

Newsletter No. 19

June 2019

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1 Annual Commission Meeting in Bucharest, June 2019

(i) General

The 2019 Annual Meeting of the Commission was titled: “*Water sustainability in a changing world*” and was hosted by the Faculty of Geography of the University of Bucharest. It was jointly supported by the Research Institute of the University of Bucharest (ICUB), the Research Centre “Water resources and water-related risk management (GRARH) and the Institute of Geography of the Romanian Academy (IGAR).

The conference was organised under the leadership of Prof. Liliana Zaharia supported by colleagues and post-graduate student volunteers from the Department of Meteorology – Hydrology of the Faculty of Geography.

The international scientific committee and local organising committee comprised members of the Commission, the Academy of Romania, Romanian universities and research institutes and, importantly, practioners from various organisations such as the National Administration of Romanian Waters and the National Institute of Hydrology and Water Management adding applied aspects to the meeting.

Prof. Zaharia also succeeded in soliciting support by the Vice Rector of the Bucharest University and the Vice Dean delivering opening addresses. The conference was also honoured by Prof. Fu addressing the participants in his capacity as member of the IGU Executive Council and President of the Geographical Society of China.

The Chair, in his opening address, elaborating on the justification for a geographical water commission stressed the need for an integrated approach to complex water issues employing the specific strengths of Geographers in adopting insights and tools of neighbouring sciences to arrive at new and holistic views rather than further increasing compartmentalisation of water sciences. In doing so the Commission actively encourages membership of non-Geographers working on water and its sustainable use as well as of practioners as ultimate recipients of scientific solutions.



Opening addresses by Proffs. Fu (left) and Winde (Photos: Prof. Frolova)

In addition to the thematic sessions on day one and two an excursion on urban hydrological engineering and a two-day field trip on Carpathian mountain hydrology formed part of the conference programme.

All participants received a comprehensive collection of supporting documents including printed and digital versions of the conference programme, a book of abstracts as well as two most informative guides on the two field trips indicating thoroughness and attention to detail of the organisers.

Prof. Zaharia also managed to attract local financial support of the conference to supplement accommodation costs, providing additional material for the conference bag and keeping fees at a

minimum. The good quality of the catering and the grand location of the gala dinner deserve special recognition in this context.

In summary, the Chair and the members of the SC of the Commission would like to express their sincere gratitude towards all involved in preparing and hosting a scientifically sound and professionally organised meeting that was most enjoyable. We especially wish to thank Prof. Zaharia for providing members with such a memorable event.

(ii) Sessions, presentations and field trip

In five sessions spread over two fully packed days a total of 15 oral presentations (one no show) and 11 posters were presented, with the authors of the latter introducing their work in a 5 to 15 minutes talk. The topics of the thematic sessions in chronological order were:

- (1) Keynote addresses
- (2) Water resource variability in a changing environment and hydrological hazards and related risks management
- (3) Human pressure and impacts on hydro-systems and water resources, monitoring and sustainable water management
- (4) Poster session
- (5) Methodology in hydrological research: GIS, modelling, remote sensing

Topics addressed ranged from analysing hydrological processes in rivers in the context of changing environments with example from Russia, flood risks and predictions for rivers in Romania, human impacts on water quality and flow associated with global mining activities and urbanisation as well as the use of advanced satellite technology to assess water budgets on earth. Cross cutting topics that managed to fuse natural and social research methodologies were also presented with examples from flood risks of Romanian rivers, the reconstruction of historical floods from archives as well as water management practices on ocean cruise ships. The comparative advantages of Geographers over competitors in the field of stream morphology assessments were explored by Prof. Canjevac based on personal experiences in Croatia.

Geographically, the presented research ranged from the global scale (GRACE and soil water satellites, mining) to regional and local approaches covering study areas in Romania (as host country naturally dominating the conference), Russia, Croatia, Uzbekistan, China, Germany and France as well as the extreme latitudes of the Arctic and Antarctic. Presenting members hailed from Canada, Croatia, China, France, Russia, Slovakia, South Africa, USA and different provinces of Romania including Wallachia, Transylvania and Moldavia.



Prof. Zaharia and her attentive audience

As mentioned above, two field trips were offered a half-day trip on urban hydrological

engineering of the Colentia River in Bucharest and a two-day trip on Carpathian mountain hydrology, both supported by dedicated well-illustrated study guides.



During the city excursion

As part of the 2-day field trip that addressed issues pertaining to “Human pressures on hydrosystems: the example of the Arges watershed” (Day 1) we were received by the local agency responsible for raw water provision, flood protection and water monitoring in Pitesti, which not only received us warmly with snacks and gifts but also patiently answered the many questions we had after the introductory presentation. Subsequently we visited the Vidraru Dam near Curtea de Arges (Transsylvania) constructed from 1960 to 1966 whose 166 m high concrete arch dam wall dams the Arges River and generates 220 MW of hydropower using 4 Francis turbines located underground in a 42-km-long tunnel system. Energy generation is its primary purpose. Endowed with plentifully water and a mountainous topography Romania has another 14 large hydroelectric power stations.



At the Arges River water agency (left) and the Vidraru dam

After a very interesting and long first day and an excellent stay over at the Vila Bran Mountain Resort (near ‘Dracula’s castle’) we visited Brasov, located in an inner Carpathian depression and crossed into the neighbouring watershed that feeds the Colentia River that flows through Bucharest to where we safely returned in the evening filled with exciting memories. Along the way we visited Romania first hydroelectric plant, built in 1884, using flowing water for powering the nearby residence of the royal family in Sinaia.



2nd day of the field trip looking before descending into the depression of Brasov (left), the hydroelectric power plant of 1884

2 Business Meeting 2019

On the second day of the conference the annual business meeting of the Commission was held addressing the following agenda points:

- (i) Membership development
- (ii) Joint publication/ Hydrogeography book project
- (iii) Hydrological glossary project
- (iv) Session proposals for IGC Istanbul 2020
- (v) Miscellaneous

Outcomes:

- (i) *Membership:* In contrast to earlier years where membership grew by simply adding email-addresses of conference participants to the distribution list the Commission now requires specifically developed templates capturing research interests and professional profiles to be submitted before membership is conferred to applicants. In this way active participation is encouraged as only members with interest in the work of the Commission tend to submit the required information. Furthermore, by displaying member profiles on the website direct collaboration among members working in specific fields is facilitated even attracting interest from non-members visiting the website. Together with the comprehensive overhaul of the website design and content (still in progress) this may explain that the Commission now ongoingly receives unsolicited applications for membership helping to broaden geographical representivity and the member base of the Commission. As of 20 June 2019, the Commission has a total of 57 registered members representing six continents.
- (ii) *Joint publication:* Following the Quebec meeting 2018 different options for a joint Commission publication were explored including special issues of established journals as well as a book on Hydrogeography as proposed by Prof. Karthe. After a brief discussion the meeting agreed with a proposal by Prof. Natalia Frolova to publish a special issue in the Scopus-indexed journal: *Geography, Environment, Sustainability* (<https://ges.rgo.ru/jour>) based on a selection of papers presented in Quebec (2018) and Bucharest (2019). As preliminary working title directing the type of submission the following is proposed: “*Water sustainability: geographic perspectives based on international case studies*”. The intention of the special issue is briefly described below (first draft):

As a follow-up of recent conferences of the IGU Commission for Water Sustainability in Quebec (2018) and Bucharest (2019) we propose the compilation of a special issue dedicated to studies of water-related challenges in different geographical environments ranging from climate-induced hydrological extreme

events in the arctic circle to man-made impacts on water quality and availability through urbanization, irrigation, mining and deforestation in arid and semiarid areas of Africa, Europe and Asia addressing the water-energy-food nexus to the development of hydrological methods and tools encompassing latest remote sensing technology, GIS and numerical modelling. Based on case studies from Russia, China, South Africa, Central and Eastern Europe and Antarctica and other areas the issue aims to promote integrated transdisciplinary approaches to water sustainability from different water-related disciplines including Physical and Human Geography, Civil Engineering, Biology, Sedimentology and others. By transcending disciplinary boundaries and limitations the special issue aims at arriving at an improved understanding of how the complex interplay between natural and anthropogenic factors impacts on the sustainable use of water as a renewable yet increasingly scarce resource.

We encourage members to offer suggestions for thematic focal points and the title of the special issue via email (frank.winde@nwu.ac.za; frolova_nl@mail.ru).

Once details on the actual topics and format requirements are agreed upon with the publisher members will be asked to submit manuscripts.

- (iii) *Hydrological online glossary*: Recognising that there are at least two online multilingual hydrology glossaries already in existence it was proposed that any further work should focus on a wiki-platform type of format that allows expanding and updating of entries. However, this will require a longer-term commitment which needs to be assured before the Commission can embark on the project.
- (iv) *Session proposals for IGC Istanbul 2020*: It was proposed that themes similar to those of the Bucharest sessions be adopted for Istanbul 2020 possibly complemented by water topics that are of particular relevance to Turkey in order to attract and accommodate widespread participation of local Geographers. In addition, a dedicated session on socio-economic water aspect is added to attract human Geographers and foster an integrated research approach

The following sessions are proposed for Commission sessions in Istanbul which are open for modifications/ suggestions:

(1) *Water resource variability, monitoring, hydrological hazards and risk management*

- hydrological processes: hydrograph analyses, run-off formation, climatic drivers, land use impacts etc.
- floods (long-term trends in magnitude and frequency, dynamics, risks and risk perception, prediction, reconstructing historical events etc.)
- droughts (natural and man-made causes, trends in magnitude and frequency, susceptibility, resilience, coping strategies etc.)
- water monitoring: observation networks, data availability, quality and accessibility
- mitigation strategies for extreme events
- hydrological processes in lakes, rivers, estuaries, groundwater, karst and soil
- integrated water resource management

(2) *Human pressures on water: causes and consequences*

- human impacts on water availability: groundwater mining, dewatering of aquifers, irrigation, mining, industry, urbanisation, aquaculture, deforestation, urban agriculture, land use changes etc.
- surface water and ground water pollution, sediment pollution
- exposure pathways and associated risk analysis, pollution sources, mitigation strategies
- mobilisation and immobilisation of waterborne contaminants
- impacts on human health, ecosystems and habitats
- conventional and emerging contaminants (micro plastics etc.), geochemical mobility

- and environmental fate of waterborne contaminants, toxicity and bioavailability
- waste-water prevention and treatment
- waterborne diseases, sanitation issues, epidemiological/ medical geology studies

(3) *Sustainable water use in the context of the water-energy-food nexus*

- causes and geographical patterns of water scarcity
- SDGs on water, energy and food: relations and interdependencies
- water overuse, water use efficiency, water consumption, water losses
- water use in energy generation and storage (cooling water, steam production, thermal pollution, emerging technologies ...), water implications of renewable energy expansion and e-mobility
- energy use for water provision (desalination, pumping, conventional potabilization, recycling, waste-water treatment, sludge disposal ...)
- water and energy for food: irrigation, horticulture, meat vs. crops
- embedded water, bottled water trade, virtual water trade

(4) *Socio-economic aspects of water sustainability*

- socio-economic drivers of water consumption, access to water,
- privatisation of water, water pricing, metered water
- leakage-related water loss, non-revenue water, mitigation strategies
- centralised vs. decentralised water supply and waste treatments
- national and international water conflicts and water collaboration
- cross boundary catchment management
- water access as a human right, SDG 6

(5) *Methods in hydrological research*

- Hydro-GIS, Virtual geographical environment,
- numerical modelling: groundwater, surface water, scale-dependent processes,
- remote sensing (satellites, drones etc.)
- crowd sourcing of hydrological data,
- big data, data transparency, raw data storage and sharing

(6) *Water issues where Europe meets Asia: challenges and success stories in Turkey*

- focus is on real-world local water issues from a natural science or human sciences point of view preferably combining both views
- possible topics include drinking water quality and management in Turkey, water use and availability now and in future, dams and other large water projects, cross-boundary catchment management issues etc.

3 Joint open project calls for members

(i) *Water flow regime assessment tool (GRWAT)*

Based on a formalised procedure to assess water flow regimes using a numerical hydrograph separation tool (GRWAT) developed by Dr. Kireeva (Moscow State University) the meeting supported the proposal to call on members to help validating the tool and increasing its robustness by providing suitable data sets for testing the tool.

To this end Dr. Kireeva will compile a brief introduction into the tool and its applications and indicate what data will be required. This information will be displayed on the website.

One of the envisaged outcomes is a joint publication on the applicability and limits of the GRWAT tool with all members who provided relevant data listed as co-authors. The data as well as the algorithm used will be available online.

(ii) Ground truthing of soil moisture satellite data (SMOS, SMAP)

Similar to the above project on GRWAT Prof. He agreed to a proposal of the Chair to support a joint initiative by the Commission to improve currently used algorithm for calculating soil moisture measured by two different types of satellites (SMOS and SMAP). Having used a set up in arid and mountainous parts of Western China to compare satellite data with in-situ ground measurements of soil moisture certain systematic deviations were detected. However, in order to improve the satellite data on soil moisture as a crucial element of the water cycle more ground truthing data from a wider range of physical environments are needed. Supplying members with a short overview on the required set up by Prof. He the Commission encourages members to consider partaking in the exercise in order to improve the accuracy of this important tool. This would be a truly global endeavour of our Commission and is also envisaged to result in one or more joint publications.

4 Meetings in 2020

(i) IGC 2020, Istanbul (Turkey)

After having received feedback from members on the proposed sessions listed above the chair will inform the organisers accordingly.

We also consider contacting local members of the Commission (we have 2 members from Turkey) to please consider the preparation of a water-related field trip as part of the event continuing with the well-established and much-valued tradition of the Commission.

(ii) 4th Conference on World's Large Rivers, Moscow 2020

Prof. Frolova invited members to the upcoming event in Moscow taking place from 3-7 August 2020 and is supported by UNESCO, IAHR, IAHS and the IAG to name but a few. Topics include the following:

- Hydrology, Hydraulics & Water Quality
- Sediment Transport & River Morphology
- Ecology & Restoration
- Integrated River Management,
- Climate Change and its impact in general and specifically related to Russian and Arctic Rivers.

For more details please refer to the following website: <http://worldslargerivers.boku.ac.at/wlr/>

5 Output in 2018/19: request for information

In preparation for the annual report for 2018/2019 due in December 2019 I herewith kindly request all members to please provide me with a list of outputs over the period 10-2017 to 10-2018 that relate to the Commission including joint publications, presentations and posters, jointly supervised students, research visits, joint workshops, conferences and meetings, joint research proposals and collaborative projects (e.g. as part of BRICS programmes) etc.

Any information provided *on or before 25 November 2019* will be included in the report.