



Introductory editorial

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Due to the exceptional geological, hydrogeological and geomorphological complexities of karst, activities that strive to change natural features in this environment are risky. This is especially true of those that aim to change the natural water regime. There is a wide range of human activities that can affect nature. Development of entire regions would be impossible without them. For these reasons, there is an increasing need to raise awareness of the sustainable use of natural resources simultaneously with their actual utilization.

Water is the most significant, and in many instances the only significant resource of karst terrains. The prosperity and often the very survival of society depend on the adaptation of its regime to the needs of humans. Food production, flood prevention, water supply, infrastructure construction, vegetation survival, and electricity production are all important developmental factors. Due to the specific nature of karst, surface flows are often intermittent. Depending on terrain, they may be modified by a network of underground channels and caverns through which water circulates deep below the surface. The increasing frequency of floods and droughts in karst terrains also raises the need for a concept of sustainable management of surface and groundwater in this environment.

Adapting water regimes to needs of local and regional development is highly unlikely without abstraction of water from karst aquifers, capture of karst springs, construction

of surface and underground hydrotechnical facilities (dams and reservoirs), and creation of various types of tunnels and canals. Construction of this infrastructure in karst is extremely complex in the technical sense; risks are higher than in other geological environments while certain negative consequences of a technical and an ecological nature are often inevitable. In some cases, these consequences cause conflict situations in the region including possible cross-border issues. Questions may be raised about the level of risk posed to objects and the environment. Knowledge of hydrogeological and hydrological characteristics of karst ponors and ponor zones is key to the optimal management of water resources. Functioning of the karst itself plays a very important role in determining the quantity of water present in a karst system. Knowledge of these characteristics is also important for the design and construction of any type of hydrogeological and hydrotechnical facilities which are frequently constructed in these zones.

The aim of decades of research performed on karst terrains has been to ensure sustainable extraction and protection of surface and groundwater. As a result of this research, karst scientists are rapidly providing a higher quality foundation to systematically and sustainably manage water in karst terrains—a resource that is vital for today and for future generations.

Today's modern technologies allow for deep exploration of karst aquifers (drilling and geophysical research), research of deep siphon canals using divers and special underwater robots, chemical analyses of the composition of groundwater (in laboratories equipped with high sensitivity devices), determination of the genesis of groundwater using isotopic (stable and radioactive) analyses, as well as production of 3D spatial models of karst aquifers and their mathematical modelling. These ever-increasing problems and the requirements for sustainable management of resources as significant as surface and groundwater in karst have positively influenced the growth of a multidisciplinary approach to research. This is especially true in the last 30 years.

This special thematic edition partly includes extended versions of the selected papers that were presented at the

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International Symposium KARST 2018. They deal with the topics presented and discussed through the work of a large number of world-renowned authors. A number of the authors were specifically invited to address areas of karst exploration: hydrogeology, geomorphology, engineering geology, speleology, in relation to the sustainable use of karst waters

as an essential natural resource. The papers cover a wide range of recent scientific research that has been performed in karst terrains all over the world (China, USA, Canada, Russia, Iran, Turkey, Malaysia and many European countries).