NE FRIEND Project 5 Catchment Hydrological and Biogeochemical Processes

Activities 2002-2006

2002

ERB2002 conference, Slovakia
The group organized the 9th international conference of the European Network of Experimental and Representative Basins (ERB) on Interdisciplinary Approaches in Small Catchment Hydrology Monitoring and Research in Demanovska dolina, Slovakia on 25-28 September (http://www.ih.savba.sk/erb2002/index.html).The conference was attended by 96 scientists from 16 countries. Participants presented 40 oral presentations in 3 sessions and 28 posters. Contributions were disseminated in **printed book of extended abstracts**, **conference CD** which includes extended abstracts plus 33 full papers provided optionally by the authors with no limit on number of pages or application of colours. Oral presentations (40 papers) were published as post-conference proceedings in **UNESCO Technical Documents in Hydrology No. 67** in 2003. Extended verions of six selected contributions were published in **special issue of Journal of Hydrology and** Hydromechanics in 2003,vol. 51, no. 3 (http:\\www.ih.savba.sk).

2003

Mountain Hydrology workshop, Romania
The workshop was organized during the regular meeting of the group in Bucharest on 26 September 2003 with the sponsorship of German IHP/OPH committee. Eleven presentations presented (http://www.ih.savba.sk/ihp/friend5/index.html) at the workshop were published also in the proceedings. Extended papers were published by German IHP UNESCO committee in 2004 as **Studies in Mountain Hydrology** (ed. A. Herrmann, U. Schrőder).

Exchange
Two students from Wageningen university worked on their thesis in Slovakia (October-December), where they studied the surface-groundwater relationship in the alluvium of a small mountain creek.

2004

Exchange, Netherlands-Slovakia
One student from Wageningen university worked on her thesis in Slovakia (June-August) on hydrological response of a mountain catchment.

Hydrology of Mountain Environments conference, Germany
Prof. A. Herrmann co-organized the International conference on Hydrology of Mountain Environment Berchtesgaden, Germany.

ERB2004 Conference, Italy
contributions to the organization of 10th international conference of ERB in Torino, Italy (14-17 October 2004, http://www.irpi.to.cnr.it/ERB2004Conference.htm)

2005

Snow meeting, Slovakia
Group participants from Institute of Hydrology SAS and Czech Hydrometerological Institute organized and attended the seminar during the annual Slovak Snow meeting. Seminar proceedings were prepared (www.ih.savba.sk).

International Conference on Forest Impact on Hydrological Processes and Soil Erosion, Yundola, Bulgaria
The conference was organized by University of Forestry, Sofia and NE FRIEND 5 was one of the cnvenors.

Monograph
Pekárová, P., Koníček, A., Miklánek, P. (2005) Influence of landuse on runoff regime in experimental microcatchments of the Institute of Hydrology SAS. (in Slovak with an English summary), Veda, Bratislava, ISBN 80-224-0865-4, pp. 216.

2006

Snow meeting, Czech Republic
the tradition of regular snow meetings with exchange of information on current problems in snow hydrology in Slovakia and Czech Republic will continue in Czech Republic.

ERB2006 conference, Luxembourg
The conference will be organized by L. Pfister.

BIOHYDROLOGY 2006 conference, Czech Republic
The international conference will be organized by M. Tesař

FRIEND conference, Cuba
Many group participants sent contributions to the conference.

Scientific knowledge- results of individual studies

Research in various catchments repeatedly confirmed the role of groundwater in catchment runoff (Herrmann, 2002; Uhlenbrook et al., 2002). Preferential flow may play an important role in runoff generation and nitrate leaching (Schumann, 2004; Doležal, 2004) and the role of unsaturated zone was recognised (Somorowska, 2002; 2004). Tracers are important tools in such a research and the methods of their applications are continuously evolving (Uhlenbrook, 2002, Uhlenbrook and Hoeg, 2003). Extended hydrometric measurements in small research catchments enabled development of new concepts of runoff generation (Tesař et al, 2001). Information on runoff and water quality generation was used to proposed an alternative management system of soil and water protection on the landscape scale (Kvítek, 2005). Swampy catchments are dominated by vertical component (net precipitation-evaporation-infiltration). Groundwater recharge of such a catchment is mostly influenced by long intensive precipitation events (Lenartowicz, 2003). Hydrological cycle and thus also runoff generation from the long-term view (hydrological years) is to a large extent

influenced by vegetation (Van der Hoeven at al., 2005; 2005a; Stehlík and Bubeníčková, 2002). Simple method of Makking resulted in similar estimates of evapotranspiration as the more complex methods, e.g. the Penman method (Van der Velde et al., 2004). Anticipated climate and landuse changes would have significant impacts on runoff regime (Querner et al., 2005), e.g. through the recharge of springs (Uhlenbrook et al., 2003). However, runoff generation would be influenced only gradually (Herrmann, 2004). Mountain peatland should have guaranteed supply of water also in the future (Woronko and Zmudzka, 2004). Although the snow water equivalents in a mesoscale mountain catchment of central Slovakia significantly decreased between 1962 and 2001 (Pecušová et al., 2004), the analysis of the long term climatic and snow data did not indicate dramatic change over the last century (Kulasová, 2005). As far as flood runoff is concerned, measured data do not indicate increase of high flows in the last decades (Holko et al., 2005, Pekárová et al., 2005).

List of research participants 2002-2006

Country	**Name**	**Institution**
Czech Republic	P. Řičicová, L. Bubeničková, A. Kulasová	Czech Hydrometeorological Institute
	M. Tesař, M. Šír	Institute of Hydrodynamics, Academy of Sciences of Czech Republic
	F. Doležal, T. Kvítek, Z. Kulhavý, P. Fučík, J. Vopravil	Research Institute for Soil and Water Conservation
Germany	A. Herrmann	Institute of Geoecology, Technical University Braunschweig
	S. Uhlenbrook	UNESCO-IHE Institute of Water Education
Luxembourg	L. Pfister	CRP Gabriel Lippmann
Netherlands	P. Warmerdam	Wageningen university
	E. Querner	Alterra Wageningen
Poland	M. Gutry-Korycka, U. Somorowska, M. Lenartowicz, D. Woronko	Faculty of Geography and Regional Studies, Warsaw university
Slovakia	P. Miklánek, Z. Kostka, L. Holko	Institute of Hydrology, Slovak Academy of Sciences

P. Seuna (Finnish Environment Agency) and L. Andersson (Swedish Hydrometeorological Institute) were also group participants in previous years. P. Seuna retired in 2004, L. Andersson will not participate in the future.

List of meetings 2002-2006

Year	Place	Date
2002	Demanovska dolina, Slovakia	25 September 2002
2003	Bucharest, Romania	26 September 2003
2004	Torino, Italy	10 October 2004
2005	Yundola, Bulgaria	6 October 2005
2006	Luxembourg, Luxembourg	19 September 2006

Strategic plan for the future

It can be expected that future activities will be dominantly based on individual research projects of group participants. Individual research projects will develop the topics and approaches mentioned in group report. The well established cooperation of NE FRIEND Project 5 and ERB should continue because of similar research interest of both groups. Except regular biannual ERB conferences, joint workshops on ad hoc topics should be organised in the years between the ERB conferences. Other joint activities should comprise:

- regular snow meetings of the Slovak and Czech participants (L. Holko, A. Kulasová)
- CRP Luxembourg-UNESCO-IHE cooperation in small catchments research (S. Uhlebnrook, L. Pfister)

Individual research projects will be focused on:

- investigation of relationships among runoff generation (and water chemistry) and factors like geology, geomorphology, climate, soils, land use, agriculture, fertilisers, nature conservation measures, water management policies, land consolidation, grassland promotion, afforestation etc. - in small agricultural catchments containing tile drainage systems (F. Doležal et al.)
- flow regime in river basins under global change at different catchments' scales (E. Querner)
- stability and extremalization of hydrological cycle in different catchments (M. Gutry-Korycka et al., M. Tesař et al.)
- assessment of flood impacts in urban catchments (M. Gutry-Korycka et al.)
- application of rainfall-runoff models for runoff prediction in global climate change of catchments catchments (M. Gutry-Korycka et al.)
- hydrological predictions at multiple scales based on small-scale processes understanding (S. Uhlenbrook), application of experimental data in the improvement of rainfall-runoff simulations (Řičicová et al.)
- further development of the Integrated Catchment Approach (ICA) to study catchment hydrology, study of preferential flow, numerical groundwater modelling, hydrological nad hydraulic regionalization (A. Herrmann)