis of computed factors in individual areas. These values are also a base for visualization of stages of emergency of agronomic drought. The visualization is also connected to beginning of vegetation period (predominantly the beginning of May).

The influence of reservoirs on the progress of hydrological drought was assessed. The comparison of determination of dry period by water management coefficient and the probabilistic method using index SDI was carried out. Additionally, the basic documentation was prepared for solution of crisis situation caused by drought occurrence and lack of water in the area of the Czech Republic.

Sustainable use of water resources under the condition of climate change

Project manager: Ing. Adam Vizina, et al.
tel.: (+420) 220 197 404, e-mail: adam_vizina@vuv.cz

Duration: 2011–2014

The project objective is using estimation of probable development of water balance influenced by climate change for evaluation of prospective status of surface and groundwaters. Current recommended approaches to water balance of perspective status do not correspond with current conditions: climate change already in progress and consequent changes of water regime in the Czech Republic. The software tools are necessary to be prepared for the solution: 1) for connections between hydrological balance of water quantity and components of water management balance and 2) for perspective evaluation of the status of the water quantity. The certificated methodology for evaluation of the perspective status of quantity of surface and groundwaters will be prepared based on validation of software tools at selected pilot catchments by the end of the project (2014).

The software and user interface allowing modeling of relations between hydrological and water management balance and derivation of series of natural discharge were created in 2012.

The model allows quantification of water use (mainly of drained waters) and to estimate natural hydrological conditions. This tool was used for water balance modeling at more than 200 catchments. Consequently the number of catchments increased more than ten times. The reason was verification of the model and requests of project partners on usability of the results in river basin planning in 2013. The planning is carried out by 2015.

New global optimizations were implemented in the BILAN model. They allow the robust model calibration. The results after this optimization show better values of optimization criteria. The "non-linear reservoir" was implemented in model BILAN.

The issues of water scarcity are also dealt with; the results will be used for evaluation of perspective scenarios. The hydrological values are measured for accuracy improvement in the Rakovnický Creek catchment (problems with lack of water) and in the Upper Metuje River catchment (a catchment unique in Europe because the divides of surface and groundwaters are equivalent and it is suitable for modeling and validation of models). The measurements are also carried out at the Hlasivo station that measures evaporation.

Protected areas of surface and groundwater for human consumption: Assessment of raw water quality and its use in practice

Project managers: Ing. Anna Hrabánková, Ing. Jiří Pícek
tel.: (+420) 220 197 437, e-mail: anna_hrabankova@vuv.cz

Duration: 2011–2013

The project has several objectives. Because of the impacts of climate change, which are permanently increasing, variability of quantities of groundwater and surface water is also increasing and consequently the water quality is also fluctuating. Raw water as a source of drinking water is irreplaceable. It is therefore very important to know its quality and its development in the whole territory of the Czech Republic. In order to ensure high-quality drinking water for water supply purposes in the Czech Republic, it will be necessary to determine the relationships between the water quality and various factors, such as river flow patterns in the individual periods. Water authorities will also need relevant information on the current quality of raw water for their decision-making. The data on water quality will be also needed for the implementation of Nitrate Directive (91/676/EEC) and relevant reporting, and for the fulfillment of the requirements of the Water Framework Directive (2000/60/EC).

The draft of methodology for acquiring, processing and using of data on quality of raw surface and groundwater was created in 2012; its purpose is to ensure the availability of data on raw water in sufficient quantity and quality. The draft is based on the result of the project's first year. The methodology is supposed to use new procedures and software tools in such way that the water authorities and other stakeholders will have sufficient, correct and complete documentation for decision making and planning. The methodology will be validated in pilot areas and development of new software will be finished simultaneously.

Development of a tool and methodology for continuous measurements of snow water equivalent in the field

Project manager: Ing. Alena Kulasová
tel.: (+420) 220 197 372, e-mail: alena_kulasova@vuv.cz

Duration: 2011–2014

The objective of the proposed project is the development of a field measurement device and a methodology for continuous determination of snow water equivalent, its comprehensive testing in various types of terrain and vegetation cover conditions and creating a methodology of installation and handling the device to measure the snow water equivalent, including in places which are difficult to reach but which have the greatest influence on the computed snow water storage.

In 2012 we have tested the principles of the intended snow water equivalent measurement:

- placing and installation of the prototype device on the weighing principle,
- manual measurement, mutual checks and comparison,
- development of a datalogger.

Support of long-term planning in water management sector in context of climate changes

Project managers: Ing. Martin Hanel, Ph.D., Ing. Magdalena Mrkvičková
tel.: (+420) 220 197 404, e-mail: martin_hanel@vuv.cz

Duration: 2012–2014

The project objective is creation of the methodology for verification of measures proposed in the frame of long-term planning in water management regarding their effectivity under conditions of climate change. Important partial aim of the project is creation of scenario/s of climate changes that will summarize robust findings on estimates of climate change for the Czech Republic and their uncertainties. It will form a reference frame for climate change impact studies and adaptations on them. It will allow intercomparison among impact studies, too.

The first year of the project was focused on creation of consistent conception of the methodology, data portal and reference climate change scenarios. The first version of the methodology was created. The analysis of similar abroad documents and the consultations with representatives of the Ministry of the Environment took place. The relevant documents related to preparation of second river basin plans were evaluated with the aim to bond the methodology to international context and legislative and practice requirements. The aim of the methodology is to provide a lead for taking into consideration the climate changes at long-term water management planning. Formally, the methodology is divided into the two parts: technical and planning. The first is focused on technical aspects of scenarios creation and their application in hydrological modeling; the second is focused on using the scenarios and results of climate change impact modeling at planning according to WFD and generally in water management planning. The reference climate change scenario rScen1 was created, the two other will follow. Regarding the products, a detailed plan of database content was created; some of the basic products are already available.

Securing the quality of drinking water supplied to small municipalities from local sources

Project managers: RNDr. Josef Vojtěch Datel, Ph.D., Ing. Anna Hrabánková
tel.: (+420) 220 197 543, e-mail: josef_datel@vuv.cz

Duration: 2012–2015

The objective of the project supported by the Technology Agency of the CR is a creation of certified methodology "Comprehensive Management of Small Water Sources for Optimal Securing of Quality of Drinking Water at Usual and Exceptional Situations" that is aimed for administrations of small municipalities (focused at municipalities with up to 1000 inhabitants) with own local water sources.

Management of small water sources has its specifics and current legislative, technical and legal solutions mostly reflect the situation of big municipalities and big water companies.

The project is focused on creation of suitable tools for comprehensive management of quality of water from small water sources for municipalities with up to 1000 inhabitants. The groundwater withdrawal prevails in case of the small sources. The certified methodology will be created based on analysis of relevant directives and methodology documents. The methodology will be an effective tool for administrations of municipalities and operators of small water networks; it will allow the systematical securing of water quality as good as possible under usual conditions as well as during exceptional situations. It will cover all the issues from technical status of the water intake facility and its regular maintenance, securing a sufficient protection of taken water, an optimal regime of water intake to arranging the most suitable frequency of water sampling. It will be possible to determine the robustness and vulnerability of usual water sources against different exceptional situations and to determine usability of other backup sources in the municipality cadastral area or in its close surroundings in case of emergency supply. The project focused on the analysis of current situation (small water sources from perspectives of the CR, EC and WHO, hygienic aspects, legislative, impact of flood situations on small water sources), the selection of pilot localities (detailed description of eight localities and summarized data on one pilot district) and on the formulation of the first version of the methodology. Intermediate results were presented at the seminar in Košice, at the Congress of IAH and at the 16th Slovak Hydrogeology Conference. The project partner is the GEOtest, a.s., Brno (RNDr. Josef Slavík, Ing. Ludmila Hartlová).

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

Project manager: Ing. Anna Hrabánková
tel.: (+420) 220 197 437, e-mail: anna_hrabankova@vuv.cz

Duration: 2003–2012

To fulfill the requirements of the Nitrate Directive, those vulnerable zones in the sense of its stipulations were delineated, which drain water which is polluted or at risk of nitrate pollution from agricultural sources and in which measures for limiting concentrations of nitrates in the water will 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 revision of these borders was elaborated in 2007 and the second revision took place in 2011. This project is a permanent activity, the TGM WRI, p.r.i., is the expert body authorized by the Ministry of the Environment.

All 2012 activities were focused on fulfillment of reporting duty of the Czech Republic for the period 2008–2011. All available data on surface and groundwaters (parameters nitrates and phosphorus) had to be processed. The data were put in the data model in required format then and sent to European Commission. The main output of the project in 2012 was the Report of the Czech Republic about status and directions of water management development and agriculture techniques after the Article 10 and Amendment V about change or addition to the list of delimited vulnerable zones after the Article 13 of Nitrate Directive 91/676/EEC. Simultaneously, the continual activity went on (expert support on national and international level and active participation at meetings of Nitrate committee in Brussels).

The methodology of determination of minimum residual flows

Project manager: Ing. Pavel Balvín
tel.: (+420) 220 197 313, e-mail: pavel_balvin@vuv.cz

Duration: 2010–2012

The project objective was the creation of the new methodology of determination of values of minimum residual flows. The motivation is the preparation of the amendment of Water Act that introduces the determination of minimum residual flows to be approved by the government decree.

The methodology deals with the approach to the determination of minimum residual flows on watercourses and below water reservoirs in the conditions of CR. The methodology was created based on the requirements of the Ministry of the Environment of CR (new approaches of the value distributions of minimum residual flows regarding seasonal and regional hydrological variability of CR). The settings of the values of the minimum residual flows were determined in such way to take into consideration hydrology variability and the impact of the values on biological components (mainly fish and macrozoobenthos).

The methodology is used as a documentation for the creation of the government decree that will be a tool for water authorities while issuing permissions to use water.

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

Project managers: Ing. Magdalena Mrkvičková, Ing. Jan Brabec, Ing. Adam Beran et al.
tel.: (+420) 220 197 536, e-mail: magdalena_mrkvickova@vuv.cz

Duration: 2008–2012

The aim of the project is to develop a guidance document for adaptation measures proposal and design. Guidance is focused on long-term water balance assessment and on simulation modeling of structural adaptation measures on water management infrastructure. The guidance document should support the process of River Basin Management Plan preparation in context of climate change.

In 2012, the proposed guidance was applied on a Blšanka pilot river basin. Hydraulic and hydrological assessment of 4550 Holedeč hydrogeological area was carried out in cooperation with PROGEO, Ltd. The results of the water management balance assessment, which is annually elaborated in compliance with the Czech water law, indicate that this area has passive groundwater balance in the long term. The effect of groundwater abstraction on quantity of surface water in the lower part of the Blšanka River catchment was also estimated. The possible impact of climate change on groundwater levels within the affected area was also evaluated. Except that work, simulation modeling of adaptation measures on surface water resources in Chrudimka River basin was finalised. The applied methodologies and also the results of adaptation measures proposal in all three pilot river basins (Orlice, Chrudimka, Blšanka) were described in a monograph called "Adaptation measures proposal for eliminating the impacts of climate change on water balance in the Czech Republic".

Constraining continuous simulations of flood frequency using mapping saturated areas to constrain prediction uncertainties

Project manager: Ing. Šárka Blažková, DrSc., et al.
tel.: 220 197 222, e-mail: sarka_blazkova@vuv.cz

Duration: 2011–2015

Project deals with variable saturated areas in catchments from the point of view of the frequency of flood runoff generation.

Data on the saturation of small catchment originated in our research in the Jizera Mountains. Modelling is being carried out with TOPMODEL and uncertainties are being estimated with the

GLUE method – Generalised Likelihood Uncertainty Estimation. The research is done in cooperation with the Lancaster University.

Evaluation of the risk of landslides and floods from glacial lakes, the Cordillera Blanca, Peru

Project managers: Ing. Petr Bouška, Ph.D., Ing. Marie Benešová, RNDr. Jan Klimeš, CSc. (Institute of Rock Structure and Mechanics of the AS CR, p.r.i.), doc. RNDr. Vít Vilímek, CSc. (Faculty of Science, Charles University)
tel.: (+420) 220 197 392, e-mail: petr_bouska@vuv.cz

Duration: 2011–2014

The project is focused on increase of safety of local inhabitants and also on creation of methodology usable in other high mountains regions. The evaluation of natural hazards (landslides and floods from glacial lakes) is carried out in selected glacial valleys in the mountain range Cordillera Blanca in Peru (calculations of hill slopes stability in vicinity of glacial lakes, modeling of infiltration of precipitation, predisposition to and emergency of landslides). TGM WRI carries out the modeling of floods caused by overflow or burst of dams of glacial lakes consequently to slide of rock or ice into the lake.

The works continued on watercourse Chucchún below the Lake 513 in 2012. Block of ice dropped here in Lake 513 from the peak of Hualcán in April 2010. It caused flow wave on Chucchún River. The raw model of this area was created in the project first year and this specific event was simulated. Newly measured data were used for accuracy improvement of 1D model HEC-RAS (River Analysis System v. 4.1.0, Hydrologic Engineering Center, U. S. Army Corps of Engineers). The results of event simulation showed depths in individual assessed cross-sections, the value of the discharge and range of flood event. The project partners from Institute of Rock Structure and Mechanics (Academy of Sciences of the Czech Republic) and Faculty of Natural Sciences (Charles University) discussed the results of flow wave simulation with officials in Peru and other local experts. The project results were also presented in several papers in national and international research journals.

Mathematic modeling of the effects of the Vltava System of Dams on flood events on the Elbe River

Project manager: Ing. Pavel Balvín
tel.: (+420) 220 197 313, e-mail: pavel_balvin@vuv.cz

Duration: 2010–2012

The project evaluates the influence of the Vltava River cascade of reservoirs on the floods on the Elbe River, both on the Czech and the German sections of the river. The purpose of the project is to assess the effects of flood transformation in the Vltava River cascade of reservoirs for several types of floods and to evaluate its influence on peak flows in selected cross sections in the Czech Republic and the Federal Republic of Germany. The project is implemented on the basis of the contract between TGM WRI, p.r.i., and Federal Hydrological Institute based in Koblenz.

In 2012 the calculations for each flood event and final Czech-German report were completed. For the simulation of the operation of the Vltava River cascade of reservoirs during the floods Aqualog multifunction modeling tool was selected. This tool is currently used as a forecasting model based on rainfall-runoff simulation in the catchment area of the Elbe River. HEC-RAS hydrodynamic model was used for the calculations outside of the Vltava River cascade of reservoirs. This model is commonly applied in conditions of the Czech Republic. Four control cross sections (Prague-Chuchle, Ústí nad Labem, Dresden and Barby), which were selected, will be

used for presentation of the results. Ústí nad Labem cross section is the most downstream river site simulated using the HEC-RAS model by TGM WRI, p.r.i., in close cooperation with the Aqualogic, Ltd company. Downstream section of the Elbe River is simulated by German project partner using SOBEK simulation model. Whole evaluated section was processed in regimes influenced/not influenced by cascade and for two types of flood. The summer flood 2002 was selected as a first representative type and winter flood 2006 was selected as a second type. Each gauging station was evaluated for five computed scenarios: Q10, Q50, Q100, Q200 and Q500. The project results were presented at international symposiums in Prague and Dresden in 2012.

Review of groundwater resources in the Czech Republic: Hydrology documentation for Activities 2, 4 and 6

Project managers: Ing. Ladislav Kašpárek, CSc., RNDr. Josef V. Datel, Ph.D., Ing. Pavel Balvín, Ing. Martin Hanel, Ph.D.
tel.: (+420) 197 227, e-mail: ladislav_kasperek@vuv.cz

Duration: 12/2011–6/2014

TGM WRI, p.r.i., is the coordinator of activities 2, 4 and 6 of the project, which is coordinated by the Czech Geological Survey. A simplified determination of natural groundwater resources will be developed for 55 hydrogeological regions in the framework of the activity 2 the Evaluation of the resources for the assessment of the quantitative status of groundwater. The activity 4 Hydrological measurements including the construction of water gauging stations on the selected rivers is to select sites (about 80) and to design and construct the water gauging stations. This activity includes also monitoring, hydrometric measurements and the data evaluation. The objective of the activity 6 on Calibration of hydrological models based on existing and newly observed data will be to prepare the models of hydrological balance for 56 hydrogeological regions for the determination of the time course of groundwater recharge.

Fifty-five hydrogeological regions were evaluated from the point of view of available hydrogeological data and present water balance data in 2012. Methodological work focused mainly on quaternary hydrogeological regions with connection to watercourse was carried out simultaneously. Watercourse sections suitable for hydrometric measurements were selected firstly, field survey followed and suitable specific locations of sites for discharge measurement were selected during the survey. 97 hydrometric measurements were carried out at selected sites and evaluated consequently.

Eighty discharge gauging stations were put into operation and their documentation was prepared in the Activity 4. Consequently, the hydrometric measurements started. In total 177 measurements were carried out. The maintenance of measurement sites, stations and instruments was carried out continuously as well as field collection of data, their inspection and evaluation of progress of hydrometric parameters.

Relevant discharge gauging stations were selected for chosen set of 20 hydrogeological regions in the Activity 6 in 2012. Relevant precipitation, temperature and air humidity series were calculated. Discharge series were calculated for intercatchments reaching hydrogeological regions from the discharges in stations. The special version of model BILAN was prepared for elimination of inaccuracies. The characteristics of individual catchments, regions and sizes of overlaps of catchments (intercatchments) with hydrogeological regions were calculated.

Delimitation of vulnerable zones and economic impact of Nitrate Directive 91/676/EEC implementation in the Croatia

Project managers: Ing. Anna Hrabánková, RNDr. Josef V. Datel, Ph.D.
tel.: (+420) 220 197 437, e-mail: anna_hrabankova@vuv.cz, josef_datel@vuv.cz

Duration: 2012

The preparation of gradually implementation of individual European Directives is going on in Croatia to be able to fulfill them from very beginning of membership in 2013. That is the reason why the Ministry of the Agriculture of the Republic of Croatia called invitation for project that would bring a solution of implementation of Nitrate Directive 91/676/EEC.

The methodology of evaluation of nitrate pollution and symptoms of eutrophication from agriculture activity and consequent delimitation of vulnerable zones were carried out in the frame of the project. The identification of areas contaminated from or threatened by agriculture followed. These areas were delimited in natural boundaries. The project results were: delimitation of the vulnerable zones in two variants (for the whole area of Croatia and as a 51 per cent of the area with specific delimited areas) and consequent creation of the action plan with evaluation of economic impacts of the all measures.

Model research of the stilling basin floor of the Děčín barrage weir on the section physical model

Project managers: Ing. Ondřej Motl, Ing. Ján Šepelák, prof. Ing. Pavel Gabriel, DrSc., Ing. Petr Bouška, Ph.D.

tel.: (+420) 220 197 233, e-mail: ondrej_motl@vuv.cz

Duration: 2012

The aim of the research work was the design optimization of the weir in terms of the ice transfer and the water flow during the construction and operation of the barrage. For this purpose, the section hydraulic model was built on a scale 1 : 20, based in the experimental channel in the small hydraulic laboratory of TGM WRI, p.r.i.

It followed from previous research of the effective transport of ice through the Děčín barrage on the hydraulic model on a scale 1 : 70 that an undesirable accumulation of ice was formed in the area of the stilling basin floor in some cases. Therefore, the design of the stilling basin floor was validated by research on 2D hydraulic model on a sufficiently large scale 1 : 20.

Since the same problem appeared also on the section hydraulic model on a scale 1 : 20, the stilling basin floor was redesigned three times. Weir adjustment under the option 4 appeared like the best from investigated variants, because only this option fulfilled all expected requirements for which this research took place in TGM WRI, p.r.i. In this option, a spillway area behind the sector closures was formed into a springboard with baffle blocks and the concrete structure was replaced by the heavy backfill with increased bottom in the slope of 1 : 12.

Reference Laboratory of Environment Components and Wastes

Investigation of the impact of the Temelín Power Plant accident on contamination of Vltava and Elbe Rivers as far as border gauging station at Hřensko

Project managers: Ing. Eduard Hanslík, CSc., Ing. Eva Juranová

tel.: (+420) 220 197 269, 220 197 335, e-mail: eduard_hanslik@vuv.cz, eva_juranova@vuv.cz

Duration: 2012–2015

This project aims to determine the radionuclides distribution between water and bottom sediments in the longitudinal cross sections of Vltava River downstream of the waste water outlet of the Temelín Nuclear Power Plant as far as border gauging station at Hřensko.

In 2012, the literature review was carried out. It focused on the concerned river sections, nuclear accidents, especially the feasibility of radionuclides releases into the environment and their behavior in the hydrosphere, and on the techniques of sorption experiments. Research of tritium migration was conducted in longitudinal cross section of Vltava and Elbe Rivers using tritium from normal Temelín Nuclear Power Plant operation as a tracer. The monitoring sites for sediments sampling (used for the sorption experiments) were surveyed, including analyses of these sediments. The method of determination of radionuclides distribution coefficients between water, sediments and dissolved solids was suggested and verified using the sorption experiments.

Determination of the amount of illicit drugs and their metabolites in municipal wastewater (DRAGON) – new tool for obtaining of complementary data on illicit drug consumption in the Czech Republic

Project manager: Ing. Věra Očenášková

tel.: (+420) 220 197 451, e-mail: vera_ocenaskova@vuv.cz

Project team: Ing. Petr Tušil, Ph.D., MBA, Ing. Magdalena Kvíčalová, Ing. Danica Pospíchalová, Ing. Alena Svobodová

Duration: 2012–2015

The main aim of this project is the application of sewage epidemiology method in the conditions of the Czech Republic and top-up of statistic methods for estimation of the illicit drugs.

The DRAGON project is focused on monitoring of illicit drugs and their metabolites in raw municipal sewage waters. From the results of analysis of sewage water amounts of drug of abuse consumption in monitored urban agglomerations will be recalculated. Usually, the concentrations of the drugs are determined in inflow to a wastewater treatment plant. The novelty of the approach of the project is the determination of concentration of illicit drugs and their metabolites also in nodal points of sewerage network. The new approach will allow the estimation of amount of consumed drugs of abuse in individual urban districts, too. Localities selected for monitoring are Prague, Brno, Ostrava, Plzeň and Ústí nad Labem.

In the first year of the project, review of latest findings in respected research field was completed and analytical method for determination of illicit drugs and their metabolites in the municipals sewage water was established. The suitable sampling points in sewerage network were selected.

The project is founded under the Security Research Program of the Czech Republic. The program is organised and funds are provided by Ministry of the Interior of the Czech Republic.

Examination of possible impacts of the Temelín Nuclear Power Plant on hydrosphere

Project manager: Ing. Eduard Hanslík, CSc.

tel.: (+420) 220 197 269, e-mail: eduard_hanslik@vuv.cz

Duration: 2003–2012

The objective of the project was to provide an independent examination of possible impacts of the Temelín Nuclear Power Plant on hydrosphere and other components of the environment and determination of reference levels for the possible construction of new blocks of the plant.

Impacts of Temelín Nuclear Power Plant on hydrosphere were monitored for the needs of the Ministry of the Environment. From the results of the field monitoring it followed that there is no increase in concentrations of artificial radionuclides in the Vltava River (recipient of waste water from the plant) in comparison with the reference (not exposed) sites. The only exception is the tritium volume activity. The increase in the tritium concentration is attributable to its discharges from the plant (according to the data provided by CEZ, the owner of the plant). Thermal pollution leads to an increase in the temperature of the water in the Vltava River downstream from the cooling towers and the outflow of waste water from the plant. Pollution standards according to Government Regulation No. 61/2003 Coll., as amended, were not exceeded.

Guaranteeing the activity of the permanent and emergency component of nationwide Radiation Monitoring Network

Project managers: Ing. Eduard Hanslík, CSc., Ing. Barbora Sedlářová
tel.: (+420) 220 197 269, 220 197 280, e-mail: eduard_hanslik@vuv.cz, barbora_sedlarova@vuv.cz

Duration: permanent project

The objective of the project is to monitor the levels of radionuclides in hydrosphere in normal and, where appropriate, in the emergency regime in cooperation with laboratories of the river basin boards (Povodí, s. p.).

Respecting the Framework Agreement on the activities of the components of the nationwide radiation monitoring network between the Ministry of the Environment and the State Office for Nuclear Safety, the Reference Laboratory of TGM WRI, p.r.i., guarantees the activities of the permanent and emergency component of nationwide radiation monitoring network in cooperation with water management laboratories of the river basin administrations. In the period of the monitoring in the normal radiological situation (in 2012), the development of the concentrations of radioactive substances in surface and drinking waters, sediments, water sludge and fish biomass was monitored at selected gauging stations. Increased concentrations of tritium in comparison with the background were identified in the Vltava River at Prague-Podolí and at the outlets of the Elbe River and the Morava River. This is a consequence of discharges of waste water from the Temelín Nuclear Power Plant and Dukovany Nuclear Power Plant. The results of the monitoring are continuously transmitted to nationwide radiation monitoring network in the scope of the information system of the State Office for Nuclear Safety.

Monitoring and evaluation of the quality of surface water and groundwater and their changes in connection with the influence of the operation of the Temelín Nuclear Power Plant on its vicinity

Project manager: Ing. Eduard Hanslík, CSc.
tel.: (+420) 220 197 269, e-mail: eduard_hanslik@vuv.cz

Duration: 2000–2012

The objective of the project is given by its name.

Monitoring and evaluation of the influence of the Temelín Nuclear Power Plant on the environment was carried out for the needs of Czech Power Works, respecting the conclusions of the examination of the effects of changes in buildings (EIA) on the environment. The outputs of the projects provide the new reference level before a construction of a new nuclear source at the Temelín Power Plant.

Integrated monitoring of the changes in the concentration of radioactive substances in groundwater resources and in water after its treatment

Project managers: Ing. Eduard Hanslík, CSc., Ing. Barbora Sedlářová
tel.: (+420) 220 197 269, 220 197 309, e-mail: eduard_hanslik@vuv.cz, barbora_sedlarova@vuv.cz

Duration: 2012

The objective of the project was to monitor and evaluate the concentrations of radioactive substances in the groundwater resources and in water after its treatment.

Concentrations of radioactive substances (including radon 222) were monitored and evaluated in water resources. The changes consequent to the water treatment technologies aimed at reducing their content in packaged drinking water and natural mineral water were evaluated (a project carried out for the needs of Eco-Aqua-Servis).

Concentrations of radioactive substances in the Orlík Reservoir and its tributaries after initiation of the operation of Temelín Nuclear Power Plant (period 2012)

Project managers: Ing. Eduard Hanslík, CSc., RNDr. Diana Marešová, Ph.D.
tel.: (+420) 220 197 269, 220 197 335, e-mail: eduard_hanslik@vuv.cz, diana_maresova@vuv.cz

Duration: 2012

The objective of the project was to monitor and evaluate the concentrations of radioactive substances in Orlík Reservoir and its tributaries for the needs of the river administrator.

The development of concentrations of tritium volume activity was monitored in surface water downstream from waste water discharge from Temelín Nuclear Power Plant, including the vertical distribution of tritium in Orlík Reservoir, and further the reference (unaffected) localities. The monitoring was carried out for the needs of the Vltava River Board.

The evaluation of monitoring of changes in gamma-ray dose increments and the concentrations of radioactive substances in the Nuclear Research Institute Řež locality

Project managers: Ing. Eduard Hanslík, CSc., Michal Novák
tel.: (+420) 220 197 269, 220 197 256, e-mail: eduard_hanslik@vuv.cz, michal_novak@vuv.cz

Duration: 2012

The objective of the project was to monitor and evaluate the impacts of the radioactive substances from past contamination sources.

In the framework of the project, the effects of remediation of impacts of past contaminations in the Nuclear Research Institute Řež locality on the hydrosphere and other components of the environment were monitored. These are part of the bases for the assessment of the effectiveness of remedial measures taken in the framework of the Implementation project of the remediation works.

The research of detection methods and methods of determination of radioactive contamination

Project managers: Ing. Eduard Hanslík, CSc., Ing. Barbora Sedlářová
tel.: (+420) 220 197 269, 220 197 280, e-mail: eduard_hanslik@vuv.cz, barbora_sedlarova@vuv.cz

Duration: 2012

The objective of the project was to develop and test a method for rapid determination of the total beta volume activity.

The literature review was carried out. The verification of the effectiveness of measurement of strontium-90 in equilibrium with yttrium-90 and iodine-131 was launched. The disturbing influences are also evaluated. The motivation is the development of a new method for fast determination of total beta volume activity. The method will be used at radiation gauging stations and by radiological laboratories of River Basin Administrations in the frame of Radiation Monitoring Network.

Branch of Water Protection and Informatics

Accuracy classification for existing delimitation of flood plain areas in the Czech Republic, and implementation of the results in delimitation methodology

Project manager: Ing. Hana Nováková, Ph.D., et al.
tel.: (+420) 220 197 226, e-mail: hana_novakova@vuv.cz

Duration: 2010–2014

The main objective of the project is to carry out a comparison study on the accuracy of delimitation of flood plain areas in selected reference locations (watercourse sections), which are specific in terms of various parameters – morphology of the area, the type of land-use (the characteristics of the surface of landscape, vegetation, urban areas), hydrological and other parameters, affecting the accuracy of the results of hydrodynamic modeling, and subsequent delimitation of the flood plain areas. 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 modeling (1D or 2D), and delimitation of flood plain areas using new elevation data for the territory of the Czech Republic acquired by aerial laser scanning, launched at the end of 2009. Conclusions from the results of the comparison for the reference sites will be used to develop a classification method for the flood plain areas delimitation accuracy. The classification method will be a suitable additional tool for decisions on priorities of new delimitation of flood plain areas. Subsequently, the method will be applied to the development of a methodology for delimitation of flood plain areas according to the requirements on inputs, hydraulic aspects of mathematical modeling, and outputs.

The most of the project activities in 2012 were similar to the previous year. Some activities that started already in 2011 were finished: the evaluation of the results of the numerical modeling for the first 5 reference localities and data preparation for the subsequent numerical modeling. In cooperation with the subcontractor, HYDRO EXPERT company, other 6 localities were chosen. The subcontractor did the 1D or 2D flood modeling on these localities. Results (flood levels) were analyzed and compared with original datasets. Statistical evaluation of differences is one of the bases of the comparative study.

The terrain survey of reference localities was done during summer 2012. Places of interest and their floodplains were described and a detailed photographic documentation was provided. Floodplain and river channel characteristics are part of the catalogue of criteria which influence an accuracy of flood area delimitation. The outline of the comparative study was created, which compilation is the main task of 2013 project research.

Flood risk management plan (FRMP)

Project managers: Ing. Libor Ansoerge, Ing. Karel Drbal, Ph.D., Mgr. Lenka Koubková
tel.: (+420) 220 197 385, e-mail: libor_ansorge@vuv.cz

Duration: 2012

The aim of the Flood Risk Management Plan (FRMP) for pilot area is to test currently prepared evidence and experience gained in the context of the planning process in the water management sector and flood protection sector. Subsequent aim of the project is to assess suitability and completeness of these background materials for the compilation of FRMP and prepare templates of outputs and procedures for the process of its creation.

Establishment of FRMP for pilot area is based on the existing pilot activities under international project LABEL, specifically, the production of flood hazard maps and flood risk maps and Documentation of significant flood risk areas. FRMP is the main output of the implementation of EC Directive 2007/60/EC on the assessment and management of flood risks (FRMD). FRMP is a part of the planning process in the water management sector and thus it is closely linked to the establishment of River Basin Management Plans (RBMP) for Sub-basins. RBMP's and Documentations of significant flood risk areas are the main information base for establishment of FRMP. There exist important demands on the coordination of process of establishment of RBMP's on Sub-basin level (responsibility: River Boards, state enterprises) and establishment of FRMP's on national level (responsibility: the Ministry of the Environment).

The Jizera River catchment was selected as a pilot area. There were prepared flood hazard maps and flood risk maps (Elbe River Board, s.e., 2010) and Documentations of significant flood risk areas (Elbe River Board, s.e., 2011) for the Jizera catchment previously in the frame of international project LABEL. The aim of the current project is not to produce new data sets. These data sets will be developed in the process of establishment of RBMP's and Documentations of significant flood risk areas.

The processing of data of flood plain areas delimited from 1st January to 30th November 2012

Project manager: Ing. Viktor Levitus, Ph.D.
tel.: (+420) 220 197 378, e-mail: viktor_levitus@vuv.cz

Duration: 2012

The objective of the project was to process the data of flood plain areas delimited from 1st January to 30th November 2012 and their implementation into the united data model of the Flood plain areas register. The register is maintained in the frame of water management registers of the information system of public administration.

The following subtasks regarding processing of spatial and tabular data of delimited flood plain areas were completed: compilation of geometry data with different formats, validation of clean topology, inspection of attributes, identification in space against administration units, scanning of water resource management decisions etc.

Creation and maintenance of data sources, support of data and map outputs of the reporting: International Commission for the Elbe River Protection, International Commission for the Protection of the Danube River and International Commission for the Odra River Protection against Pollution

Project managers: Ing. Michael Jakš, Ing. Tomáš Fojtík
tel.: (+420) 220 197 401, e-mail: michael_jaks@vuv.cz

Duration: 2012

The objective of the project is the creation of fundamental data sets for fulfillment of reporting obligations of the Czech Republic for individual international commissions and adaptation of these data sets for consequent attachment of expert attributes. As well, the objective is a creation of maps in relevant formats.

The production of fundamental data sets for international commissions continued in 2012. The transfer points on rivers and segments of cross-border water bodies are consequently approved by individual international commissions. Simultaneously, the tables of trans-boundary water bodies were constructed.

Similarly as in the previous year, many composed maps were created to be submitted to individual commissions for approval. The solution of issues of attributes changes in reporting templates for next reporting was started. These changes are caused by changes in delimitation of running water bodies.

The proposition of activities in the field of administration and development of selected data sets of the DIBAVOD (administration and development of the DIBAVOD)

Project managers: Ing. Tomáš Fojtík, RNDr. Pavel Mayer
tel.: (+420) 220 197 355, e-mail: tomas_fojtik@vuv.cz

Duration: 2008–2012

The objective of the project in 2012 was to finish the first round of collaboration with CHMI (Czech Hydrometeorological Institute) on creation of water divides in scale 1 : 10,000 and to update data set of water courses DIBAVOD, including the essential audits.

In the first half of the year, the changes in water divides obtained from CHMI were audited, consulted and implemented. Accepted changes had influence on water course data set which had to be appropriately changed both in graphics and attributes.

Water courses and water divides data sets were validated by set of audits in such way to guarantee their desired quality. These audits were focused on geometry and attributes. All the discovered errors had to be removed and consequently the process of audits had to be repeated.

The year-round collaboration with Czech Office for Surveying, Mapping and Cadastre (COSMC) consisted in the transfer of data on changes in water courses and operative consultations on issues and solutions of problematic localities in frame of update of the ZABAGED®.

The management of ISVS-VODA registers and information support of the implementation of combined approach to emission limits assessment

Project manager: Ing. Pavel Richter, et al.
tel.: (+420) 220 197 461, e-mail: pavel_richter@vuv.cz

Duration: 2012

The objective is to guarantee the fulfillment of the TGM WRI obligations following from the Regulation No. 391/2004 Coll., Government Decree No. 229/2007 Coll. and relevant Methodical Direction of the Water Protection Department of the Ministry of the Environment. The management of ISVS-VODA registers and information support are realized in the environment of Hydro-ecological Information System (HEIS VUV), which is a central information system of research units in the TGM WRI. The main purpose of the HEIS VUV is a storing, processing and securing of information availability.

In 2012, the project focused on securing the functionality of the system operation. The system provides updated data from registers the TGM WRI is responsible for. The other aim was to secure service availability in the frame of the ISVS-VODA registers management (<http://www.voda.gov.cz/portal/>).

The following registers were updated in 2012: the register of vulnerable zones, the register of bathing waters, the register of the state of the water bodies, the flood plain areas register and the register of water source protection areas (including the protection areas of reservoirs). The audit and updating of reference data (administrative borders) was also carried out. The reference data are used in the individual registers of ISVS-VODA.

According to amendment to Water Act, the register of protected areas was incorporated into the structure of ISVS-VODA. This register is available from 12th December at HEIS VUV portal (the actual availability is determined by the availability of the data for the portal). The information web pages for this register including the downloadable data were created.

The updated data and results of calculation were published at the HEIS VUV portal in the frame of the information support of the implementation of combined approach to emission limits assessment implementation. The data update run after information of amendment of the Government Decree No. 61/2003 Coll., register of wastewater discharges for water management review, the property register of wastewater treatment plants and the register of industrial sources of contamination. The assessment of fulfillment of requests on quality of surface water followed. The assessment was done countrywide for basic variants (current status and under assumption of compliance with emission limits).

The availability of metadata was ensured as it follows for TGM WRI from Act No. 123/1998 Coll. Metadata are created according to Czech National Standard (CNS) ISO 1915 "Geographical information – Metadata" and CNS CEN ISO/TS 19139 „Geographical information – XML implementation scheme“. Metadata are audited and further exported at Metadata portal of the Ministry of the Environment (MIS MicKa), the metadata are then exported directly at National geoportal INSPIRE. Data are available both at the portal ISVS-VODA and at the address <http://geoportal.gov.cz/web/guest/catalog>, where to the data from MIS MicKa are exported for public preview.

The services guaranteed by the system are available for the Ministry of the Environment, experts and general public at the address <http://heis.vuv.cz>.

The support of the representation of the Czech Republic in activities of the International Commission for the Protection of the Elbe River (ICPER)

Project managers: Ing. Marie Kalinová, RNDr. Hana Prchalová, Ing. Magdalena Mrkvičková, RNDr. Denisa Němejcová, et al.
tel.: (+420) 220 197 213, e-mail: marie_kalinova@vuv.cz

Duration: long-term activity

The aim of the project is to provide expert support for ICPER activities in certain fields, the preparation of documents and participation of the TGM WRI employees at the activities of the ICPER expert groups. The employees of the other organizations (River Boards, s.e., CHMI etc.) participate also in activities of expert groups.

Main task of the expert groups was in 2012 the audit of fulfillment of objectives of International Elbe River Basin Management Plan, creation of materials for public participation and preparation of the next planning cycle. Specifically, the International Program of Measurements on the Elbe was updated. The common principles for dealing with lack of water were created. The information on methodologies of assessment of ecological status of surface water and status of groundwater were exchanged.

The employees of the TGM WRI participated in 2012 at the activities of expert group Surface Water, expert group Groundwater, ad-hoc group Management of Water Quantity and ad-hoc group Hydrobiologists.

The support of the participation of the Czech Republic in activities of Permanent Committee Saxony and Permanent Committee Bavaria of the Czech-German Commission for Cross-Border Water

Project managers: Ing. Marie Kalinová, Ing. Věra Kladivová, Mgr. Pavel Eckhardt, et al.
tel.: (+420) 220 197 213, e-mail: marie_kalinova@vuv.cz

Duration: long-term activity

The objective of the project is a long-term provision of expert materials to Ministry of the Environment for cooperation on cross-border water and a support of activity of both the Permanent Committees.

The issues are solved in Czech-German expert groups, alternatively in direct collaboration of Czech and German experts. Employees of TGM WRI, p.r.i., participate on preparation of expert materials for meetings of expert groups and superior bodies of this cooperation. Employees of other organizations (River Boards, s.e., CHMI etc.) also participate in this activity.

In 2012 experts from TGM WRI, p.r.i., participated in following topics: quality of surface and groundwater, preparation of materials for concept of record from meeting of Permanent Committee Saxony and participation in meeting itself.

Employees of TGM WRI, p.r.i., participate in protection of *Unio crassus* and *Margaritifera margaritifera*. They participated in preparation of the meeting of the Permanent Committee Bavaria as well.

Bathing waters: Expert support of the reporting according to the Directive 2006/7/EC

Project manager: Ing. Helena Grünwaldová, CSc.
tel.: (+420) 220 197 376, e-mail: helena_grunwaldova@vuv.cz

Duration: 2012

The objective of the project is to process the materials for reporting according to Directive 2006/7/EC about management of bathing waters quality for the Ministry of the Environment in collaboration with Ministry of Health. Other task is to update the List of Bathing Places in the Czech Republic including the proposition of management measures for improvement of the quality of bathing waters.

In 2012, following activities were carried out: the audit of data from monitoring of the Ministry of Health. The data are needed for reporting according to the Directive 2006/7/EC. The project outputs were also the propositions of management measures for completing of reporting templates and legislation summary for united procedure of approval of the List of Bathing Waters.

The register of surface waters used for bathing in the Czech Republic is available for users from public administration and public at internet pages <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.: (+420) 220 197 283, e-mail: jiri_dlabal@vuv.cz

Duration: permanent activity

The objective of the project is to develop a Summary Water Balance document for the main river basins in the Czech Republic as specified in Section 1, paragraph 2 of Ministry of Agriculture Decree No. 431/2001 Coll. on the contents of the water balance assessment, manner of its preparation and water balance data.

The following outputs were prepared as components of the analyses of water resources utilization and water quantity and quality requirements for the year 2011:

- a register of data on water withdrawals and waste water discharges, submitted to the River Boards, s.e., in accordance with the Decree No. 431/2001 Coll. (updated files on the withdrawals and discharges in 2010, data transformed for the purposes of calculations in database files and other outputs),
- check balance calculations corresponding to the former summary water management balance assessment and/or the Ministry of Agriculture guideline on processing of water management balances for individual catchment areas,
- summary hydrological balance assessment,
- summary water management balance assessment – quantity of surface water (the quality was not evaluated) and the quantity of groundwater.

Summary information on water in the Czech Republic

Project manager: Ing. Arnošt Kult
tel.: (+420) 220 197 246, e-mail: arnost_kult@vuv.cz

Duration: permanent activity (till the end of 2012)

The objective of the project is to collect, analyze and publish summary information on waters in the Czech Republic in various forms of outputs in accordance with the requirements of Ministry of the Environment on the basis of the results of the projects carried out in TGM WRI, p.r.i., and using other data sources.

The outputs of the project were in 2012 as follows:

- At the beginning of the year 2012 a Water Resources Journal 2010 was completed. It includes an assessment of natural conditions (carried out by using time series 1995, 2000, 2005, 2006, 2007, 2008, 2009 and 2010), water resources, water quality in watercourses, water abstractions and waste water discharges, data and information on public water supply systems and public sewerage systems, on waterways, the use of water power and the results of the summary water balance assessment,
- For the Report on the Status of Water Management in the Czech Republic in 2011 (a part in responsibility of Ministry of the Environment), the project team prepared necessary supporting documents on water management and data on produced and discharged pollution from point sources, pollution from non-point sources, emergency pollution, quality of surface water and its development since 1990, structures aimed at water protection (an overview of the construction and reconstruction of municipal and industrial waste water treatment plants in 2011), and other necessary information,

- Input documentation for chapter “Water” in the 2012 Statistical Yearbook of the Environment of the Czech Republic and other supporting documents required during the year by Ministry of the Environment.

Emissions and their impact on water environment

Project manager: Ing. Petr Vyskoč

tel.: (+420) 220 197 425, e-mail: petr_vyskoc@vuv.cz

Project team: RNDr. Hana Prchalová, Mgr. Pavel Rosendorf, Ing. Alena Kristová, Ing. Tomáš Mičaník, RNDr. Jitka Svobodová, Ing. Petr Tušil, Ph.D., MBA, Ing. Jiří Pícek, Ing. Pavel Richter, RNDr. Renata Filippi, Mgr. Silvie Semerádová, Ing. Martin Durčák, Ing. Jaroslav Beneš (Vltava River Board, s.e.)

Duration: 2012–2014

The objective of the project is the creation of tools (methodology and relevant software) for assessment of impacts of emissions on state of water. Methodology and software will allow for each of water bodies, where emergency of not meeting the objectives of water protection regarding the specific criterion exist, to quantify the share of individual pollution sources that cause the adverse status. Consequently, the information basis for the proposal of measures will be provided. The project is supported by Ministry of Agriculture of the Czech Republic in the frame of program of agricultural applied research and experimental development “Complex Sustainable Systems in Agriculture 2012–2018” (project ID QJ1220346). The organizations participating in the project are TGM WRI, p.r.i., and Vltava River Board, s.e.

In 2012, the activities focused on literature review, data collecting and evaluation of usability of individual data sets. The intermediate outputs were: identification of relevant pollutants, i.e. substances for which the meeting the objectives of water protection might be put in danger and identification of important pollution sources and path of pollutants into the water environment.

Jointly used groundwater on the Czech-Saxony border (GRACE)

Project managers: Ing. Marie Kalinová, Mgr. Pavel Eckhardt, et al.

tel.: (+420) 220 197 213, e-mail: marie_kalinova@vuv.cz

Duration: 2011–2014

The objective of the project is a protection of water sources and identification of causations of dropping of groundwater levels in two cross-border areas Hřensko–Křinice/Kirnitzsch and Petrovice–Lückendorf–Johnsdorf–Oybin. The outputs will be common strategies of protection of groundwater in the two areas. The project is supported by European Regional Development Fund via Program Objective 3 for support of cross-border activities between the Czech Republic and the Free State of Saxony.

The main project activities are: creation of groundwater flow models, monitoring of springs abundance, study on age and mixing of groundwater, study on climate change impact on water in both areas and study on groundwater fauna. The project is focused on collaboration between Czech and German experts and public participation.

In 2012, some of the studies were contracted out, the web pages of the project were built (<http://www.gracecz.cz>), the information research and field work continued, the data were gathered. Common coordination workshops were organized. The meetings regarding the individual topics of the project (groundwater flow models, groundwater fauna, and hydrogeology of the areas) were organized. The most important outputs of the project are information about the project and status of groundwater sources in the selected areas for Permanent Committee Saxony of the Czech-German Commission for Cross-Border Water and results of first phase of creation of groundwater flow models for selected areas.

The processing of water management balance of current and projected status of surface water quantity in subbasins of the Upper Vltava, Berounka, Lower Vltava and other Danube tributaries

Project manager: Ing. Petr Vyskoč
tel.: (+420) 220 197 425, e-mail: petr_vyskoc@vuv.cz

Project team: Ing. Jiří Pícek, Ing. Jan Brabec, RNDr. Hana Prchalová, RNDr. Renata Filippi, Ing. Libor Ansorge, Mgr. Silvie Semerádová, Ing. Jiří Dlabal

Duration: 2012–2013

The objective is processing of water management balance of current and projected status of surface water quantity in subbasins of upper Vltava, Berounka, lower Vltava and other Donau tributaries. The client is the Vltava River Board, s.e.

The processing of water balance is according to the Water Law the component of the survey and evaluation of the status of surface and groundwater. The principles, procedures and tools developed in earlier research activities of the TGM WRI are implemented. Mainly the outputs from the research project MZP0002071101 are used.

The previous outputs are: harmonization of water balance with the requirements of the Water Framework Directive, using the results of water balance at water management planning and implementation of simulation modeling methods of storage function of water management systems. The project follows on similar focused projects at TGM WRI, p.r.i., from 2006.

The revision of the estimations of guarantee of water demand from Dukovany Power Plant, 2nd phase: Water management solution

Project team: Ing. Petr Vyskoč, Ing. Jan Brabec, Ing. Jiří Pícek
tel.: (+420) 220 197 425, e-mail: petr_vyskoc@vuv.cz

Duration: 2012

The objective of the project was to carry out the water management study that assessed the possibilities of guarantee the raw water supply from the Jihlava River, i.e. from the Dalešice-Mohelno reservoir for the potential considered enlargement of the nuclear power plant Dukovany. The study is a component of the project "The addition of the feasibility study of a new nuclear facility in Dukovany in a field of water management". The client was the Nuclear Research Institute Řež, division Energoprojekt Praha. The final user of the feasibility study are the Czech Power Works. The water management study followed on previous studies focused on same issues and carried out in years 2008–2011.

The objective of the study was the evaluation of the possibilities to guarantee the raw water supply for Dukovany Power Plant using methods of simulation modeling of storage function of a water management system. The evaluation was done in variants according the considered air temperature increase (the processing of hydrological inputs was carried out in the 1st phase) and water demands corresponding to considered capacity of the power plant in respective control periods.

The feasibility study of a new nuclear facility in Dukovany: The study on possibilities of the increase of water supply from the Vranov Reservoir at current hydrological situation

Project team: Ing. Petr Vyskoč, Ing. Jan Brabec, Ing. Jiří Pícek
tel.: (+420) 220 197 425, e-mail: petr_vyskoc@vuv.cz

Duration: 2012

The objective of the project was to carry out a water management study assessing the possibilities of the increase of the water supply from the Vranov reservoir as a component of general assessment of feasibility of water transmission from the Vranov reservoir to the Dalešice-Mohelno reservoir. The study is a component of the project "The addition of the feasibility study of a new nuclear facility in Dukovany in a field of water management". The client was the Nuclear Research Institute Řež, division Energoprojekt Praha. The final user of the feasibility study are the Czech Power Works.

The assessment was carried out for current hydrological conditions using simulation model of a storage function considering the water supply and minimal discharge. The output of the study is the assessment of the increased water supply that would be available for improvement of storage function of the Dalešice-Mohelno reservoir. The reservoir provides water for Dukovany Nuclear Power Plant.

Branch of Water Technology

A safety assessment of the emergency infrastructure components – drinking water

*Project managers: Ing. Václav Šťastný, Ing. Lubomír Petružela, CSc., Ing. Jana Hubáčková, CSc.
tel.: (+420) 220 197 249, e-mail: vaclav_stastny@vuv.cz*

Duration: 2010–2014

The objective of the project is to propose and to optimize methods for resolving emergency events (pollution accidents and natural disasters) in drinking water supply. The outputs of the project will be used by government authorities in the development of integrated emergency plans and securing supply of drinking and technological water under emergency situations.

The project, carried out in collaboration with several specialised organisations and coordinated by CITYPLAN Prague, is financed by the Ministry of the Interior of the Czech Republic. The project was launched at the end of October 2010.

In 2012, the information review on protection of water pipeline networks and water towers at crisis situations was added. The information base for crisis analysis in this field was completed in a form of analytical table and expert sheets; the table was preliminarily evaluated and the model scenarios of crisis situations were created. Employees of TGM WRI participated mainly in activities regarding transport and storage of drinking water.

Alternative sources of water in municipalities during the state of emergency – exploitation of original local sources

*Project managers: RNDr. Josef K. Fuksa, CSc., Mgr. Pavel Eckhardt, Ing. Lenka Matoušová, Ing. Eva Mlejnská, Ing. Alžběta Petráňová, Ing. Václav Šťastný
tel.: (+420) 220 197 330, e-mail: josef_fuksa@vuv.cz*

Duration: 2011–2014

Aim of the project is the research on possibility of use of still existing water springs in cities (over 20,000 inhabitants) to supply water in the state of emergency. In the 2nd year case studies in selected municipalities and on selected objects were carried out during the year cycle – determinations of discharge, water quality parameters and preliminary estimations of water treatment in emergency situations.

Survey of maps and archive documents and field verification led to the elimination of substantial part of municipalities from the presumptive list. The complete monitoring was accomplished in Prague and Brno, in Plzeň and Dečín the field verification was done and the monitoring has been started. Four sampling missions were done covering approximately four year seasons on 83 springs. Together with the results of preliminary survey in the year 2011 a series of reliable data is being created, which will continue with the monitoring in the year 2013.

Research on the intensification of rural and small wastewater treatment plants by non-capital means

Project managers: Ing. Václav Šťastný, Ing. Martina Beránková, RNDr. Dana Baudišová, Ph.D.
tel.: (+420) 220 197 249, e-mail: vaclav_stastny@vuv.cz

Duration: 2011–2015

The objective of the project is to show whether the utilization of biotechnological products can improve the status and the function of small wastewater treatment plants, both activated and extensive. The main objective of the project is then to develop optimum method for monitoring of the application of biotechnological products on wastewater treatment plants.

The project deals with both the influence of the dosage of a biotechnology product on the operation and function of small domestic wastewater treatment plants and verification of the influence of biotechnological products on the treatment effect and the operation of the extensive wastewater treatment plants with biological stabilization tank. During the project, the input documentation will be prepared for the elaboration of the certified procedure for the success verifying of these non-traditional methods of intensification of wastewater treatment plants.

In the second year of the project, the measurements of biotechnological product application at different types of wastewater treatment plants (WWTP) were carried out. The types of WWTP were as follows: small standard domestic WWTP and WWTP with stabilizing tank in given locality. The preliminary evaluation was carried out (the comparison of results before and after application of enzymatic product).

Final treatment pools used with low intensity

Project team: Ing. Filip Wanner, Mgr. Ondřej Simon, Mgr. Michal Bílý, Ph.D.
tel.: (+420) 220 197 241, e-mail: filip_wanner@vuv.cz

Duration: 2012–2015

The project is focused on potential of final treatment of wastewater from activating wastewater treatment plants (WWTP) in final treatment pools that are newly designed. The project is based on prototype WWTP Zbytiny for 500 population equivalent. The objective of the project is a quantification of processes that take place in final treatment pools under various conditions and optimalization of the processes. Concurrently, the attention is focused also on potential of pools while the domestic WWTPs are used.

In the first year, the extensive literature research was carried out. The literature research was focused mainly on description of analogue or comparable systems of final treatment with Zbytiny locality. It put emphasis on description of principles and processes participating in final treatment of wastewater. Simultaneously, the sampling was carried out at WWTP Zbytiny. The sampling was focused on description of total effectivity of treatment in biological pools. The effectivity of individual stages of treatment was described for different parameters and indicators of pollution. Simultaneously, the attention was paid to quantification of transform of individual forms of pollution (mainly nitrogen and phosphorus) among individual components.

The suitable localities with existing or planned domestic WWTP were searched for. The focus was only on localities where the construction of soil pools as a further stage of treatment is possible. Several localities were chosen and finally three of them were selected. At these three localities the preparatory activities for construction of soil pools started. According to original plan the construction will take place during the 2013 year.

Other scope of the project is to verify and describe processes in biological pools using plastic tanks. This activity is realised at TGM WRI premises. In last year, the preparatory activities for launching these "pool experiments" took places. Main activity was the preparation of grounds and necessary infrastructures for placing of the pools.

The research of the optimization and increase of effectivity of wastewater treatment from small settlements using extensive technologies

Project manager: Ing. Eva Mlejnská

tel.: (+420) 220 197 316, e-mail: eva_mlejnska@vuv.cz

Project team: Ing. Lenka Matoušová, Ing. Alžběta Petránová, Ing. Miloš Rozkošný, Ing. Filip Wanner

Duration: 2012–2015

The project is focused on research of possibilities how to increase the effectivity of wastewater treatment from individual houses or small villages using soil filters, root zone wastewater treatment plants and biological pools (so called extensive technologies). The objective of the project is mainly to bring up new technological components for the increase of treatment effectivity. Other objective is a development of suitable bacterial agents determined for support of treatment processes of the above mentioned technologies and regeneration of clogged filter fillings of soil filters and soil zone wastewater treatment plants.

The project follows on previous research projects which found out that the extensive technologies are accompanied by many restricting issues. The issues are caused by design of the system or not suitable choice of technology. They are caused often by the wrong operation.

The objective of the project is to eliminate these problems by simple change of the technology or by application of suitable agent that supports to increase the treatment effectivity or removes clogs in filters filling. The project uses not only laboratory or pilot models but also existing localities.

The project is divided into six fundamental research themes: decrease of the secondary pollution of biological pools, intensification of biological pools, intensification of root zone wastewater treatment plants, intensification of soil filters, clogging up of filter fillings and approach to restoration of extensive technologies. In the first year of the project, many activities started on laboratory models and at existing localities.



Implementation and operation of final treatment models



Placing of field electrodes for continual monitoring of water temperature, electrical conductivity and oxygen concentration

Registers of point pollution sources and support to the reporting on the performance of the transitional period for the application of Council Directive 91/271/EEC and reporting according to the Articles 15, 16, 17 of this Directive

Project managers: Ing. Eva Mlejnská, Ing. Elzbieta Čejková
tel.: (+420) 220 197 316, e-mail: eva_mlejnska@vuv.cz

Duration: permanent activity

The objective of the project is to acquire, collect, process and provide information on municipal and industrial pollution sources.

In 2012, the project focused on updating, evaluation and forwarding of information on removal of wastewater via public sewerage systems and on the degree and manner of treatment of such wastewater. The files for official software UWWTP 2010 Questionnaire were audited; additions and corrections of files were carried out. The Questionnaire brings information to European Commission on performance of Directive 91/271/EEC in the area of the Czech Republic according to the Article 15. The UWWTP 2010 Questionnaire is intended also for administrative, financial and ecological information support for the Ministry of the Environment and for experts and broad public sector.

Possibilities for removal of specific pollutants (PPCPs) at wastewater treatment plants

Project manager: Ing. Miroslav Váňa
tel.: (+420) 220 197 371, e-mail: miroslav_vana@vuv.cz

Project team: RNDr. Josef K. Fuksa, CSc., Ing. Jana Hubáčková, CSc., Ing. Roman Jobánek, Ing. Jiří Kučera, Ing. Magdaléna Kvíčalová, Ing. Pavla Martinková, Ing. Lenka Matoušová, Ing. Danica Pospíchalová, Ing. Filip Wanner

Duration: 2009–2013

The objective of the project is to describe and test the most suitable technologies and to improve the 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, operators and water management authorities in designing of wastewater treatment plants restoration projects and it will also serve as a base for the application of verified components of the treatment technology process to eliminate selected PPCPs from wastewater. The studies of these issues are implemented in the framework of a research co-financed by the National Agency for Agricultural Research of the Ministry of Agriculture.

The main objective of the project in 2012 was to examine different possibilities of technology layout of the wastewater treatment plant on a pilot plant (built in 2011). The aim was to reach the highest effectivity possible of elimination of following compounds from wastewater: salicylic acid, clofibrilic acid, carbamazepine, ibuprofene, diclofenac, estrone, 17 β -estradiol and 17 α -ethynyl-estradiol. Simultaneously, the possibilities of elimination of these compounds by using different types of tertiary treatment (UV light, activated charcoal filter and coagulation). Based on obtained knowledge such technology layout of the wastewater treatment plant was designed that eliminates the tracked compounds more effectively. The proposed technology layout will be verified in the last year of the project.

The literature review on the relevant research topics was extended. The results of measurements at the existing wastewater treatment plants were evaluated and published.

Fungal biofilms for wastewater bioremediation complementary to wastewater treatment plants

Project managers: Ing. Filip Wanner, Ing. Miroslav Váňa, Ing. Václav Šťastný, Ing. Eva Mlejnská
tel.: (+420) 220 197 241, e-mail: filip_wanner@vuv.cz

Duration: 2009–2013

Fungal biofilms have a considerable degradation potential that has not been satisfactorily used for remediations. Immobilised cultures of ligninolytic fungi utilising unspecific enzyme mechanisms to degrade pollutants can be applied alongside activated sludge technologies in the decomposition of recalcitrant substances that are not degraded in wastewater treatment plants. The project focuses on the research of fungal biofilms colonising inert or lignocellulosic materials and acting over an extended period under conditions of bacterial stress, and on investigation of the structural, biological and biochemical properties. The project will include measurements of the biofilm capacity in degradation of selected pollutants and elimination of heavy metals and determination of 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 2012, the possibilities of bioremediation with fungi culture *Irpex lacteus* while using the actual wastewater (common wastewater from inlet of treatment plants which was filtered and with added RBBR pigment). The sprinkled biofilm reactor was used for the research. From obtained results follows that 70 per cent of pigment was removed (measured as a decrease of absorbance, wave length: 592 nm). Removal of water pigmentation was going on for approximately one month. The value of absorbance became stable then and another decrease did not occur. It can be explained by depletion of some wastewater component or by accumulation of some intermediate product that blocks continuation of the process. The research of this issue will follow in the next year. Simultaneously, the preparation for testing of actual wastewater bioremediation continued. Two types of wastewater will be used for testing: filtered common wastewater with added pigment and wastewater from textile manufacturing. The RBC reactor and sludge batch reactor with activated sediment will be used for testing.

Activities of the Testing Laboratory for Water Management Facilities

Project manager: Ing. Věra Jelínková
tel.: (+420) 220 197 464, e-mail: vera_jelinkova@vuv.cz

Duration: permanent activity

The Testing Laboratory for Water Management Facilities provides primarily accredited testing of the treatment efficiency of domestic wastewater treatment plants (WWTP) according to CSN EN 12566-3+A1. It is also possible to carry out accredited test to determine the content of residual oil from oil/water separators of light liquids and grease traps.

In 2012, three domestic WWTPs were tested after testing protocol SOPC1. One of them will follow testing in 2013. One of WWTP reached the treatment efficiency meeting the limit of Government Decree No. 416/2010 Coll.

Unaccredited testing followed by examination of domestic WWTPs parameters, which were requested by foreign clients. The parameters are not defined in CSN EN 12566-3+A1. Additionally, one boat WWTP was tested.

The laboratory facilities are also used for other activities of the Branch of Water Technology. The model for observation of depletion of pharmaceuticals residue during the treatment process was installed in 2011. Another activity was testing the enzymes influence on effectivity of domestic WWTPs.

Brno Branch of the Institute

Drying out of streams during climate change: Prediction of risk and biological indication of drought periods as new methods for water resources and landscape management

Project manager: RNDr. Petr Pařil, Ph.D.
tel.: (+420)541 126 331, e-mail: petr_paril@vuv.cz

Project team: doc. RNDr. Světlana Zahradková, Ph.D., RNDr. Denisa Němejcová, Mgr. Vít Syrovátka, Ph.D., RNDr. Jiří Kokeš, Mgr. Pavel Tremel, Mgr. Marek Polášek, Mgr. Libuše Opatřilová, RNDr. Yvonne Puchýřová

Duration: 2012–2015

The objective of the project is to create a map of watercourses complete dry-out vulnerability. The map will be based on abiotic data. The retrospective method of complete dry-out events identification will be proposed. This bioindicator method will be based on taxonomic and functional analysis of macrozoobenthos. The analysis will include metrics quantifying the frequency and extent of dry-out. The model for creation of the vulnerability map will be validated using this method. The project outputs will allow identification of areas that are at most under risk and effectively focus the protection measures.

More of the small watercourses are threatened by risk of the complete dry-out in some specific sections in connection with climate change in progress. The community of invertebrates can be successfully used for indication of previous complete dry-out because it reacts on this radical disturbance not only by change of species compositions but also by different species traits. The project objectives are to create new bioindicative approach useable in practice and map base that will show the most threatened sections of watercourses based on registered dry-outs, status of the community and abiotic predictors.

Localities were selected in the area of CR and literature review was carried out in the project first year. The database of properties (connected to the dry-out) of the three most important groups of water insects (mayflies, stoneflies and caddis-flies) was created based on literature review. Additionally, first versions of maps of dry-out risk based on abiotic factors were created. These were compared with observed occurrence of dry-out as registered in the Salamander data base that is one of important data sources of the evaluation.

The anaerobic separator of suspended solids and nutrients

Project managers: Ing. Hana Hudcová, Ing. Miloš Rozkošný, Ph.D.
tel.: (+420) 541 126 325, e-mail: hana_hudcova@vuv.cz

Duration: 2012–2014

The project objective is to develop and validate an economically feasible device, capable on the principle of combination of mechanical and biological anaerobic treatment and other new physical-chemical methods to ensure compliance with increased requirements to remove nutrients (N and P) and suspended solids from waste water from buildings with large variation in seasonal waste water production and to support its implementation into the practice.

The project deals with the current situation resulting from new legislation in recent years, especially the Government Decree No. 416/2010 Coll., by which the requirements for discharges of waste water by an infiltration were modified. Achieving these requirements is particularly challenging where it is not possible or convenient to use aerobic biological treatment; example is a building with large variation in pollution production or with seasonal operation. Strict requirements for infiltration have their reasons – low content of suspended solids due clogging, removal of nitrogen from the groundwater quality point of view. The reason to develop the device has been the increasingly strict requirements for discharges into receiving waters with high water quality or insufficient water flow.

The project not only addresses the issue of pre-treatment, but also different ways of final purification. Pilot plant technologies for anaerobic waste water pre-treatment and separation of suspended solids in anaerobic conditions should be designed and tested in the frame of the project. Batching equipment to the next treatment stage, sorption processes, catalytic oxidation, electro-chemical methods and sanitation of waste waters should be also tested and implemented.

Identification of significant areas with cultural and historical values threatened by natural and anthropogenic stresses

Project manager: Ing. Milena Forejtníková
tel.: (+420) 541 126 324, e-mail: milena_forejtnikova@vuv.cz

Project team: Ing. Miriam Dzuráková, Mgr. Igor Konvit, RNDr. Hana Mlejnková, Ph.D., Mgr. Jana Ošlejšková, Ing. František Pavlík, Ing. Miloš Rozkošný, Ph.D., Ing. Pavel Sedláček.

Collaborating organization: National Heritage Institute, Prague

Duration: 2012–2015

The objective is to evaluate the size of threat for selected categories of historical objects (Cultural Heritage Objects and UNESCO objects) and protected areas (urban monuments preservation areas, village heritage sites, archeological heritage sites and other heritage sites) by important natural, industrial and agriculture hazards in CR using unified procedure.

The categorization of historical objects will be carried out according to the size of potential threat individually for each hazard. Consequently, the synthesis of all threats and comprehensive

evaluation of objects and sites listed above will be processed. Special attention is paid to the Cultural Heritage Objects of global importance.

The evaluation is processed based on spatial map analyses using the available databases, field surveys and process modeling. The results will be verified by comparison with findings of regional offices of the National Heritage Institute.

The project outputs will extend the integrated information system of National Heritage Institute by systematic findings in form of thematic databases. The set of specialized maps will be generated from these databases. The maps will show the size of potential threat to all observed historical objects by evaluated hazards: river floods, torrential rains, water and wind erosion, landslides, atmospheric deposition, industrial activity and also threats to the objects bound to the water including changes of their diversity. Additional outcome will be web mapping application that will present the results to the public interactively.

The methodology describing how to evaluate the selected potential threat to the other historical objects will be an independent project output. The methodology will also describe what documentation should be used preferentially and what procedures should be chosen. It will be possible to use the methodology at the repeated (updated) evaluation of historical objects and its use will allow compare the size of threat in time and space.

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

Project manager: Ing. Karel Drbal, Ph.D.
tel.: (+420) 541 126 300, e-mail: karel_drbal@vuv.cz

Duration: 2007–2012

The objective of the project was to develop an effective method and appropriate tools for transposition of the Directive of the European Parliament and of the Council on the assessment and management of flood risk (2007/60/EC) into the legal system and institutional framework of the Czech Republic.

On the basis of the results of the detailed analysis of the requirements of the Directive of the European Parliament and of the Council on the assessment and management of flood risk (2007/60/EC, hereinafter referred to as the Directive) and the relevant legal regulations in force in the Czech Republic a detailed proposal was submitted for a method for the transposition of the Directive into the conditions of the Czech Republic and the last version of the implementation plan, which should ensure the fulfillment of the all requirements in the Directive.

The methodical tools for preliminary evaluation of flood risks in CR were prepared in previous years. The tools contain the approaches how to implement the issue of flash floods into the process. The supplemented contentual frame of plans of flood risk management in compliance with Regulation No. 24/2001 Coll. The proposals of variants were processed for issue of long-term planning of the flood preventive and operational measures as a public service. The proposals were based on available analyses and prognoses of increase of the gross national product. The necessity of the implementation of the principle of shared financing in the system of financing flood related issues (consequent participation of private entities) followed i.e. from the comparison of economic demands of flood events with comparable public services. The contribution to the parameterization of the objectives of the flood risk management on national level for current planning period was the evaluation of possible effects of the implementation of specific protection demands. The evaluation was based on analyses of characteristics in the areas with significant flood risk. Simultaneously, the generally useable description of multicriterial analysis methods was prepared as a suitable supporting tool in decision making process of the evaluation of individual proposals of flood protection measures. The motivation is the fulfillment of general requests of Directive 2007/60/EC. The variants of the proposals of these measures have to be evaluated regarding the mitigation of negative impacts of floods on human health, environment, cultural

heritage and economic activity. The participation at meetings of Floods Directive Reporting Drafting Group was ensured in the frame of the project in 2012.

Expert support of the Czech Republic's participation in the International Commission for the Danube River Protection

Project manager: Ing. Stanislav Juráň
tel.: (+420) 541 126 322, e-mail: stanislav_juran@vuv.cz

Duration: 2008–2012

The objectives of the project were aimed at supporting a wide variety of activities, resulting from the participation of the Czech Republic in the activities of the International Commission for the Protection of the Danube River and its key expert groups. There are especially activities provided by Pressures and Measures Expert Groups (P & M EG), the Monitoring and Assessment Expert Group (MA EG) and the Task Group for Nutrients (N TG).

In 2012 the activities were based on the Danube River Basin Management Plan (DRBMP), preparation of the Joint Danube Survey 3 (JDS3) and permanent work activities. Documents on the status of implementation of measures concerning the reduction of inputs of nutrients into water from agglomerations were prepared for P & M EG. The documents for evaluation of agricultural measures were provided for N TG. Activities MA EG were focused on the preparation of the Third Joint Danube Survey (JDS 3). A number of comments and documents were developed for the meetings and key documents of the MA EG. Example of the permanent activity is the ensuring of data for the preparation of water quality yearbook.

Cooperation with the Slovak Republic on transboundary waters

Project manager: Ing. Stanislav Juráň
tel.: (+420) 541 126 322, e-mail: stanislav_juran@vuv.cz

Duration: 2008–2012

The main objective of the task is to support the activities of the Czech-Slovak Working Group for Water Protection, which works under the Czech - Slovak Commission for Transboundary Waters. In accordance with the approved Work Plan of the OV Group the activities are focused on the organization and management of the joint meetings. The permanent activity is the assessment of the results of monitoring transboundary watercourses according to national legal regulations and issues of water quality accidents.

In 2012, the project carried out the assessment of monitoring results from period 2011 at fixed monitoring sites of transboundary waters located on significant watercourses. Furthermore, the quality of surface water was evaluated in selected rotating monitoring sites in accordance with the approved program. The assessment of long-term concentration changes in water quality indicators (pH, N-NH₄, N-NO₃, P_{total} and chlorophyll a) was carried out. Time changes and diagrams of trends of indicators include monitoring results from the period 2000–2011. Guideline for Reporting and Warning Service relating to the exceptional serious deterioration of the quality of transboundary watercourses was updated. In 2012, two joint meetings of the working group for water protection were organized, focused primarily on the tasks arising from the session of the Commission and for preparing joint Czech-Slovak monitoring.

Cooperation with Austria on transboundary waters

Project manager: RNDr. Hana Mlejnková, Ph.D.
tel.: (+420) 541 126 333, e-mail: hana_mlejnkova@vuv.cz

Duration: 2012 (with a view to a long-term activity)

The project includes activities resulting from the Protocol of the Czech-Austrian Commission for transboundary waters, aimed at the monitoring and quality control of transboundary watercourses.

The project focused on fulfillment of requests of Czech-Austrian Commission for Transboundary Waters regarding items of maintenance of the cleanness of the transboundary watercourses (e.g. Moravská Dyje River, Dyje (Thaya) River, Pulkava River, Lužnice River, Malše River, Dračice River, Světlá River and Větší Vltavice River).

The quality monitoring of transboundary watercourses was carried out according to the Programme of Monitoring of Czech-Austrian Transboundary Watercourses that was approved by representatives of the both countries. The monitoring results were evaluated and information on status of the contamination brought by listed watercourses over state boundaries and on the general trend of the development of water quality in transboundary watercourses was submitted to Czech-Austrian Commission for Transboundary Waters.

The frequency of monitoring on watercourses Dyje and Pulkava was reduced in 2012. The interlaboratory comparative tests of Czech and Austrian Laboratories were organized. The results of tests contributed to increase the informational value of evaluated results and helped to solve the discrepancies.

The 2012 results showed the predominantly constant status of the water quality, i.e. the uncontaminated water – 2nd quality class according to CSN 75 7221 in the Dyje River in the area of the Podyjí National Park, in the Větší Vltavice River, in the Světlá River and at the border monitoring site of the Lužnice River; the contamination of water (3rd class) was determined in the Moravská Dyje above and below the river mouth of the contaminated Austrian Pulkava, in the Dračice River and in the Lužnice River at Nová Ves. The strong contamination (4th–5th class) caused predominantly by Phosphorus was determined at the lower part of the Dyje River. The extreme contamination (4th–5th class) is presented constantly in the Pulkava above and below the outlet from the Austrian chemical factory.

The issues of water contamination in the water reservoir Znojmo AOX and the Austrian discharge of wastewater from Agrana company into the Lužnice River were dealt with. Mutual information on measures outside the immediate area (potentially contributing to the improvement of water quality in transboundary watercourses) was going on.

All the mentioned documents are prepared for 21st meeting of Czech-Austrian Commission for Transboundary Waters. The 2011 results were processed in Protocol of 20th Meeting of the Commission.

Technical assistance in implementation of Convention on the Protection and Use of Transboundary Watercourses and International Lakes

Project manager: Ing. Stanislav Juráň
tel.: (+420) 541 126 322, e-mail: stanislav_juran@vuv.cz

Duration: 2010–2012

The aim of the project is to provide a support to the Ministry of the Environment regarding the implementation of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes. The project covers technical support by TGM WRI, p.r.i., in the area of integrated water resources management and their assessment.

In 2012, preparational documents were analyzed for meetings and texts prepared by the UN ECE Convention Secretariat in Geneva were commented. Another activity was the participation at the joint 13th meeting of working group of Monitoring and Assessment (MA) and 7th meeting of working group of Integrated Water Resources Management (IWRM). All the necessary requirements arising from the results of the negotiations were fulfilled.

Potential flood damages and hazards in the Lower Morava River and the Lower Thaya River Basin – International project CEframe (work package 4)

Project manager: Mgr. Pavla Štěpánková, Ph.D.

tel.: (+420) 541 126 312, e-mail: pavla_stepankova@vuv.cz

Research team: Ing. Libor Clubna, Mgr. Igor Konvit, Ing. Miriam Dzuráková, Ing. Helena Nováková, Ing. Milena Forejtníková, doc. Ing. Aleš Dráb, Ph.D. (FAST VUT Brno), Ing. Petr Janál, Ph.D. (CHMI Brno), Ing. Lucie Březková (CHMI Brno), Ing. Ladislav Gimun (River Board Povodí Moravy, s.e.)

Duration: 2011–2012

Project CEframe (Central European Flood Risk Assessment and Management in CENTROPE region) was focused on flood risk assessment and management on Transboundary Rivers –the Danube River, the Thaya River, the Morava River and the Leitha River. Partners from Austria, Czech Republic, Hungary and Slovakia took part in this project.

Work package dealt with flood risk assessment based on potential flood losses calculated for chosen transboundary rivers. Common methods for flood losses calculation had to be found, because of different input data in each country. The methodology from the Rhine Atlas was used, which has been modified for participating countries. Depths of flooding for different flood scenarios and geodatabase CORINE land cover for land use were used as input data. The project results were compared with results calculated by Czech national methodology for flood losses assessment. Information about flood risk based on flood losses were used as an input for work package 5, which dealt with flood risk management strategy in project area.

Specialized internship for experts of the State Meteorological Service of Moldova

Project manager: RNDr. Denisa Němejcová

tel.: (+420) 541 126 331, e-mail: denisa_nemecova@vuv.cz

Research team: Ing. Pavel Sedláček, Mgr. Marek Polášek, Mgr. Jiří Kroča, Mgr. Libuše Opatřilová, doc. RNDr. Světlana Zahradková, Ph.D., RNDr. Hana Mlejnková, Ph.D., Ing. Monika Skotalová

Duration: October–December 2012

The project objective was to organize an internship of the Moldavian experts (hydrobiologists of State Meteorological Service of Kishinev) in TGM WRI, p.r.i., Brno. Moldavia is one of so called “priority countries” that are supported by CR regarding the possibilities and importance of individual issues in selected fields including the protection of environment. Moreover, Moldavia lies in Danube River Basin and relatively detailed monitoring and evaluation of surface running waters is requested in the basin by International Commission for the Danube River Protection. In this context, the internship suitably contributed to improvement of expert knowledge and abilities of the Moldavian biologists.

Third short-term internship of employees of the State Meteorological Service in Kishinev was organized already in 2012. The internship continued on previous ones. The project objective was to support significantly professional growth and the broadening of the expert potential of Moldavian biologists in the area of biomonitoring of biological components of watercourses. Specifically, the knowledge level of the Moldavian colleagues of the taxonomical determination of the key biological components (macrozoobenthos, phytobenthos and macrophytes) was

increased. The realization of the internship can be seen also as a support of the fulfillment of objectives of international agreements and conventions and as a support to the process of the implementation of the Water Framework Directive 2000/60/EC in new Moldavian water act in the area of the monitoring and evaluation of ecological status in the whole Danube River Basin.

Information platform for cultural landscape

Project managers: Ing. Hana Hudcová, RNDr. Denisa Němejcová
tel. (+420) 541 126 325, e-mail: hana_hudcova@vuv.cz

Duration: 2010–2012

The project "Information platform for cultural landscape" (CZ.1.07/2.4.00/12.0011) was aimed to promote cooperation among organizations engaged in research, development and education in the field of cultural landscape. Many subjects deal with a landscape as a whole from different perspectives, a broader synthesizing approach, however, is missing, as well as interdisciplinary connections. The target group of the project was staff and students of the beneficiary (Mendel University Brno) and partner institutions (Masaryk University Brno, Institute of Geonics AS CR, p.r.i., Institute of Systems Biology and Ecology AS CR, p.r.i. – CzechGlobe, Palacky University of Olomouc, Czech Horticulture Academy of Mělník and TGM WRI, p.r.i.). Improving the coordination of project partners had a positive impact on research and tertiary education. Consequently, the current findings are easily accessible to the target group. Another objective was the creation of partner networks and development of existing ones. The motivation was common procedure for winning and processing of national and international projects and involvement into international networks.

In 2012, the project objectives were met by key project activities, which covered the activities of contact points at the institutions, management of the project information web pages, studies of good practice (short-term internships in foreign networks) and center of professional contacts activities (internal exchange of students, communication courses in English and German languages, seminars on current research project calls). Additionally, open house days at the institutions and popularizing lectures were organized and the landscape dictionary, located on the information project web site, was extended for another vocabulary.

The perspectives of landscape management – innovation of landscape disciplines

Project manager: RNDr. Denisa Němejcová
tel.: (+420) 541 126 331, e-mail: denisa_nemejcova@vuv.cz

Research team: Ing. Hana Hudcová, Ing. Miloš Rozkošný, Ph.D., doc. RNDr. Světlana Zahrádková, Ph.D., RNDr. Hana Mlejnková, Ph.D., Ing. Alžběta Petránová

Duration: 2011–2013

The objective of the project is to achieve, with the contribution of experts from the practice, a significant improvement of the skills of academic staff and improvement in the training of students in resolving problems arising from the increasing frequency of dangerous natural phenomena. The other objectives are the development of accessible e-learning study materials, the changing of the stereotype of the lectures by incorporating those prepared by experts from practice and short-term intensive training scholarships at partner organizations and universities in the EU and in the Czech Republic.

The project partners are Faculty of Forestry and Wood Technology of the Mendel University in Brno, ARVITA P, Ltd., Faculty of Civil Engineering of the Technical University in Brno and T. G. Masaryk Water Research Institute, p.r.i. The project is co-financed from the European Social Fund and the state budget of the Czech Republic.

In 2012, the project objectives were achieved through the project key activities (processing of study materials and specialized expert texts in the e-learning form, lectures and organizations of student internships at the Brno Branch of TGM WRI, p.r.i.). All these activities contribute to the involvement of students in the project and to the innovation of the teaching of the academic disciplines: landscape architecture and landscape engineering, forestry, forestry engineering and water management.

Flood Protection Education and Research Centre

Project manager: Mgr. Pavla Štěpánková, Ph.D.

tel.: (+420) 541 126 312, e-mail: pavla_stepankova@vuv.cz

Research team: Ing. Hana Hudcová, Radka Funková, Doc. Ing. Aleš Dráb, Ph.D. (FAST VUT Brno), Mgr. Ing. Jana Soukopová, Ph.D. (ESF MU Brno)

Duration: 2011–2014

The project is financed by the Operational Programme on Education for Competitiveness, supervised by the Ministry of Education, Youth and Sports. This project is focused on the development and innovation of education and its link with the research and development activities to improve competitiveness of the CR.

The project is primarily focused on the transfer of knowledge from research experience to students of collaborating universities and staff of partner organizations in flood protection. The Masaryk University in Brno, the Technical University in Brno and TGM Water Research Institute, p.r.i., are project partners. The knowledge is shared with students by organized workshops, conferences, excursions, short-term internships etc.

Assessment of agricultural land in the areas of extinct fishpond systems with the aim of supporting sustainable management of water and soil resources in the Czech Republic

Project manager: Ing. Miloš Rozkošný, Ph.D.

tel.: (+420) 541 126 318, e-mail: milos_rozkosny@vuv.cz

Duration: 2012–2015

The aim of the project NAZV KUS QJ1220233 is primarily an inventory of areas of abandoned fishpond systems (water bodies), assessment of the present landscape land-use of these areas and the proposal of a possible change to the strengthening of sustainable management of water and soil resources.

The aim of the project in 2012 was the creation of digital map and database of historical and abandoned ponds in the Czech Republic and the development of design criteria catalogue for individual sites of the abandoned ponds and pond systems assessing in terms of current land-use and potential building of water or wetland areas, and its implementation in mapping and database outputs processed by the web application. Other activities were field surveys of areas of former and existing ponds in selected areas of the Czech Republic in connection with the initial version of the map of historical ponds. The project enables to get acquainted with the project results and the issue of ponds and their function in the landscape in the form of presentations and the contribution in a research journal.

ETZ Project: Polder confluence – Renaturierungskonzept

Project managers: Ing. Danuše Beránková, Ing. Milena Forejtníková
tel.: (+420) 541 126 324, e-mail: milena_forejtnikova@vuv.cz

Duration: June 2012–October 2013

The project is based on the contract with the Austrian firm Via Donau that is a partner of the project Polder Confluence. Main partner is the River Board Povodí Moravy, s.e.

The project is focused on usability of the space above the confluence of Morava and Dyje rivers for flood protection, including realization. All the measures on watercourses must not deteriorate the status of water bodies according to WFD. That is the reason why the project focuses on ecological impacts and improvement of morphological status mainly of the Dyje River. The Austrian project partner deals with this part of the project. The TGM WRI was approached as one of three Czech organizations. TGM WRI won the contract (documentation on status and finished surveys on the Czech bank of the Dyje River).

TGM WRI focused on literature review and processing of publicly available data. We provided relevant information to the customer and adjusted the opinions that might be influenced by language barriers. The field survey in the area was not included in the contract. Additional survey is carried out only at Austrian part of the area. Main advantage of the project for the TGM WRI is the maintaining of continuity of cooperation and information transfer that were established during previous common projects.

The reviews of hydraulic calculations (1st phase) in the frame of activity “Creation of flood risk and flood hazard maps for the Morava River and the Thaya River Basins”

Project manager: Ing. Libor Chlubna
tel.: (+420) 541 126 306, e-mail: libor_chlubna@vuv.cz

Duration: 2012

The project objective is to prepare the external reviews of the first phase of hydraulic calculations as a base of flood hazard maps.

According to the Flood Directive (Directive on the assessment and management of flood risks 2007/60/EC), Czech Republic as a EU Member State is obliged to prepare flood hazard maps and flood risk maps for areas with potential significant flood risk by 22nd December 2013. Assessing of hydraulic characteristics of water flow is necessary for the purposes of flood hazard mapping. The completeness of basic documents and draft conceptual model has been evaluated during the first phase. Conceptual model includes the formulation of input assumptions with their justification, a schematization of the problem with regard to the numerical model used for the calculation with considering consequent processing of maps of hazards and risks.

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

Project manager: RNDr. Hana Mlejnková, Ph.D.
tel.: (+420) 541 126 333, e-mail: hana_mlejnkova@vuv.cz

Duration: 2012–2014

The long-term monitoring of the influence of wastewater from the Dukovany Nuclear Power Plant (NPP) on water quality in the Jihlava River and in the reservoir system Dalešice–Mohelno continued in 2012. The monitoring is based on contract with CEZ.

The influence of the Dukovany NPP on water quality in the Jihlava River is monitored at following monitoring sites in the long term: Jihlava-Vladislav, backwater of the Mohelno–Dalešice Reservoir, Mohelno-pumping station of the Dukovany NPP, Skryjský Creek and Jihlava-Mohelno. The scope of the monitoring is based on request of customer (CEZ) and it contains chemical, physically-chemical, radiological, biological and microbiological analyses. The results of monthly monitoring showed input of salts (dissolved inorganic salts, NO_3^-) and organic substances (COD-Cr) via wastewater into the Mohelno Reservoir. Consequently, the limit was exceeded in pumped water and in the Jihlava River below the reservoir system.

The influence of the Dukovany NPP on the water quality in the Jihlava River resulted in slight increase of pH, concentration of Cu, dissolved substances, other salts (PO_4^{3-} , SO_4^{2-} , Cl⁻, conductivity), tritium and trophic potential of water. Other monitored parameters of water quality were not increased below the energy system. Biological monitoring showed relatively good status of water quality in the whole monitored area. The significant influence of wastewater from Dukovany NPP on recipients was not proved by biological monitoring.

Implementation of Natura 2000 network in the area administrated by Nature Conservation Agency of the Czech Republic

Project manager: Mgr. Jiří Kroča
tel.: (+420)541 126 328, e-mail: jiri_kroca@vuv.cz

Duration: 2011–2013

The project objective is to carry out hydrobiological inventory survey in three small specially protected areas (SSPA) in the area of Beskydy Protected Landscape Area (Salajka National Nature Reserve and Kněhyně – Čertův mlýn National Nature Reserve) and in its surroundings (Skalická Morávka National Nature Reserve). The outputs of the project are the list of the taxons, the expert opinions on significant findings, evaluation of the communities status and the evaluation of the current status and the importance of given SSPA and proposal of the management.

The project is focused on determination of species spectrum of invertebrates as complete as possible at selected localities. The list itself is not the priority objective. The main aim of the studies is to evaluate the importance of taxons found, the status of their populations and based on these findings to evaluate the importance of the SSPA and propose the management.

In the project first year, the field work was going on (hydrobiological sampling using the method PERLA, measurements of the parameters of water environment (pH, conductivity, Oxygen and water temperature). The adults of taxonomical groups of temporary fauna were captured (this activity is not included in common hydrobiological studies). The Malaise traps were installed on small watercourses for this purpose. The adults were captured using entomological net and dragging method on bigger watercourses and light traps were used during nights.

In 2012, the works continued at the Skalická Morávka National Nature Reserve (adults collecting, analysis and determination of material from previous year and by end of the 2012 the final report on Salajka National Nature Reserve was prepared.

NAVARO – Development of tools for early warning and responses in the field of the protection of surface water

Project manager: RNDr. Přemysl Soldán, Ph.D.
tel.: (+420) 595 134 813, e-mail: premysl_soldan@vuv.cz

Duration: 2011–2014

The objective of the project is to develop a certified methodology, tools and relevant manual, which would describe a method for rapid detection of the emergence situations and casual factors of accidents, terrorist attacks or criminal activities with an impact on the quality of surface waters.

In the second year of the project, the activities corresponded to the approved project plan. The pilot operation of continual monitoring has started and creation of database of potential toxic pollutants for individual river basins was going on continuously. The project objective (development of tools for early detection of origin and cause of accidents, terrorist attacks or criminal activity with impact on surface water quality) is concerned by other project activity: the development and validation of mathematical apparatus for the lag time of travel of contamination, analysis of warning curves of monitoring facilities and creation of the list of clues of displays of toxic injury of fishes in contaminated recipients.

Register of industrial pollution sources – dangerous substances

Project manager: Ing. Alena Kristová
tel.: (+420) 595 134 853, e-mail: alena_kristova@vuv.cz

Duration: 1998–2012

The main objective of the project is to update annually the data on the management of selected hazardous substances and on their discharges into the aquatic environment. The types of the data are adapted to meet the requirements stipulated in legislative provisions and requirements necessary for processing of materials and specific outputs required by Ministry of the Environment.

In 2012, the inventarisation of hazardous substances in water environment (direct and indirect discharge) was carried out. The following data sources were used for the inventarisation: The data from reports sent in Integrated system of fulfilling report duties according to article 4 paragraph 38 of Law No. 254/2001 Coll. (Water Law). These data are transferred from polluter to water management office, river basin board and authorized expert entity. The full database (map viewer including tools for searching) was made available on the internet for the Ministry of the Environment of the Czech Republic and selected governmental agencies (water management offices and the Czech Environmental Inspectorate).

Cooperation in transboundary waters with Poland

Project managers: Ing. Luděk Trdlica, RNDr. Jaroslava Procházková
tel.: (+420) 595 134 800, e-mail: ludek_trdlica@vuv.cz

Duration: 2012 (long-term activity)

The main objective of the project is to ensure the required water documentation and relevant information for the activities of the representatives of the Governments of the Czech Republic and

the Republic of Poland for transboundary waters, as well as to fulfil all the requirements associated with the transboundary waters on the Czech-Polish section of the international border.

The group "Water management planning on border waters" focused on property settlements in connection with construction of polder on Oldříšovský creek (Krzanówka), Oder water way in section Ostrava–Kozle and flood protection measures on border sections of rivers Petrůvka and Opava. The attention was also paid to the preparation of construction of Nové Heřminovy reservoir on the Opava River. In the frame of the group the 15th meeting of the group was organised and the material for the 14th meeting of government representatives (November 2012) was processed.

The working group for implementation of Directive 2000/60/EC at its 8th meeting dealt with preparation of material for geometrical harmonisation of cross border bodies at Czech-Polish section of country border. The work on these issues will continue after approval of harmonisation by GIS experts.

In the area of the Polická pánev basin and the Stěnava River the working group of hydrologists and hydrogeologists performed common monitoring at Czech and Polish parts of the area of interest. Groundwater levels were monitored at selected sites and discharge in surface watercourses was monitored at selected monitoring sites. Two common (Czech-Polish) measurements on surface watercourses, springs and groundwater monitoring sites were carried out on both sides of the country border (spring and autumn 2012). The common measurements are in accordance with working group rules.

Support to the participation of the Czech Republic in the activities of the International Commission for the Odra River Protection against Pollution

Project managers: Ing. Luděk Trdlica, Ing. Petr Tušil, Ph.D., MBA, Ing. Martin Durčák
tel.: (+420) 595 134 800, e-mail: ludek_trdlica@vuv.cz

Duration: 2012 (long-term activity)

The objective of the project is to support the implementation of the provisions of the Agreement on the International Commission for the Odra River Protection against Pollution (ICOP) and the Convention on the reduction of pollution of the Baltic Sea. Furthermore, the project aims at ensuring the activities and documents for the negotiations of the Czech parts of the working groups of the ICOP, including the preparation of documentation for the meeting of heads of delegations and for the plenary meetings of the ICOP.

The managing group G1 (WFD) focus in the first half of 2012 mainly on ongoing actualization of the time schedule "Tasks of the G1 group and their working subgroups for the period 2010–2015". The attention was paid to finishing the individual strategies of reaching common objectives for important water management issues in second half of the year. The preparation of ongoing report on realization of measure program continued. The preparation of document for public consultations also continued (time plan and work program).

The working subgroup Planning (GP) dealt mainly with finishing of materials in the frame of Strategy of reaching common objectives for following themes: Morphological changes in surface water bodies, water withdrawals and transfers and important contamination load. The document standing no need of creation of a strategy for reaching environmental objectives in cross-border water bodies was prepared. The subgroup dealt also with harmonization of heavily modified water bodies and exceptions. The methods of delineation were compared between the Czech Republic and Poland. The analysis of differences in assessment was carried out.

The working subgroup Monitoring (GM) prepared documentation of summary table of all assessment methods that are relevant for International Oder River Basin District and correspond to requirements of WFD and methods of derivation of reference conditions and class boundaries. The following presentations were prepared: National methods of assessment of chemical and

quantitative status of groundwater and National methods of assessment of ecological status of surface water. The approach to harmonization of different assessment of cross-border and near to border water bodies was prepared. The subgroup organized a workshop on presentation of national methods of macrozoobenthos assessment in running water in June 2012.

Centre for Waste Management

Possibilities of using information and resources of waste management data as a tool for identification and solution of unauthorized waste management

Project manager: Ing. Věra Hudáková

tel.: 220 197 470, e-mail: vera_hudakova@vuv.cz

Research team: Ing. Dagmar Sirotková, Ing. Jana Zuberová, Ing. Světlá Pavlová, Ing. Eva Kajanová

Duration: 2012–2013

The aim of this project is to show possibilities of using information and resources of waste management data as a tool for identification and solution of unauthorized waste management. The outcomes will be used to increase the level of knowledge and to learn and maintain the necessary knowledge in this area. The readiness of state security forces will increase. Thereby the real effectiveness of the police and the Fire Rescue Service intervention in case of suspected unauthorized waste management or during an emergency situation will increase as well.

The project is focused on the processing of all available data sources, which have an impact on waste management in the Czech Republic and during the transport of waste within and outside the EU. In cooperation with the Ministry of the Environment, the Czech Environmental Inspectorate, police, customs administration and other experts the optimal procedures for identifying and solving unauthorized waste management are discussed. The information which could be used when dealing with actual unauthorized waste disposal is gathered. The manual which should provide a summary of waste management, identify responsibilities and competencies in waste management, describe hazardous properties of the waste and the possible threat to the environment and human health is being prepared. This manual will serve for preparation of specialists from state administration. Furthermore, it should show the possibility of using the data collected within the Waste Management Information System. The material related to the transboundary transport of waste applicable directly in the field is being prepared as well.

Branch of Applied Ecology

Erosion washout: increased possibility of danger for population and water quality in connection with expected climate change

Project managers: Mgr. Pavel Rosendorf, Ing. Martin Hanel, Ph.D., Ing. Jiří Pícek, doc. Dr. Ing. Tomáš Dostál (Czech Technical University in Prague)

tel.: (+420) 220 197 413, e-mail: pavel_rosendorf@vuv.cz

Duration: 2012–2015

Torrential precipitation accompanied by soil washout is a risk factor that threatens population, municipal infrastructure, even surface water resources and important recreation areas. The amount of torrential precipitation increases with climate change.

Future risks connected with these extreme events might influence important parts of the area of the Czech Republic. The main objective of the project is to propose conceptual approaches for area assessment with regard to risks of erosion washout connected to expected climate change.

The project is focused on assessment of erosion hazard and consequent transport of load that may lead to danger for municipalities, important infrastructure components, water quality in surface water bodies used for drinking water supply and important recreational water reservoirs. Simulations and assessment of transport of load will be carried out for whole area of the Czech Republic. Global model based on GIS will be used for the simulations. The detailed fully distributed episodic model will be applied on selected pilot catchments. The simulations and assessments will be carried out for current climate conditions and for potential future situation, when the distribution of precipitation extremes will be changed due to expected climate change.

In the project first year, the available data were collected and analyzed. Preliminary selection of pilot catchments was done. The changes in erosion hazard and sediment transport will be analyzed in these catchments in detail using comparison of current conditions and potentially changed future climate characteristics due to climate change.

Optimization of woody debris for watercourse restoration and semi-natural watercourse regulation

Project manager: Mgr. Pavel Kožený

tel.: (+420) 220 197 265, e-mail: pavel_kozeny@vuv.cz

Research team: Ing. Ondřej Motl, Ing. Ján Šepelák, Ing. Pavel Balvín, Mgr. Ondřej Simon, Ing. Karel Douda, Ph.D.

Duration: 2012–2015

The aim of the project is to develop new technical solutions and methods for safe and effective application of woody debris in stream restoration and semi-natural stream regulation. The project also deals with the management of woody debris in streams in the Czech Republic.

The project is focused on determination of technical parameters for using structures of wood material put in watercourses for watercourse revitalization and erosion protection. The designs of different types of objects from wood material will be modeled on physical hydraulic model. The expertise on their building and functionalities will be obtained under field conditions in frame of several revitalization and erosion protection construction projects on watercourses in the Czech Republic. The assessment of importance of woody debris for water organisms is carried out. The possibilities of wood management on natural watercourses are also assessed.

In 2012, the localities for observation of experimental inserted wood structures were selected. The dynamics of river wood in natural watercourses will be observed at selected localities along with its potential for water organisms. The several years research program started at selected localities. The program outputs will be summarized in methodology document that is one of planned project outputs. The hydraulic model for physical modeling of individual wood structures was built at TGM WRI hydraulic laboratory. The model will be used in 2013 and 2014 years.

Numerical and functional analysis of aquaculture sector including recreational fishing focused on increase of competitive ability of the Czech Republic and improvement of status of water ecosystems

Project managers: Ing. Jiří Musil, Ph.D., Ing. Tereza Vajglová (TGM WRI, p.r.i.); doc. Ing. Lukáš

Kalous, Ph.D., Ing. Miloslav Petrtýl, Ph.D. (Czech University of Life Sciences), et al.

tel.: (+420) 220 197 542, e-mail: jiri_musil@vuv.cz

Duration: 2012–2013

The aim of this project is the numerical and functional analysis of aquaculture, recreational fishing and farming of aquarium and ornamental fish, including their interactions and harmonization with the objectives of aquatic ecosystems conservation with the aim to sustainability and competitiveness.

The project deals with the identification of the effects of environmental phenomena on the sector of aquaculture and recreational fisheries and vice versa. On the basis of the socio-economic and environmental analyses of these sectors, priorities, strategies and remedial measures will be formulated in accordance with the policies and regulations of the EU. The overall aim is then to harmonize strategies of these sectors with environmental and conservation objectives to increase sectors sustainability and competitiveness.

Monitoring of catadromous migration of the European Eel (*Anguilla anguilla*)

Project managers: Ing. Jiří Musil, Ph.D., Ing. Tereza Vajglová, Ing. Pavel Horký, Ph.D., Mgr. Ondřej Slavík, Ph.D.

tel.: (+420) 220 197 542, e-mail: jiri_musil@vuv.cz

Duration: 2012–2014

*The goal of this radio-tracking telemetry project is to determine the migration success of European Eel (*Anguilla anguilla*) within its native range of distribution concerning the territory of the Czech Republic.*

With regard to dramatic population decline of the European eel, every member state of EU had to prepare the Eel Management Plan (EMP) on the basis of the Council Regulation EC 1100/2007. This plan guarantees the free migration for at least 40% of the eel adult population with respect to population state before any negative human impacts had occurred. For the purpose of the EMP in the Czech Republic, used estimation models of eel migration success were based on the catch statistics and expert judgments since real, exact data are still missing. Therefore, the aim of this project is to determine the actual migration success of the eel within its native area of distribution in the Czech Republic (Elbe and Oder rivers) using the biotelemetry method.

The methods of optimization of the proposed measures in watersheds of reservoirs leading to effective decrease of their eutrophication

Project managers: Mgr. Pavel Rosendorf, Ing. Libor Ansorge, Ing. Vlastimil Zahrádka (Ohře River Board, s. e.), doc. Dr. Ing. Tomáš Dostál (Czech Technical University in Prague)

tel.: (+420) 220 197 413, e-mail: pavel_rosendorf@vuv.cz

Duration: 2012–2015

One of important problems of status of water bodies according to Water Framework Directive (2000/60/EC) is nutrients loading in water reservoirs as it followed from approved District Water Management Plans for period 2010–2015. The most important nutrients are phosphorus and nitrogen. The issue expresses by eutrophication which is caused by increased nutrients loads in watercourses. In the end, the eutrophication may cause the changes of status of many water reservoirs. The project objective is to propose methodology and suitable technical tools for identification of such pollution sources that have the most negative impact on eutrophication of water reservoirs with regard to technical-economical possibilities and impacts of individual solutions.

In the frame of the project, the general methodology for assessment of the impact of individual pollution sources on eutrophication of water reservoirs will be developed.

The methodology will contain procedures for determination of importance of individual pollution sources, methods of addition of missing data about emitted pollution, the approaches to calculation or estimation of portion of phosphorus significant for eutrophication and finally the approach to assessment of importance of individual sources with regard to their localization within the assessed reservoir. The other important output of the project will be software decision support system (DSS). The DSS will contain besides procedures described in methodology the module of choice of suitable type measures and economical tool which will allow to optimize proposed measures in watershed of selected water reservoir for meeting of defined target status.

In the project first year, the general concept of Methodology for assessment of the impact of individual pollution sources on eutrophication of water reservoirs was built. Two pilot watersheds were selected (watersheds of Stanovice and Nechanice reservoirs). The proposed procedures will be verified at these watersheds. The data collecting was started in selected watersheds. The data on phosphorus sources are collected. Simultaneously, the first analyses were carried out. The analyses are focused on possibilities of an approach to assessment of suitable type measures for decrease of input of phosphorus in water.

The revision of the estimations of the guarantee of water demand from Dukovany Power Plant, 3rd phase: Water quality assessment below the Mohelno Reservoir

Project managers: Mgr. Pavel Rosendorf, Mgr. Pavel Šimek, RNDr. Jitka Svobodová, Ing. Eduard Hanslík, CSc.

tel.: (+420) 220 197 413, e-mail: pavel_rosendorf@vuv.cz

Duration: 2012

The objective of the project was assessment of impact of individual variants of combination of the current Dukovany Nuclear Power Plant (EDU1–4) with new nuclear facilities EDU5,6 or operation only of new nuclear facilities. The impact on water quality is assessed below the Mohelno water reservoir at Jihlava monitoring site. The classical indicators of water quality are used (including water temperature) as well as radiation indicators.

In the frame of the study, the changes in water quality were simulated. The influencing on water quality while current and new facilities are on operation was simulated. Two different values of produced power were simulated. The variants of only new facilities on operation were also simulated. The simulations were carried out with assumption of changes in discharge and withdrawals from the Jihlava River in case of scenarios of air warming of 0–4 °C. The analysis of selected indicators above the Dalešice reservoir was used for the solution. The characteristic changes of water quality in whole water reservoir system Dalešice-Mohelno were also used. The simple simulation model was created. The model was based on data analysis and it predicted changes in year average concentrations of selected indicators dependently on changes of discharges in individual scenarios. The exceeding of allowable values of selected water quality indicators was assessed for all variants. The allowable values are defined by Government Decree No. 61/2003 Coll. The target concentrations of water quality at inlet in the reservoir system were also simulated. The target concentrations would guarantee the fulfillment of limits according to the above mentioned government decree.

Water quality model of the Jihlava River within Dalešice Reservoir watershed

Project manager: Mgr. Daniel Fiala

tel.: (+420) 220 197 348, e-mail: daniel_fiala@vuv.cz

Duration: 2012–2013

The main objective of the project is to document the status of water bodies in Dalešice water reservoir watershed, to identify individual point and non-point sources of pollution and to analyse their impact on water quality.

The project is focused on the analysis of status of water bodies within Dalešice watershed. Main attention is paid to phosphorus and nitrogen sources of pollution, assessment of their impact on water quality and future measures to eliminate or lower it. Partially, valid data from headwaters, important tributaries, main stem and water management datasets are collected in 2012. In future, these data will be incorporated into MIKE BASIN modeling tool to provide localized information about present and future status. The whole project is headed by Pöyry Environment, Brno and coworked by T. G. Masaryk Water Research Institute, p.r.i., Prague, Research Institute for Soil and Water Conservation, p.r.i., Brno and Morava River Board, state enterprise, Brno.