

Satellite Driven Water Intelligence

Research statement | Dr. Islam Mohamed Gaber

I aim to develop satellite-based environmental information that can support water planning and climate-risk monitoring in arid and semi-arid regions. My research background combines remote sensing and GIS with studies of atmospheric dust, urban climate and climate-sensitive planning. My professional experience in imagery analysis and enterprise GIS motivates a practical question: how can environmental indicators remain scientifically defensible when they enter an operational decision process?

Research foundation

My PhD at Tanta University examined atmospheric dust concentrations in Egypt's Western Desert, their spatiotemporal variation and future trends. My published work includes climate considerations in Egyptian cities, climate and tourism comfort in Aswan, and precipitation patterns in Peninsular Spain. My 2026 SSRN preprint on managed aquifer recharge screening distinguishes recharge receptivity from rainfall accessibility; it proposes locations for field investigation, rather than demonstrating achieved recharge. Together, these studies motivate stronger hydrological validation and uncertainty assessment.

Proposed research programme

First, I propose to evaluate satellite indicators of water availability and environmental stress alongside precipitation and other climate observations. The initial study would compare candidate indicators against suitable ground or independently validated reference data, with explicit attention to observation gaps and the limits of spatial resolution.

Second, I would investigate geospatial AI methods for environmental monitoring. The priority would be transferable performance across locations and seasons. Spatially separated validation, documented training data, uncertainty estimates and comparison with simple baselines would be central to the design.

Third, I would translate selected indicators into operational GIS workflows. This would include documented data lineage, reproducible processing, quality checks and clear update rules. Engagement with water and planning practitioners would guide the choice of outputs and how uncertainty is communicated.

Initial outputs and collaboration

An initial collaboration could produce a reproducible pilot using openly licensed data, a benchmark and validation report, and a prototype GIS output for one agreed decision context. Publication would follow evaluation of the results. I would seek partners who can contribute hydrological observations, domain interpretation and operational feedback. These activities are proposed work; they do not imply an existing funded project or deployed water-monitoring system.

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