GROUNDWATER MAPPING BY MEANS OF MACHINE LEARNING TECHNIQUES

Description

UCM researchers have developed an app that combines satellite images with big data to improve drinking water access in sub Saharan Africa. This app is integrated in a free open-source geographic information system (QGIS), and allows for the development of zero-cost groundwater potential maps. It has been successfully tested in Mali and Chad, where it is already being used to facilitate water access among vulnerable communities.

How does it work?

The underlying principle is that, in certain hydrogeological environments, the presence of groundwater may be inferred from surface features. These include landforms, outcrop fracturing, and the presence of vegetation at the end of the dry season, among others. Spatially-distributed variables are mapped based on satellite images, and combined with other map sources. Big data techniques check this information against known drilling outcomes, and find the patterns that lead to positive and negative groundwater wells. Results are then extrapolated to the remainder of the study area.

Advantages

This app can predict the presence of groundwater with an accuracy of over 90%, depending on the available data. Both satellite images and the geographical information system upon which it runs can be obtained for free. This means that the end product can be developed at zero cost.

Where has it been developed?

This app has been developed by members of UNESCO Chair "Appropriate technologies for human development" (associated with the Environmental Hydrogeology research group), together with researchers from the University of Neuchâtel, Switzerland. Current research focuses on improving some aspects of the tool through a project of the Ministerio de Ciencia, Innovación y Universidades. At the same time, UCM researchers are using it to develop country-scale maps of the Republic of Chad, in the context of an initiative funded by the Swiss Cooperation to Development Agency.

And moreover

The research group currently develops numerous projects in the field of water. These include water quality and contamination, limnology, groundwater modelling, enviromental issues and water law. Over the last decade the group has been particularly active in cooperation to development initiatives.

Researcher in charge

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