

URBAN WATER RESILIENCE
GEO-SPATIAL APPROACHES TO MAPPING
RECHARGE ZONES
USING DRONES AND REMOTE SENSING
TECHNOLOGIES

Karthik M H
Presidency University

Urban Water Challenge

- Rapid urbanization depletes groundwater reserves faster than recharge
- Climate change intensifies rainfall variability and flooding risks
- Traditional survey methods are costly, time-consuming, and incomplete
- Urgent need for scientific mapping of aquifer recharge zones
- Integrated geospatial solutions enable data-driven decision making

Satellite Data Sources for Urban Water

- Landsat 8/9 (30m resolution) - LULC & thermal imagery
- Sentinel-2 (10m resolution) - vegetation indices & water mapping
- ISRO EOS satellites - multispectral monitoring
- Google Earth Engine - cloud processing & time-series analysis
- High-resolution UAV data (2-5cm) - local recharge zone detail

Groundwater Recharge Zone Mapping Process

- Data collection: Geology, rainfall, slope, drainage density
- Thematic layer preparation in GIS (lithology, LULC, lineaments)
- Analytical Hierarchy Process (AHP) for weighted criteria ranking
- Overlay analysis to identify high-potential recharge zones
- Validation using field surveys and piezometric data

Remote Sensing Indices

NDVI

- Vegetation health & land cover mapping

NDBI

- Built-up areas & urbanization patterns

NDWI

- Water presence & infiltration zones

LST

- Land surface temperature for UHI effects

Drone-Based RGB/LiDAR for Piezometric Monitoring

- 5cm vertical precision piezometric level measurements
- Eliminates need for traditional well leveling surveys
- Covers extensive or inaccessible areas quickly
- High-resolution point cloud generation for DEM accuracy
- Real-time data processing for immediate insights

Artificial Recharge Interventions

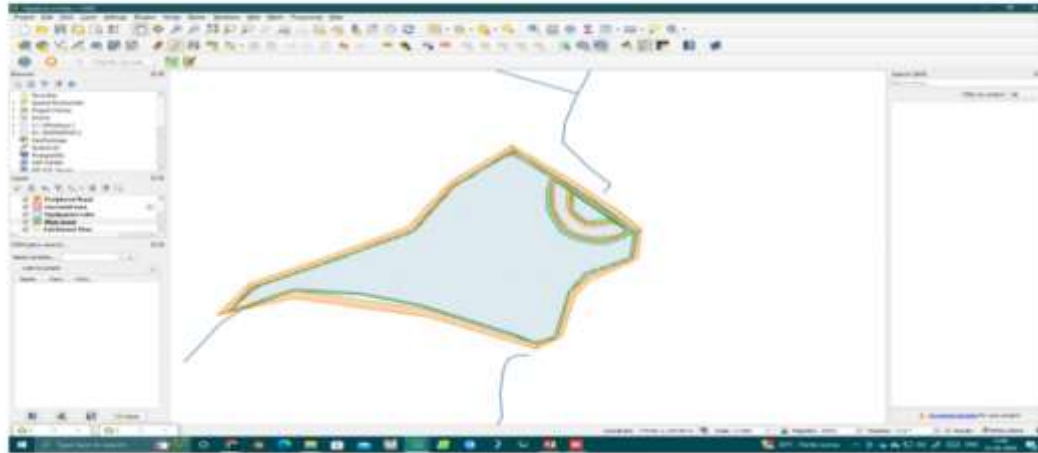
- Percolation ponds in high-infiltration zones
- Check dams and trenching in seasonal flow channels
- Rainwater harvesting & rooftop diversion systems
- Subsurface dykes for flow management
- Geospatial data guides site selection & design

Integrated Urban Water Resilience Model

- Water resources: Aquifer mapping & recharge assessment
- Socio-economic: Population density & water demand analysis
- Ecological: Green corridors & ecosystem restoration
- Infrastructure: Smart water metering & SCADA systems
- Governance: Community participation & adaptive management

Case Study: Ittagalpura

QGIS OVERLAYING FEATURE IDENTIFICATION OF LAKE, PERIPHERAL & MAIN BUND



ORI – ORTHO RECTIFIED IMAGE



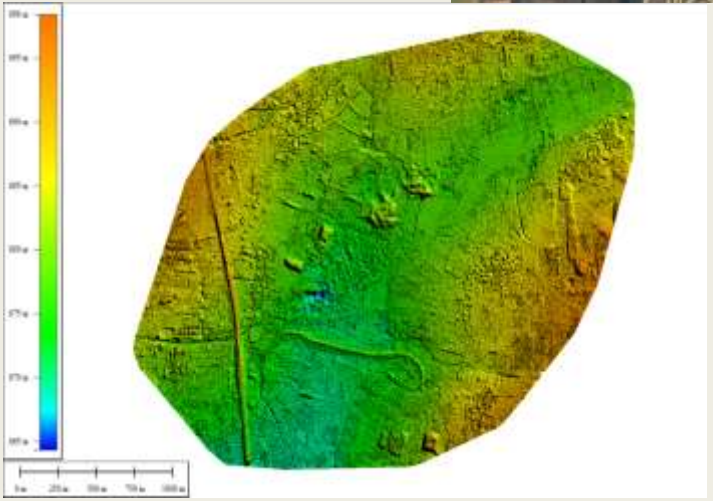
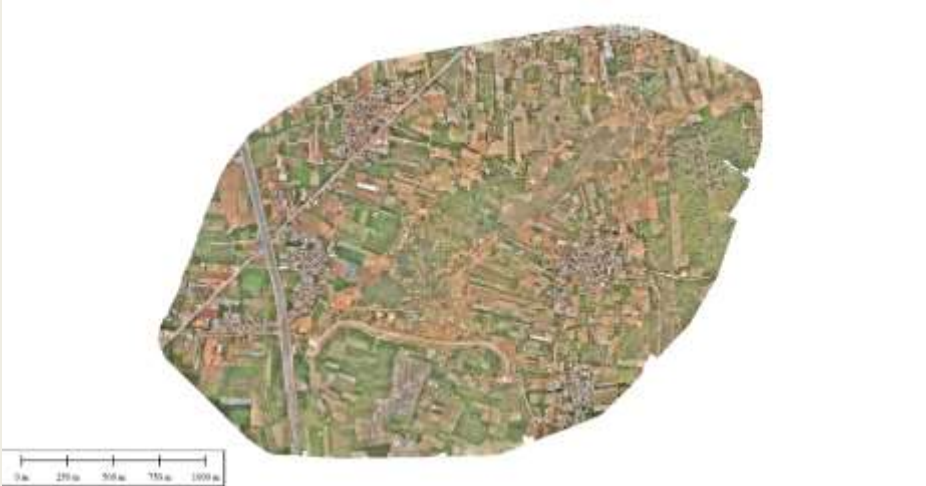
OVERLAYING OF LAKE PERIPHERAL, MAIN BUND & ENCLOSED AREA IN ORI

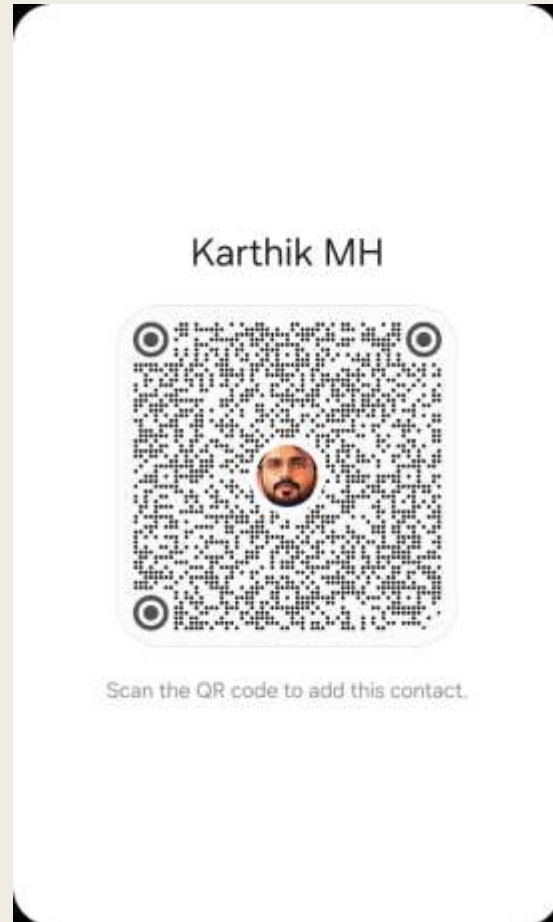


Case Study: Doddaballapura-Nagarakere



Case Study: Hullurukere





SCAN QR TO CONNECT

Karthik MH

mhkarthik7@gmail.com

Karthik.mh@presidencyuniversity.in

Mo: 8553807902

LinkedIn:

[Karthik MH - PRESIDENCY UNIVERSITY](#)