

# REPORT OF THE CZECH NATIONAL COMMITTEE FOR HYDROLOGY (CNCH) ON UNESCO IHP RELATED ACTIVITIES (JUNE 2014)

## 1. ACTIVITIES UNDERTAKEN IN THE PERIOD JUNE 2012 – MAY 2014

### 1.1. Meetings of the CNCH

#### 1.1.1. Decisions regarding the composition of the CNCH

After the election of new members in April 2012, the Committee changed its name to the Czech National Committee for Hydrology, which is intended to be stable in future periods for different purposes (e.g. publications and conferences). Along with the name, a set of several modifications of new logo was introduced. In November 2012, a new regular member, at the same time representing the Ministry of the Environment of the Czech Republic (MECR), was elected. Also, the Statute of the CNCH was approved.

Persons who were appointed to observe activities of committees of other international programmes confirmed their commitments. At this time, the CNCH has connections to:

- Czech National Committee of Geodesy and Geophysics,
- Czech National Committee for Disaster Reduction,
- Czech Committee of the International Commission on Irrigation and Drainage,
- Czech National Committee for the UNESCO Programme on Man and the Biosphere,
- Czech National Committee for IGCP,
- Czech National Committee for Cooperation with IOC UNESCO.

Through one vice-chairman and 10 national correspondents, the CNCH maintains relationships with the IAHS and its scientific commissions. Minor changes in composition of national correspondents were made during the period of report. For now, the International Commission on Remote Sensing (ICRS) and a new decade Panta Rhei are without specific representatives. This situation, however, should be improved in the near future.

#### 1.1.2. Status of IHP-VII and IHP-VIII activities

An external coworker of the CNCH, who is in charge within the Groundwater for Emergency Situations (GWES) project, reported that the project entered its final stage. It was enabled by funding the meetings by the Japanese and, especially, German governments. In this final stage *the Global Map of Vulnerability to Water-Related Disasters and Droughts* with a scale of 1:25,000,000 has been prepared. Its publication is planned to the end of 2014. As a member of the IHP-VIII Task Force team, the same external coworker participated in the preparation of final version of *the Strategic Plan of the Eighth Phase of IHP*.

Regarding the Regional Cooperation of the Danube Countries, some members of the CNCH has cooperated with Slovak hydrologists in the development of flood forecasting at the confluence of the Dyje and Morava Rivers.

The CNCH has discussed and set up its priorities and working groups aimed at experimental basins, on history of Czech hydrology and on hydrological education. As a reaction to the survey of the UNESCO Secretariat on involvement of Czech hydrologists in activities related to IHP-VIII, the CNCH forwarded the questionnaire to its members. To date, the focal areas 1.1, 1.3–1.5, and 2.4 could be covered by Czech experts.

## 1.2. Activities of the CNCH at national level

### 1.2.1. National scientific and technical meetings

The CNCH acted as a co-organizer of a Czech-Slovak conference entitled “5<sup>th</sup> Conference with International Participation on Hydrology of a Small Basin 2014” in Prague. The conference is held in triennial cycle to bring together scientists dealing with broad range of issues connected to hydrology of small basins (measurements, water cycle research, water quality etc.). The link to website is [here](#).

Further, members of the CNCH contributed to organization of several national conferences and workshops during the respective period, among others e.g. “Adolf Patera Workshop 2013” on extreme hydrological events in the basins or “Workshop Jizera Mts. – meeting across scientific disciplines”.

### 1.2.2. Participation in IHP Steering Committees/Working Groups

Mr. Jaroslav Vrba, who is the external coworker of the CNCH, held the position of the international coordinator of the GWES project (IHP-VII, Theme 3, Focal area 3.4). Otherwise, the CNCH did not receive any other reports regarding this section.

### 1.2.3. Supported or sponsored projects

The Czech Republic did not support or sponsored projects during the period of report.

### 1.2.4. Collaboration with other national committees

Historically, the CNCH has closely collaborated with the Slovak Committee for Hydrology (SCH) in organizing and promoting selected hydrological events and activities. In autumn 2012 and 2013, the SCH (with the support of the CNCH) co-organized traditional “Conference of Young Experts” consisting of three sections – “the Conference of Young Hydrologist”, “the Conference of Young Water Managers” and “the Conference of Young Meteorologists and Climatologists”. Young experts from both countries, i.e. Slovakia and Czechia, were invited. Also, the initial consultation has been made concerning the upcoming “Hydrological Days 2015” international conference, which should take place in Slovakia as well.

### 1.2.5. Other initiatives

A new [website](#) of the CNCH was launched in 2013. The website provides useful information about activities of the CNCH, UNESCO-IHP, WMO-HWRP, IAHS and other with the relevance to hydrology.

The CNCH together with the Czech Hydrometeorological Institute (CHMI) established the National prize for the attribution of a significant personal contribution to a development of hydrology and hydrological service in the Czech Republic. The prize is named after Prof. Andreas Rudolf Harlacher, a scientist and a founder of the Hydrological service in Bohemia in 1875. The prize is represented by a medal. The first laureate of the Harlacher Prize was Mr. Josef Hladný, a long time chairman of the Czech National Committee for IHP (for more information in Czech see [this website](#)).

The CNCH in cooperation with the CHMI coordinated the issue of the book *Krátké úvahy o vodě [Short Essays about Water]*. The book was prepared on the occasion of the 2013 International Year of Water Cooperation (IYWC). Nine essays were written by nine personalities of Czech water management and hydrology. The book can be downloaded from [this link](#).

The IYWC activities included the translation of selected campaign materials to Czech. Materials have been provided among others to National network of UNESCO associated schools in the Czech Republic.

The CNCH also reported events held during celebration of the IYWC via the web questionnaire by UN-Water.

The CNCH guarantees the translation of the declarations of World Water Days and its presentation in the Czech Republic.

The CHMI organized an exposition called “Water and Air around Us: Monitoring and Assessing the Atmosphere and Hydrosphere” in Prague in 2012. Its main aim was the introduction of historical and modern instruments and methods used in meteorology, climatology and hydrology. Poster from the exhibition are updated and provided for the public use on [the CHMI website](#). The newest versions of poster presentations relating to hydrology only can be found [here](#).

Representatives of the CNCH contributed to the preparation of “XXVI Conference of the Danubian Countries on Hydrological Forecasting and Hydrological Bases of Water Management” to be held in Deggendorf, Germany in September 2014 as members of scientific committee.

Through their comments, some members of the CNCH improved the content of updated Czech state standard on hydrological data of surface waters. The standard in itself has been valid since February 2014.

The collaboration with other national committees is realized through the Czech Committee for UNESCO and its sections (Environment, Education and Science). However, the CNCH contributed to the conference of Kroměříž gardens UNESCO site as the 2013 year topic was “the water structures in gardens”.

The CNCH cooperated with the Czech National Committee for Disaster Reduction in organization of seminars dealing with the discussion of experience from 2013 flood in the Czech Republic.

### **1.3. Educational and training courses**

#### **1.3.1. Contribution to IHP courses**

The CNCH did not contribute to IHP courses during the reporting period.

#### **1.3.2. Organization of specific courses**

The CNCH was not involved in organization of specific courses during the reporting period.

#### **1.3.3. Participation in IHP courses**

The CNCH did not receive any reports that Czech experts participated in international IHP courses in the past two years.

### **1.4. Cooperation with the UNESCO-IHE and/or international/regional water centers under the auspices of UNESCO**

Some Czech hydrologists and water managers maintain personal and professional contacts with members of the UNESCO-IHE staff. Czech hydrology is interested in the activities of UNESCO category 2 water-related centres; in particular in Poland as regards ecohydrology, in Japan as regards natural disasters and in the Netherlands as regards groundwater and drought.

### **1.5. Publications**

Probably, the main contribution to UNESCO publications is the following one:

**Danhelka, J., Soukalova, E., Brezkova, L. & Cernik, J. (2013) Examples of cooperation in the Czech Republic flood forecasting and information service. In: *Free Flow: Reaching Water***

*Security Through Cooperation* (J. Griffiths & R. Lambert, eds.), First Edition., 245–247.  
Paris: UNESCO/Tudor Rose. Downloadable from [here](#).

Furthermore, the IYWC was reflected in two books written in Czech:

**Czech Hydrometeorological Institute.** (2013) *Short Essays about Water* (in Czech). Prague: Czech Hydrometeorological Institute. (ISBN 978-80-87577-24-0)

**Daňhelka, J. & Elleder, L.** (Eds.). (2012) *Selected Chapters from the History of Floods and Hydrological Services in the Czech Republic* (in Czech). Prague: Czech Hydrometeorological Institute. (ISBN 978-80-87577-12-7)

The following list presents only selected scientific papers, book chapters or contributions to conference proceedings of CNCH members or IAHS national correspondents:

Adamec, M., Trizna, M., Říhová, V., **Unucka, J.** & Gergeřová, M. (2012) On 2D and 3D parameter derivation for rainfall-runoff models. *Acta Montanistica Slovaca* **17**(3), 204–208.

Blahova, J., Leontovycova, D., **Kodes, V.** & Svobodova, Z. (2013) Study of polycyclic aromatic hydrocarbon contamination of major rivers in the Czech Republic using biliary metabolite in chub, *Leuciscus cephalus* L. *Bulletin of Environmental Contamination and Toxicology* **90**(5), 521–524. doi:10.1007/s00128-013-0972-0

Březková, L. & **Starý, M.** (2013) The stochastic discharge forecast - Creation, interpretation and other applications. In: *Floods: From Risk to Opportunity* IAHS Red Book 357 (A. Chavoshian & K. Takeuchi, eds.), 283–291. Wallingford, Oxfordshire, UK: IAHS Press.

Dohnal, M., **Vogel, T.**, **Šanda, M.** & Jelínková, V. (2012) Uncertainty analysis of a dual-continuum model used to simulate subsurface hillslope runoff involving oxygen-18 as natural tracer. *Journal of Hydrology and Hydromechanics* **60**(3), 194–205. doi:10.2478/v10098-012-0017-0

Dusek, J., **Vogel, T.**, Dohnal, M. & Gerke, H. H. (2012) Combining dual-continuum approach with diffusion wave model to include a preferential flow component in hillslope scale modeling of shallow subsurface runoff. *Advances in Water Resources* **44**, 113–125. doi:10.1016/j.advwatres.2012.05.006

Dusek, J., **Vogel, T.** & **Sanda, M.** (2012) Hillslope hydrograph analysis using synthetic and natural oxygen-18 signatures. *Journal of Hydrology* **475**, 415–427. doi:10.1016/j.jhydrol.2012.10.025

Dušek, J., Lichner, L., **Vogel, T.** & Štekauerová, V. (2013) Transport of iodide in structured soil under spring barley during irrigation experiment analyzed using dual-continuum model. *Biologia* **68**(6), 1094–1098. doi:10.2478/s11756-013-0249-4

Dvořáková, Š., **Kovář, P.** & Zeman, J. (2012) Implementation of conceptual linear storage model of runoff with diurnal fluctuation in rainless periods. *Journal of Hydrology and Hydromechanics* **60**(4), 217–226. doi:10.2478/v10098-012-0019-y

Elgzeli, Y. M., Ondovčín, T., **Hrkal, Z.**, Krásný, J. & Mls, J. (2013) Impacts of heavy groundwater pumping on hydrogeological conditions in Libya: Past and present development and future prognosis on a regional scale. *Acta Geologica Polonica* **63**(2), 283–296. doi:10.2478/agp-2013-0013

Fišák, J., Stoyanova, V., Bartůňková, K., **Tesař, M.** & Shoumkova, A. (2012) Typical insoluble particles in fog water at Milešovka observatory (Czech Republic). *Pure and Applied Geophysics* **169**(5-6), 1083–1091. doi:10.1007/s00024-011-0345-8

Gerke, H. H., Dusek, J. & **Vogel, T.** (2013) Solute mass transfer effects in two-dimensional dual-permeability modeling of bromide leaching from a tile-drained field. *Vadose Zone Journal* **12**(2), 0. doi:10.2136/vzj2012.0091

- Hanel, M.**, Mrkvičková, M., Máca, P., Vizina, A. & Pech, P. (2013) Evaluation of simple statistical downscaling methods for monthly regional climate model simulations with respect to the estimated changes in runoff in the Czech Republic. *Water Resources Management* **27**(15), 5261–5279. doi:10.1007/s11269-013-0466-1
- Hanel, M.**, Vizina, A., Máca, P. & Pavlásek, J. (2012) A multi-model assessment of climate change impact on hydrological regime in the Czech Republic. *Journal of Hydrology and Hydromechanics* **60**(3), 152–161. doi:10.2478/v10098-012-0013-4
- Havlíček, V., **Hanel, M.**, Máca, P., Kuráž, M. & Pech, P. (2013) Incorporating basic hydrological concepts into genetic programming for rainfall-runoff forecasting. *Computing* **95**(S1), 363–380. doi:10.1007/s00607-013-0298-0
- Holko, L., Dóša, M., Michalko, J., Kostka, Z. & **Šanda, M.** (2012) Isotopes of oxygen-18 and deuterium in precipitation in Slovakia. *Journal of Hydrology and Hydromechanics* **60**(4), 265–276. doi:10.2478/v10098-012-0023-2
- Horecký, J., Rucki, J., Krám, P., **Křeček, J.**, Bitušík, P., Špaček, J. & Stuchlík, E. (2013) Differences in benthic macroinvertebrate structure of headwater streams with extreme hydrochemistry. *Biologia* **68**(2), 303–313. doi:10.2478/s11756-013-0156-8
- Janál, P. & **Starý, M.** (2012) Fuzzy model used for the prediction of a state of emergency for a river basin in the case of a flash flood - Part 2. *Journal of Hydrology and Hydromechanics* **60**(3), 162–173. doi:10.2478/v10098-012-0014-3
- Klimeš, J., Benešová, M., Vilímek, V., **Bouška, P.** & Cochachin Rapre, A. (2013) The reconstruction of a glacial lake outburst flood using HEC-RAS and its significance for future hazard assessments: An example from Lake 513 in the Cordillera Blanca, Peru. *Natural Hazards* **71**(3), 1617–1638. doi:10.1007/s11069-013-0968-4
- Kodešová, R., Němeček, K., **Kodeš, V.** & Žigová, A. (2012) Using dye tracer for visualization of preferential flow at macro- and microscales. *Vadose Zone Journal* **11**(1), 0. doi:10.2136/vzj2011.0088
- Kovář, P.**, Vaššová, D. & Janeček, M. (2012) Surface runoff simulation to mitigate the impact of soil erosion, case study of Třebšín (Czech Republic). *Soil and Water Research* **7**(3), 85–96.
- Kovář, P.**, Vrana, I. & Vaššová, D. (2012) Stakeholder group consensus based on multi-aspect hydrology decision making. *Journal of Hydrology and Hydromechanics* **60**(4), 252–264. doi:10.2478/v10098-012-0022-3
- Kovar, P.**, Krovak, F., Rous, V., Bily, M., Salek, M., Vassova, D., Hrabalikova, M., *et al.* (2013) An appraisal of the effectiveness of nature-close torrent control methods - Jindrichovicky Brook case study. *Ecohydrology* (published online). doi:10.1002/eco.1453
- Křeček, J.** & Punčochář, P. (2012) Design of climate station network in mountain catchments. *Hungarian Geographical Bulletin* **61**(1), 19–29.
- Kulasova, A., Smith, P. J., Beven, K. J., **Blazkova, S. D.** & Hlavacek, J. (2012) A method of computing uncertain nitrogen and phosphorus loads in a small stream from an agricultural catchment using continuous monitoring data. *Journal of Hydrology* **458-459**, 1–8. doi:10.1016/j.jhydrol.2012.05.060
- Langhammer, J.**, Hartvich, F., Mattas, D., Rödlová, S. & Zbořil, A. (2012) The variability of surface water quality indicators in relation to watercourse typology, Czech Republic. *Environmental Monitoring and Assessment* **184**(6), 3983–3999. doi:10.1007/s10661-011-2238-9
- Langhammer, J.**, Matoušková, M. & **Kliment, Z.** (2013) Assessment of spatial and temporal changes of ecological status of streams in Czechia: A geographical approach. *Geografie* **118**(4), 309–333.

- Langhammer, J.** & Rödlová, S. (2013) Changes in water quality in agricultural catchments after deployment of wastewater treatment plant. *Environmental Monitoring and Assessment* **185**(12), 10377–10393. doi:10.1007/s10661-013-3339-4
- Pavelková, H., Dohnal, M. & **Vogel, T.** (2012) Hillslope runoff generation - Comparing different modeling approaches. *Journal of Hydrology and Hydromechanics* **60**(2), 73–86. doi:10.2478/v10098-012-0007-2
- Podhorányi, M., Mudroň, I., Cirbus, J. & **Unucka, J.** (2012) Flood impact assessment using hydraulic modelling: A case study from Stonavka and Olse river confluence area, Czech Republic. *SGEM2012 Conference Proceedings*, Vol. 3, 671–678. Presented at the 12th International Multidisciplinary Scientific GeoConference. doi:10.5593/sgem2012/s13.v3020
- Podhorányi, M., **Unucka, J.**, Bobál, P. & Říhová, V. (2013) Effects of LIDAR DEM resolution in hydrodynamic modelling: Model sensitivity for cross-sections. *International Journal of Digital Earth* **6**(1), 3–27. doi:10.1080/17538947.2011.596578
- Podhoranyi, M., Kocyan, T., Mudron, I. & **Unucka, J.** (2013) The development of applications for assessment the effect of linear technical barriers on the flow in the river basin Olsa. *SGEM2013 Conference Proceedings*, 373–379. Presented at the 13th SGEM GeoConference on Water Resources. Forest, Marine And Ocean Ecosystems. doi:10.5593/SGEM2013/BC3/S12.047
- Romanowicz, R. J., Kulasová, A., Ředinová, J. & **Blazková, S. D.** (2012) Influence of afforestation on water regime in Jizera Catchments, Czech Republic. *Acta Geophysica* **60**(4), 1120–1142. doi:10.2478/s11600-012-0046-4
- Rihova, V., **Unucka, J.**, Podhoranyi, M. & Gergelova, M. (2013) Application of GIS and mathematical models in basin management - a case study in the upper Morava River basin. *SGEM2013 Conference Proceedings*, 19–30. Presented at the 13th SGEM GeoConference on Water Resources. Forest, Marine And Ocean Ecosystems. doi:10.5593/SGEM2013/BC3/S12.003
- Soukalová, E.** (2013) Transboundary cooperation in flood forecasting and warning services within the international Morava River basin. In: *Floods: From Risk to Opportunity* IAHS Red Book 357 (A. Chavoshian & K. Takeuchi, eds.), 377–382. Wallingford, Oxfordshire, UK: IAHS Press.
- Steenhuis, T. S., Hrnčář, M., Poteau, D., Romero Luna, E. J., Tilahun, S. A., Caballero, L. A., Guzman, C. D., *et al.* (2013) A saturated excess runoff pedotransfer function for vegetated watersheds. *Vadose Zone Journal* **12**(4), 0. doi:10.2136/vzj2013.03.0060
- Šípek, V. & **Tesař, M.** (2013) Soil moisture simulations using two different modelling approaches. *Bodenkultur* **64**(3-4), 99–103.
- Vlčková, M., Šrámek, V., Matoušková, V., Březina, K. B., Fadrhonsová, V. & **Kulhavý, Z.** (2012) Determination of retention curves of swelling and skeleton forest soils (in Czech). *Reports of Forestry Research* **57**(2), 133–143.
- Vogel, T.**, Dohnal, M., Dusek, J., Votrubova, J. & **Tesar, M.** (2013) Macroscopic modeling of plant water uptake in a forest stand involving root-mediated soil water redistribution. *Vadose Zone Journal* **12**(1), 0. doi:10.2136/vzj2012.0154
- Votrubová, J., Dohnal, M., **Vogel, T.** & **Tesař, M.** (2012) On parameterization of heat conduction in coupled soil water and heat flow modelling. *Soil and Water Research* **7**(4), 125–137.
- Vrana, I., Vaníček, J., **Kovář, P.**, Brožek, J. & Aly, S. (2012) A group agreement-based approach for decision making in environmental issues. *Environmental Modelling & Software* **36**, 99–110. doi:10.1016/j.envsoft.2011.12.007
- Vysloužilová, B. & **Kliment, Z.** (2012) Soil erosion and sediment deposition modelling at the small catchment scale (in Czech). *Geografie* **117**(2), 170–191.

Wetterhall, F., Pappenberger, F., Alfieri, L., Cloke, H. L., Thielen-del Pozo, J., Balabanova, S., **Daňhelka, J.**, *et al.* (2013) HESS Opinions ‘Forecaster priorities for improving probabilistic flood forecasts’. *Hydrology and Earth System Sciences* **17**(11), 4389–4399.  
doi:10.5194/hess-17-4389-2013

## 1.6. Participation in international scientific meetings

### 1.6.1. Meetings hosted by the country

The “5<sup>th</sup> Conference with International Participation on Hydrology of a Small Basin 2014” was organized in Prague from 22<sup>nd</sup> to 24<sup>th</sup> April 2014. The CNCH was a co-organizer of this conference.

### 1.6.2. Participation in meetings abroad

Czech experts, including the members of the CNCH, participated in the “14th Biennial Conference ERB 2012” (“Studies of Hydrological Processes in Research Basins: Current Challenges and Prospects”) in St. Petersburg, Russia (September 17–20), and “FLOODRisk 2012” in Rotterdam, the Netherlands (November 20–22). Regarding the first conference, the national correspondent of the ERB project (and at the same time a vice-chairman of the CNCH), was a member of scientific committee. Moreover, the same person was a member of scientific committee of the “Workshop and ERB Steering Committee Meeting”, which took place in Slovenia in 2013 (October 3–6). He also actively contributed to the workshop. The second vice-chairman of the CNCH partook in four meetings of Experts for the Danube Strategy Project (preparation within HORIZON 2020) at the Joint Research Centre, Ispra, Italy.

## 1.7. Other activities at regional level

### 1.7.1. Institutional relations and cooperation

### 1.7.2. Completed and ongoing scientific projects

Although there are many more, only the most important projects are mentioned here:

- **P. Kovar:** DREAM-CO BOKU Vienna, Danube Strategy Project, HORIZON 2020 (period 2012–2014; submitted in April 2014).
- **P. Kovar, J. Stibinger:** GLOCAD, Danube Atlas, Danube Strategy Project, HORIZON 2020 (period 2013–2014; preparatory for submission in 2016).
- Hydrological fluxes in soil-plant-atmosphere system (Czech Science Foundation grant no. 205/08/1174; completed in 2012).
- Soluble and insoluble fraction of inorganic pollutants in various types of precipitation (Czech Science Foundation grant no. 205/09/1918; completed in 2013).
- Development and use of the new technologies of the systems of early warning for flash floods (Technology Agency of the Czech Republic grant no. TA02021451; period 2012–2015).

## 2. FUTURE ACTIVITIES

### 2.1. Activities planned until December 2014

Members of the CNCH will participate in “XXVI Conference of the Danubian Countries on Hydrological Forecasting and Hydrological Bases of Water Management” to be held in Deggendorf, Germany in September 2014 (including the work in the scientific committee).

The CNCH will support the European Geosciences Union and the Czech University of Life Sciences with organization of the “HYPER Droughts: HYdrological Precipitation - Evaporation - Runoff Droughts international conference” focused on droughts to be held in Prague in autumn 2014.

The CNCH assists the local organizing committee of the “26th IUGG General Assembly 2015” in the preparation of hydrological programme (IAHS sessions, side events, guided tours etc.).

“15<sup>th</sup> Biennial Conference ERB 2014 on Advances in Hydrologic Research on Pristine, Rural and Urban Small Basins”, Coimbra, Portugal (September 9–13). The national correspondent of the ERB project, also involved in the CNCH, plays a role as a member of scientific committee of the conference.

Completion of integration of CNCH book collection into the Czech Hydrometeorological Institute library.

## **2.2. Activities foreseen for 2015–2016**

The CNCH will further participate in coordination of activities accompanying the IAHS Assembly taking place in Prague within the IUGG General Assembly in June and July 2015 (more details can be found [here](#)).

The CNCH will cooperate with the SCH on the organization of the “Hydrological Days 2015” quinquennial international conference to be held in Slovakia in 2015.

Further development of activities of CNCH working groups.

## **2.3. Activities envisaged in the long term**

Incorporating Czech hydrologists into IHP-VIII tasks.

Further maintenance of CNCH website and development of its English content.