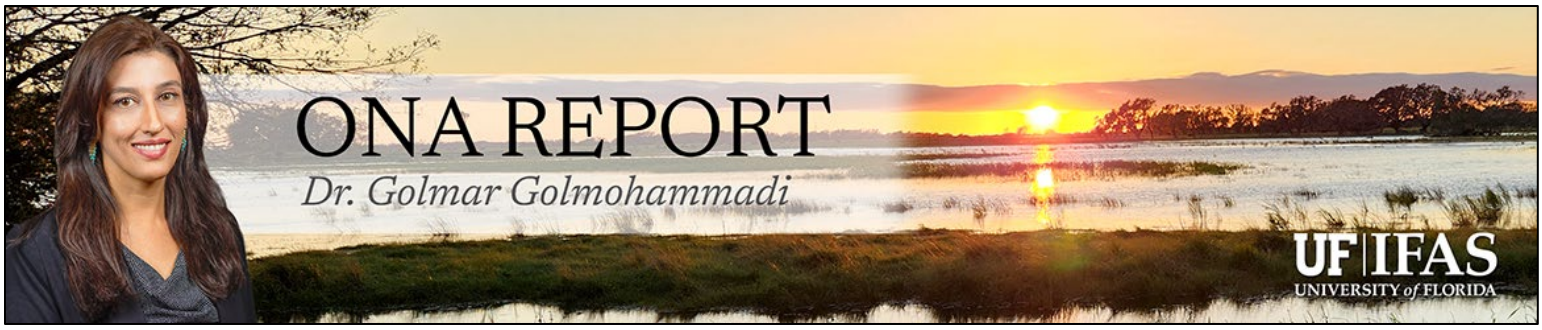

AI-based assessment of Groundwater Vulnerability in Florida

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Groundwater serves as a vital resource for drinking water supply, agriculture, and industrial use. However, it faces increasing contamination risks due to anthropogenic activities and natural hydrogeological conditions. The growing concerns over declining groundwater levels and escalating pollution have intensified the need for effective groundwater protection, highlighting the importance of accurately assessing groundwater vulnerability.

Various methodologies have been developed for groundwater vulnerability assessment, which can generally be classified into four main categories: (i) overlay and index-based methods, (ii) process-driven simulation models, (iii) statistical approaches, and (iv) hybrid techniques.

Among these, overlay and index-based methods are the most commonly used, because they are relatively simple, cost-effective, and efficient in evaluating large areas. The most widely adopted method in this category is the DRASTIC model.

The DRASTIC method (Fig. 1) evaluates groundwater vulnerability by assigning numerical ratings and weights to seven key hydrogeological parameters, represented by the acronym DRASTIC:

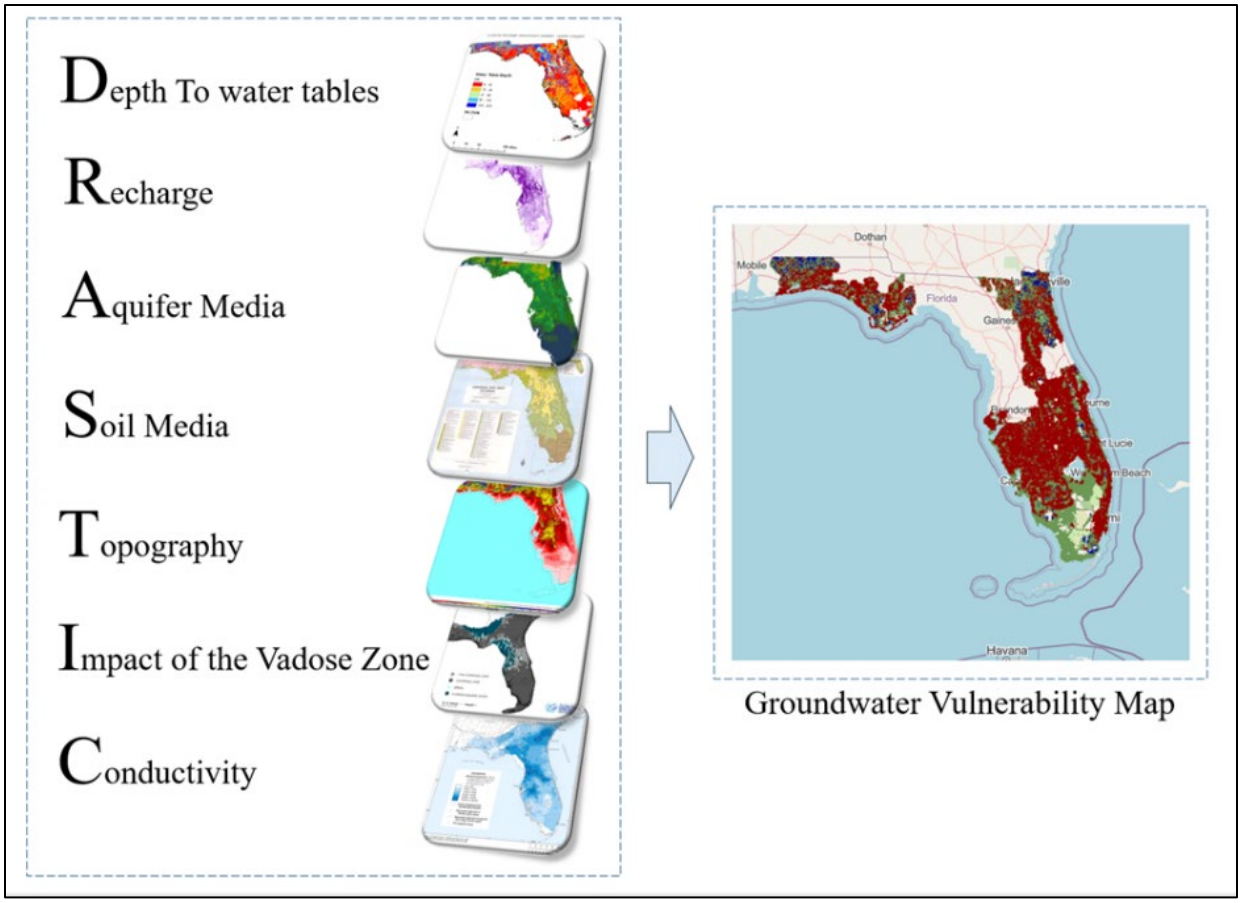

Figure 1. Flowchart of DRASTIC method

As part of our AI research initiative in Florida, we are advancing beyond traditional index-based approaches such as the DRASTIC method by employing interpretable, data-driven AI techniques.

We have started a research effort focused on applying advanced AI methods to assess groundwater vulnerability to nitrate pollution in Florida.

Groundwater Vulnerability in Florida

The Surficial Aquifer System (SAS) is a significant groundwater resource in Florida, particularly in the southeastern and panhandle regions, where it serves as a primary source of potable water. This aquifer is predominantly composed of unconsolidated sands, shell beds, and thin limestone layers. The SAS has relatively shallow depths and high permeability, increasing its susceptibility to contamination from surface activities. in contrast to deeper, karst-dominated Floridan Aquifer System (FAS), the SAS lacks extensive confining layers, making it more vulnerable to pollutants from agricultural practices, urban runoff, and industrial discharges.

Our research introduces a framework for evaluating groundwater vulnerability by improving the DRASTIC model that incorporates land use and nitrate pollution parameters. By incorporating AI models, this approach aims to streamline process and reduce the computational demands of groundwater contamination risk assessments.

The insights gained from this research have the potential to refine groundwater vulnerability mapping tools and contribute to more robust water resource management strategies. These advancements are crucial for ensuring sustainable water resources management, especially in light of increasing environmental pressure and growing water demands.

For more information on this research and education program, please contact Golmar Golmohammadi at g.golmohammadi@ufl.edu.

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Upcoming Events

Ona Highlight – 'AI Application in Water Resources Management' – May 27, 11:00 – 11:45 a.m. with Dr. Golmar Golmohammadi. Visit our website calendar to register for the Zoom or call us to attend in person: 863-735-1001.

UF/IFAS RCREC 16th Annual Youth Field Day – June 5, 8:00 a.m. – 2:00 p.m. Open to students ages 8 to 18 attending with their youth leader or parent. Registration ends 6/3. https://rcrec-2025-yfd.eventbrite.com/. Questions, call us at 863-735-1001.

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UF/IFAS Range Cattle REC - 3401 Experiment Station Rd., Ona - http://rcrec-ona.ifas.ufl.edu/