

ELTAHER MOHAMED MAHMOUD SHAMS

PhD in GIS & Remote Sensing | GIS & Spatial Solutions Consultant | GIS Data Analyst

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Department of Natural Resources and Energy, Damanhour University, Egypt

PROFESSIONAL SUMMARY

GIS and Remote Sensing Consultant and academic specializing in advanced spatial solutions for major engineering projects, urban planning, and infrastructure design in Egypt and the Kingdom of Saudi Arabia. Extensive experience in managing engineering geodatabases; preparing structural and detailed plans for cities and infrastructure projects; and designing and analyzing road networks and integrated utility networks (potable water, electricity, sewage, and street lighting). Proven expertise in advanced hydrological studies, flash-flood risk modeling and structure protection, and groundwater and irrigation water quality assessment using geospatial methods and international standards. Skilled in integrating GIS software with engineering design and surveying applications, and in applying spatial analysis to support engineering decisions, quality control, and the management of project phases through final delivery in line with the highest international engineering standards.

CORE COMPETENCIES

- **GIS & Spatial Data Management:** Enterprise geodatabase design, spatial and attribute data management, data conversion and quality control, geostatistical and spatial statistical analysis (ArcGIS, QGIS, SPSS), custom GIS tools and ModelBuilder workflows, web GIS applications (ArcGIS Online and ArcGIS Server)
- **Remote Sensing & Earth Observation:** Satellite image processing, geometric and spectral correction, hyper-band ratio analysis, land-use and land-cover change detection, urban growth modeling, solar radiation analysis, mineral exploration, Google Earth Engine, ERDAS Imagine
- **Hydrology, Water Resources & Flood Risk:** Watershed and drainage-basin analysis, flash-flood modeling and hazard mapping, flood hydrographs and discharge estimation, dam and reservoir siting, groundwater exploration and potential mapping, managed aquifer recharge (MAR), irrigation and drinking water quality assessment (HEC-RAS, WMS, HYFRAN)
- **Infrastructure & Utility Networks:** Road, tunnel, railway, potable water, sewage, electricity and street-lighting network design and analysis, Geometric Network analysis, voltage-drop analysis, as-built surveys, integration of GIS with AutoCAD and Civil 3D
- **Urban & Regional Planning:** Structural and detailed city plans, current-situation studies, land-use analysis, service-location suitability, spatial planning of public services, building-regulation and permit support
- **AI & Predictive Spatial Analytics:** Random Forest, machine learning and XGBoost for spatial prediction of groundwater, flash floods, sand-dune movement, dust storms, rockfall, plant diseases, and agricultural and grazing suitability
- **Renewable Energy & Environmental Assessment:** Renewable-energy site suitability analysis, environmental impact assessment, climate analysis (pressure, temperature, wind, rainfall, solar radiation, evaporation, humidity), seismic hazard mapping
- **Surveying & 3D Modeling:** Total station, level and GPS data processing, projection transformations, topographic and urban 3D modeling
- **Project Management & Leadership:** End-to-end project delivery and quality control through final handover, progress payment certificates and bills of quantities, technical reporting, stakeholder presentations, student and research supervision

PROFESSIONAL EXPERIENCE

PhD Lecturer – GIS & Remote Sensing (Spatial Solutions)

2024 – Present

Institute of Graduate Studies and Environmental Research, Department of Natural Resources and Energy, Damanhour University, Egypt

GIS and Remote Sensing Consultant

2019 – 2024

Makkah Municipality (Amanat Makkah), Makkah, Saudi Arabia

Project 1: Lighting and Electrical Projects for Roads and Tunnels, Makkah

- Built a geodatabase for the electrical network.

- Tracked performance and produced progress reports.
- Performed spatial planning of the network (cables, panels, towers, meters).
- Developed a geographic information system for the Souq Al-Sagheer Tunnel.
- Monitored periodic maintenance and installation works.

Project 2: Water Desalination and Treatment Plants – Khulais Storage Lake, Abha Dam and King Fahd Dam

- Conducted spatial analysis of water properties (environmental monitoring).
- Carried out flash-flood and water supply studies.
- Built geo-environmental databases for mountain storage lakes.

Lecturer (PhD) – GIS & Remote Sensing

2016 – 2019

Faculty of Arts, Department of Geography and GIS, Assiut University, Egypt

GIS and Remote Sensing Consultant

2012 – 2016

Al-Bia Planners, Designers and Engineers, Saudi Arabia

Project 1: Structural and Detailed Plan for the Khulais City Complex, North of Makkah

- Created base maps from satellite imagery.
- Built a geodatabase of land use and services.
- Studied existing conditions and analyzed land use.
- Prepared detailed plans for the Khulais and Mudrikah urban settlements.
- Prepared technical reports.

Project 2: Flash-Flood Drainage Plan for Jeddah and Selection of Protection Measures

- Performed hydrological studies and drainage-basin analysis.
- Modeled flash-flood runoff and calculated discharges.
- Analyzed and assessed flood risks.
- Produced engineering designs for protection networks and structures.

Project 3: Road and Tunnel Network Analysis, Makkah

- Digitized the road network from satellite imagery.
- Surveyed and mapped utilities, traffic signals, number of lanes, and road widths.
- Analyzed traffic networks and flow.

GIS Data Analyst

2010 – 2012

Engineering Department – Technical Drawing Office, Montazah First District, Alexandria, Egypt

- Helped identify buildings violating building regulation lines in Montazah First District, Alexandria.
- Monitored urban changes and continuously updated survey maps from satellite imagery.
- Conducted field surveys and plotted measurements on survey maps.
- Evaluated and identified the most suitable locations for public services.
- Handled building permits and suitability reports.

Instructor – GIS & Remote Sensing

2008 – 2010

Higher Institute for Literary Studies, Department of Geography and GIS, Alexandria, Ministry of Higher Education

GIS and Remote Sensing Specialist

2006 – 2008

Alex Surveying, Alexandria, Egypt

Project 1: Potable Water Networks, Montazah District, Alexandria

- Performed spatial analysis of potable water networks.
- Identified network deficiencies.
- Contributed to a future plan for potable water networks in the Montazah area.

Project 2: Health Services and Land Use, Montazah District, Alexandria

- Created a detailed base map of the current situation.
- Conducted as-built GPS field surveys of service locations and plotted them on maps.
- Produced heat maps and interactive maps showing areas of service efficiency and deficiency.

TECHNICAL SKILLS & EXPERTISE

- **AI & Machine Learning:** Applies Random Forest, machine learning and XGBoost within GIS to predict groundwater occurrence and properties, flash-flood accumulation (water harvesting), and areas suitable for agricultural expansion and grazing
- **Spatial Hazard Prediction:** Predicts spatial hazards such as sand-dune movement, flash floods, dust storms, and plant-disease locations using AI tools
- **Renewable Energy:** Identifies optimal sites for renewable-energy facilities based on natural and human factors such as terrain, weather patterns, and energy demand, using remote sensing and GIS
- **Environmental Impact:** Uses GIS to analyze the environmental impact of energy projects and identify potential areas of concern; conducts environmental impact studies, groundwater exploration, and climate analysis (pressure, temperature, wind, rainfall, solar radiation, evaporation, relative humidity)
- **Infrastructure Mapping:** Maps engineering network infrastructure such as water, electricity, and sewage lines; designs lighting networks (poles, towers, cables, distribution panels, meters, concrete foundations, tunnel fans) with advanced spatial databases and voltage-drop analysis
- **Network Analysis:** Builds and analyzes road, water, sewage, tunnel, and railway networks using Geometric Network analysis tools in GIS and open-source software
- **Natural Resources:** Applies GIS and remote sensing to inventory and explore natural resources, including mineral exploration for economic mineral resources
- **Model Building:** Builds spatial models in ArcGIS (ModelBuilder) to analyze water, air, and geo-environmental problems
- **Spatial & Geostatistical Analysis:** Performs spatial suitability analysis for site and route selection and environmental impact assessment using commercial and open-source GIS; conducts spatial statistics and geostatistical analysis using GIS and SPSS
- **Satellite Image Analysis:** Applies hyper-band ratio analysis to satellite imagery to produce maps of water quality, air quality, environment, climate, pollution, and change monitoring; analyzes solar radiation from satellite imagery; corrects displacements, converts between projections, and improves spatial and spectral resolution
- **Land-Use Change & Urban Growth:** Detects land-use changes and identifies future urban growth axes using ERDAS Imagine and ArcGIS; builds predictive models for future planning of utility efficiency and quality
- **Survey Data Integration:** Processes total station, level, and GPS survey data in GIS and surveying software and builds spatial analyses from them
- **Hydrology & Flood Analysis:** Performs complete flash-flood analysis: stream delineation, drainage basins, flow velocity, flood hydrographs, flood volume, hazard areas, and optimal dam and reservoir locations; advanced hydrological studies using ArcGIS, HYFRAN, WMS, HEC-RAS, and QGIS
- **Project Management:** Manages projects based on GIS and remote sensing technologies; delivers projects to authorities with quality assurance through handover; prepares and reviews progress payment certificates and bills of quantities
- **Spatial Databases:** Creates, manages, and updates spatial databases in GIS software with improved geometric accuracy; handles all spatial and attribute data, including data acquisition, programmatic analysis, and conversion between data formats
- **Web GIS:** Builds web applications to browse and manage project data accurately (Creating a Web Application with ArcGIS Online)
- **Cross-Disciplinary Integration:** Integrates environmental, geological, natural, and urban aspects in GIS and remote sensing software
- **Custom Tools & Automation:** Develops custom software tools within ArcGIS and ERDAS Imagine for specific analyses in engineering and planning projects
- **Urban Planning:** Produces structural and detailed city plans using integration of Esri, Autodesk, and open-source software
- **3D Modeling:** Creates 3D models of urban areas and topography using GIS and remote sensing software
- **Reporting & Communication:** Writes reports for all project phases and handover processes; attends meetings and delivers effective presentations

SOFTWARE PROFICIENCY

ArcGIS Pro | ArcGIS Desktop | ArcGIS Server and ArcGIS Online | ERDAS Imagine | QGIS (Quantum GIS) | SAGA GIS | Global Mapper | Google Earth Pro | AutoCAD | Civil 3D | HEC-RAS | WMS | HYFRAN | SPSS

SELECTED RESEARCH & PUBLICATIONS

- **Remote Sensing (Q1):** Agricultural drought assessment using Google Earth Engine (GEE)
- **Sustainability (Q1):** Evaluation of planning and quality of irrigation water networks in arid lands
- **Applied Water Science (Q1):** Groundwater potential mapping and its use for drinking
- **Environmental Geochemistry and Health (Q2):** Health risk assessment of groundwater
- **Natural Hazards (Q1):** Flash-flood hazard modeling for infrastructure in the Wadi Feran Basin, South Sinai
- **Geomatics, Natural Hazards and Risk (Q1):** Risk assessment of sand-dune movement on agricultural and urban expansion and infrastructure networks in the Qattara area, Matrouh Governorate
- **Geomatics, Natural Hazards and Risk (Q1):** Managed aquifer recharge (MAR) using dams, artificial lakes, and wadis to recharge groundwater from flash floods, applied to the Red Sea wadis, Egypt
- **Natural Hazards (Q1):** Machine learning and artificial intelligence for identifying rockfall along road corridors and evaluating protection measures, applied to the South Sinai road network, Egypt

PROFESSIONAL PROJECTS & ACTIVITIES

- **Egyptian Code Update (HBRC, 2025):** Advanced GIS application for the national seismic hazard map within the update of the Egyptian Code for Structural Loads and Forces 2025, enhancing safety and economy in structures
- **Energy Conferences and Exhibitions:** Active participation in scientific forums presenting applied research and building partnerships in energy and natural resources
- **Student Activities – "Leave a Mark" Family:** Supervision of scientific and educational initiatives to develop students' leadership and university skills
- **FAO Webinars:** Attendance of international specialized workshops on land and water sustainability and food security

CERTIFICATIONS & TRAINING

- Diploma in GIS Programming – Arab Academy for Science, Technology and Maritime Transport (2012)
- Diploma in Remote Sensing Technology – Arab Academy for Science, Technology and Maritime Transport (2013)
- Certificate in Geographic Information Systems (GIS) – Esri, Environmental Systems Research Institute, USA (2020)
- Certificate in Engineering and Planning Project Data Management – Esri, USA (2020)
- Certificate in Spatial Analysis in Engineering Projects – Esri, USA (2021)
- Certificate in Using GIS to Solve Spatial Problems in Engineering Projects – Esri, USA (2021)
- Certificate in ArcGIS Pro Basics – Esri, USA (2021)
- Diploma in Surveying Instruments (Level, Theodolite, Total Station) and Surveying Software (AutoCAD, Surfer, Land Desktop Civil) – Association of Surveying and Mapping Graduates (2009)
- Training Course in Civil 3D for Road, Electricity, and Gas Projects – Association of Surveying and Mapping Graduates (2017)
- Course in Network Analysis (Roads, Potable Water, Electricity, Sewage) in GIS Software – Alex Survey, Alexandria, Egypt (2016)
- International Computer Driving License (ICDL) – UNESCO (2014)
- Training Course in Self-Development and Capacity Building – Leadership Preparation Institute, Helwan, Egypt (2023)

PROFESSIONAL MEMBERSHIPS

- Egyptian Geographical Society
- United States Geological Survey (USGS)
- Association of Surveying, Mapping and GIS Graduates
- Center for Innovation and Entrepreneurship, Damanhour University
- Member, Energy Committee, Damanhour University

LANGUAGES

- **Arabic:** Native / Excellent
- **English:** Very Good