Researchers develop new index to diagnose causes of water scarcity

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The methodology has been tested in Ebro river basin and can lead to conclusions about the reliability and vulnerability of systems to water scarcity, as well as to diagnose their possible causes and to propose solutions.

From the water management perspective, water scarcity is an unacceptable risk of facing water shortages to serve water demands in the near future. Water scarcity may be temporary and related to drought conditions or other accidental situation, or may be permanent and due to deeper causes such as excessive demand growth, lack of infrastructure for water storage or transport, or constraints in water management.

Diagnosing the causes of water scarcity in complex water resources systems is a precondition to adopt effective drought risk management actions. A group of researchers of the Technical University of Madrid (UPM) have developed four new indices to evaluate water scarcity that have been tested in the Ebro river basin.

UPM researchers propose a methodology for interpretation of index values that can lead to conclusions about the reliability and vulnerability of systems to water scarcity, as well as to diagnose their possible causes and to propose solutions.

These four indices were presented to be used in conjunction and were conceived as an assistance tool to decision making in water resources planning. Indices are computed using simple mathematical relations, so that their meaning is intuitive for their target users.

Required data for index computations can be easily obtained from the results of water resources simulation models. Therefore, indices can also be used to summarize and transfer the results obtained from the models.

The conclusions of the analysis show that water scarcity are mostly related to the nonexistence of a good hydraulic infrastructure", explains Javier Martín Carrasco, professor of the Departamento de Ingeniería Civil: Hidráulica y Energética of the UPM and one of the authors of this job.

Criteria were given to interpret index values, focusing the analysis on decision support to establish lines of action in a context of proactive drought management. The analysis can lead to conclusions about the reliability and vulnerability of systems to water scarcity, as well as help to diagnose their possible causes and to propose solutions.

In cases where several systems are analyzed, indices are also useful to make a comparative study between systems and to prioritize actions.

System diagnostics, based exclusively on the analysis of index values, were compared with the known reality as perceived by system managers, validating the conclusions in all cases.

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