

Plastics in karst groundwater systems

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This project is focussed on the fate and impact of plastic pollution in karst groundwater systems. Plastic contamination is pervasive and a serious global issue, contaminating even remote locations such as deep underground water stores. However, there has been almost no research undertaken of the occurrence and fate of plastics in groundwater systems which are key drinking water supplies around the world. Some of the most important groundwater stores are found in karstic terrains, often characterised by the presence of cave networks, sink holes and rapid subsurface transport of pollutants. Around 14% of the earth's land surface

is covered by karst terrains and 25% of the global population completely or partially dependent on drinking water from karst systems. Chalk is an example of a karst system which in Europe we rely on heavily for - yet there is no published research on microplastic pollution in UK karst. This project will assess micro (1-1000 micron) and nano-plastic (<1 micron) contamination across a range of European karst systems (from karstified systems with lower vulnerability to the most highly vulnerable karst). Through sampling springs and other outflow points the project will elucidate relationships between the degree of karstification and the nature of microplastic pollution, including the amount and type of plastics, their size ranges and shape characteristics. The project will include extensive fieldwork across the UK, Croatia, and Slovenia to collect representative samples and the development of laboratory methods to characterise microplastics in groundwater using state-of-art techniques.



Training opportunities:

At the BGS and UKCEH laboratories in Wallingford, you will shadow and learn from experienced MP analysts, with access to the UK's most advanced analytical facilities for micro- and nano-plastic assessment: the UKCEH plastics laboratory. At Wallingford and Surrey University, you will be trained in isolation and analytical techniques for the identification and characterisation of MPs and nanoplastics. These will include, among others, infrared and raman microspectroscopy.

You will also be trained in groundwater field sampling methods, and in the principles of karst hydrogeology, and have the opportunity to develop and explore your own experimental approaches, including novel groundwater sampling methods for karst boreholes and springs. Training courses (e.g. statistics/data analysis) will also be offered. There will be opportunities for fieldwork in Croatian and Slovenian karstic terrains.

Student profile:

This project is suitable for students with a good degree (ideally first class, or 2:1) in either environmental or

physical sciences or engineering (including but not limited to geology, chemistry, biology, biochemistry, geography) and/or students with a relevant MSc (e.g. hydrogeology, hydrology, environmental engineering). Previous experience in undertaking fieldwork would be highly desirable, as would a high level of numeracy, experience in undertaking laboratory analysis and familiarity with statistical packages. A willingness to undertake fieldwork and laboratory work is essential - these will form key activities for the PhD. A driving licence is essential for fieldwork activities.

References:

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