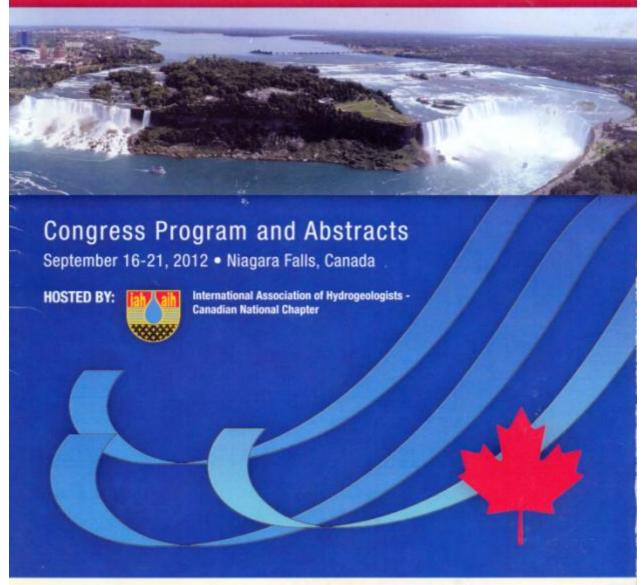
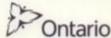
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The following people acted as "champions" for the Congress technical sessions. They proposed and helped to grganize the sessions, helped promote the Congress, encouraged abstract submissions and reviewed abstracts. Many are also volunteering to help chair the sessions. Their efforts are greatly appreciated and invaluable to the success of the Congress.

Energy and Climate

Groundwater and Climate Change: Linkages and Adaptation

Richard Taylor (UK), Diana Allen (Canada), Makoto Taniguchi (Japan), Jianyao Chen (China)

Jason Gurdak (USA), Tim Green (USA), Bridget Scanion (USA) Geothermal Energy

Grant Ferguson (Canada), Han Zaisheng (China), Alper Baba (Turkey)

Hydrogeological Issues Surrounding Shale Oil and Gas

Avner Vengosh (USA), Ramon Aravena (Canada)

Hydrogeological Issues Related to Oil Sands

Steve Wallace (Canada), Jon Fennell (Canada)

Carbon Sequestration

Dan Palombi (Canada), James Brydie (Canada)

Karst Hydrogeology

Karst Aquifers, Environmental Problems and Global Change Topics in General Karst Hydrogeology

Dereik Ford (Canada), Liu Zaihua (China) Characterization and Management of Karst Aquifers

Nico Goldscheider (Germany), Barbara Mahler (USA), Geary Schindel (USA)

Modeling Karst Aguifer Systems

Neven Kresic (USA), Nicolas Massei (France)

Stephen Worthington (Canada), Nadine Goeppert (Germany), Jiang Guanghui (China)

Artificial Tracers and Environmental Isotopes to Understand and Quantify Water Flow-paths and Pollutant Transport in Karst Aquifers

Piotr Maloszewski (Germany), Przemyslaw Wachniew (Poland), Ralf Benischke (Austria)

Groundwater-Surface Water Interactions

Groundwater-surface Water Interactions and Ecohydrology

Bruce Misstear (Ireland), Philippe Van Cappellen (Canada), Raoul-Marie Couture (Canada), Fereidoun Rezanezhad (Canada), Marie Larocque (Canada), Masaki Hayashi (Canada), Allison Aldous (USA), Joseph Gurrieri (USA), Hillol Guha (USA), Andrea Bradford (Canada) Vadose zone processes: Edwin Cey (Canada), James Smith (Canada)

Groundwater Management- Technical

Groundwater Recharge: Advances in understanding recharge processes, characterizing spatial/temporal variability, and techniques for managed aquifer recharge Peter Dillon (Australia), Victor Heilweil (USA)

Hydrogeophysics

Anthony Endres (Canada), Peete Pehme (Canada)

The Role of Aguitards in Aguifer Protection

Wendy Timms (Australia), Jim Hendry (Canada)

Frontiers in Numerical Modelling

John Molson (Canada), Rene Therrien (Canada)

Transboundary Aquifer Systems of the Americas

Alfonso Rivera (Canada)

Cold Regions Hydrogeology

Jeff McKenzie (Canada), Victor Bense (UK)

Hydrogeologic Characterization of Fractured Rock Settings Kent Novakowski (Canada)

Three-Dimensional Geologic/Hydrogeologic Mapping

Hazen Russell (Canada), Holger Kessler (UK)

Regional Groundwater Flow Systems: Theory and Application

José Joel Carillo Rivera (Mexico), Judit Mádi-Szónyi (Hungary), Joszef Tóth (Canada)

Urban Hydrogeology Issues

Ken Howard (Canada), Dan Rogers (USA), Stephen Foster (UK)

Development and Application of Conceptual Models in **Numerical Modelling**

Mike Wireman (USA), Denis Peach (UK)



palette of possible technological applications that can further the goal of a sustainable, independent water supply — a fundamental requirement for every human settlement. This concept should be expanded to include consideration of any necessary additional energy requirements, with the goal that these be met by renewable, off-grid sources. This poster will expand on alternative approaches for this concept (given varying local conditions), elements of which can include: disinfectant dosing pumps powered by micro turbines in pipes; coupled turbine-pump supply units; photovoltaic and wind generators; and supplementary tapping of groundwater.

636 - The status of groundwater protection in Serbia and the implications of new regulations

Sobodan Vujasinović, Zoran Stevanović, Ivan Matić, Jelena Zarić & Saša Milanović University of Belgrade, Faculty of Mining and Geology, Department of Hydrogeology, Belgrade, Republic of Serbia

Some 75% of the public water supply is abstracted from groundwater resources from different types of aquifers: intergranular in alluvial and terrace deposits, karst aquifers and artesian aquifers of Neogene basins. Beside the fact that Serbia still uses certain freshwater aquifers that represent real natural reserves of high-quality water, the state of groundwater protection and quality is wholly unsatisfactory. A new legislation for sanitary protection zones for groundwater sources was introduced in 2008. The new rulebook takes the time of infiltration into account as well as the distance of the intake structure from the protection zone. The new legislation separately deals with karst, fracture and intergranular environments. The time of infiltrated water propagation for the second zone of sanitary protection in a porous environment of an intergranulary type is equal to 50 days, while it amounts to one day in a karst-fracture type. Areas with intensive percolation, such as sinkholes, ponors and faults could be assigned under the first zone as highly vulnerable. The implementation of the new legislation is challenging in practice, related to the application of new regulations to existing groundwater sources. Many of them have functioned for decades, and their position is now threatened due to intensive urbanization or industrialization, which have made the establishing of a zone of sanitary protection according to the new regulations difficult. According to monitoring data for the period from 2007 to 2011, the quality of raw water collected in most of the groundwater sources is satisfactory while monitoring is not being implemented in accordance with the new regulations. In 2007, out of 155 central water supply systems controlled, 29% of the waterworks had simultaneous physical-chemical and microbiological irregularities. Of the 128 tested groundwater sources in 2011, only 36 have a complete Report about groundwater sanitary protection zones. Serbia is the first country in the region to have a complete map of groundwater vulnerability on a national level (1:500.000), which provides a good basis for future spatial planning, as well as preventive protection of the most important and still not exploited groundwater resources.

660 - Recharge Processes and Dynamics in Intergranular Aquifer Investigated through Isotopic Composition of Spring Water: Case Study of River Radovna Springs (Slovenia, Europe)

Anja Torkar

Department of Geology - University of Natural Sciences and Engineering, Ljubljana, Slovenia Mihael Brenčič

Department of Geology – University of Natural Sciences and Engineering, Ljubljana, Slovenia Department of Hydrogeology, Geological Survey of Slovenia, Ljubljana, Slovenia Polona Vreča

Jožef Stefan Institute, Department of Environmental Sciences, Ljubljana, Slovenia

Springs of the River Radovna are situated in the north-eastern part of Slovenia, (Southern Alps), South-Central Europe. The spring water discharges through several diffuse springs located in fluvioglacial sediments, which cover the bottom of the valley. The recharge area for the springs is positioned in high mountains which consist of karstified limestones. The River Radovna is 17 km long, almost entirely groundwater flow dominated, where several visible and invisible inflows from karstified limestone are presented. Appearances of karstic springs in the valley are related to the contact between Quaternary sediments filling the valley and carbonate rocks forming slopes of the valley. Discharge of the springs fluctuates considerably and is heavily related to snow melting period. During low flow period some of the springs dry up.

For better understanding of the recharge processes and the dynamics of Radovna springs, systematic monitoring of water chemistry and stable isotopes of hydrogen, oxygen and dissolved inorganic carbon was carried out during the years 2005 and 2008, Isotopic composition of dissolved inorganic carbon varied between -55% and -14%. Isotopic composition of hydrogen and oxygen varied between -55% and -83%, and between -7.0% and -11.8%, respectively. For an even better understanding of processes further detailed investigations started in 2011. Instruments were built in for continuous



293 - Unstable regime of Dinaric karst aquifers as a major concern for their sustainable utilization

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- *Geological Survey of Montenegro, Podgorica, Montenegro;

Arben Pambuku⁴, Zoran Stevanovic⁸, Neno Kukuric⁶ & Zeljko Zubac⁷

- *Albanian Geological Survey, Tirana, Albania;
- *University of Belgrade Faculty of Mining & Geology, Department of Hydrogeology, Belgrade, Serbia;
- *IGRAC, Delft, The Netherlands;
- THET, Trebinje, Bosnia & Herzegovina

DIKTAS (Protection and Sustainable Use of the Dinaric Karst Transboundary Aquifer System) is an on-going GEF project implemented by UNDP and UNESCO's IHP aiming to bring together specialists and decision makers from the Dinaric region in SE Europe in order to improve the common utilization and protection of karst waters and related ecosystems. The three capitals get their drinking waters from the karstic aquifers (Sarajevo from the Vrelo Bosne springs, Tirana from Selita and Shemria, and Podgorica from Mareza spring). Along the Adriatic and Ionian coast almost all cities and tourist centres consume karstic groundwater discharging from large springs such as Timavo, Zvir, Jadro, Ombla among others. On average, the huge springs along the Neretva Valley and in the Kotor Bay annually discharge more than 150 m3/s directly or indirectly into the Adriatic Sea. It is assumed that 2/3 of all the groundwater resources in Albania are linked with karstic aquifer, and they provide more than roughly 60% of the water consumed in the country. Although perennial and sinking streams are regulated by several reservoirs, variable discharge is the main concern for sustainable utilization of karstic groundwater. This particularly concerns the coastal zone where salt water intrusions inland are common in the summer and autumn periods. Some of the springs are drying out or discharging as submarine flows, while their maximum could be over 100 m³/s (e.g. Sopot, Ljuta near Kotor). Some other large springs also have a large variation between maximal and minimal discharges: Oko (Trebinje water supply) 0.5-40 m³/s; Bregava (Stolac i Ljubinje water supply) 0.33-71.7 m³/s; Buna 3-123 m³/s; Bunica 0.7-207 m³/s. Based on 380 conducted tracing tests, the fictive groundwater velocities in Dinaric karst are as follows: in 70% of cases from 0 to 5 cm/s; in 20% of cases, 5 to 10 cm/s; and in 10% of cases, more than 10 cm/s (even 80 cm/s is recorded). Fluctuation of the groundwater level by 100m within 24h has been registered in several boreholes, while a difference of 312m between maximal and minimal levels (Nevesinie area) is one of the highest ever recorded worldwide. One of the main tasks towards sustainable development of the karst aguifers will be to improve monitoring systems, in terms of both the quantity and quality of the water.

472 - Preliminary hydrogeological characterization of karst tributaries of the San Franciscan Depression, River Corrente, Bahia, Brazil

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- (2) CPRM Serviço Geologico do Brasil, Brasília, Brazil
- (3) Karlsruhe Institute of Technology (KIT), Institute of Applied Geosciences, Division of Hydrogeology, Karlsruhe, Germany

Brazilian economy has experienced substantial growth in the last decade. Balancing economic development and the associated increase of water consumption with environmental sustainability is a challenge for both society and the government. Karst aquifers are important freshwater resources for the growing population in some regions of Brazil. The west region of the state of Bahia is known for its abundant water resources. Corrente River (basin surface: 42,732 km²), provides approximately 30% of the total water flow of the Sao Francisco River (basin surface 631,133 km²). During recent years, Bahia has undergone a marked process of economic growth driven by agricultural modernization. Important transformations in land use can be observed and water resource management is disorganized and predatory. The karst aquifers on the San Franciscan depression are located downstream of an intensively exploited region, the Urucuia sandstone aquifer. Karst aquifers are characterized as being high vulnerability to contamination and low capacity of self-purification. This study aims to: (i) perform a preliminary characterization of the hydrogeological behaviour of the karst system in relation to the whole basin by characterizing water hydrochemistry, and (ii) to

