

ACIWRM- KERS
QGIS – Google Earth Engine (GEE) – Drone Technologies
for Water Resources

Thematic Training Curriculum
(draft)

Hands-on training workshop on QGIS, GEE, Drone survey and DGPS

<p>Day 1: Essential QGIS for Water Resources</p> <ul style="list-style-type: none"> • Introduction to QGIS • Fundamental GIS concepts • Fundamental Remote Sensing concepts • Working with Vector Data Layers • Working with Raster Data Layers • Consuming Web Services • Georeferencing • Interpolation • Data Editing • Multi-Criteria Overlay Analysis • Must-have Plugins • Fundamentals of cartography • Styles and Symbology • Vector data visualization • Raster data visualization • Print Layouts • Creating and Exporting Maps 	<p>Day 2: Advanced QGIS for Water Resources</p> <ul style="list-style-type: none"> • Open-source software and the QGIS project • QGIS Processing Toolbox • Batch Processing • Modelling complex workflows with Graphical Modeler • Print Layouts and Automating • Map Creation with QGIS Atlas • Advanced Expressions • Visualize time-series data with 2D Animations. • Visualize terrain and flood simulations with 3D Animations. • Hydrological Analysis in QGIS via SAGA/GRASS • Introduction to Python • Visual Tour of the PyQGIS API • Python Actions and Startup scripts • Custom Python Expressions • Writing Processing Scripts • Writing standalone python scripts • Building Plugins
<p>Day 3: Applications of Google Earth Engine in Water Resources</p> <ul style="list-style-type: none"> • Introduction to Google Earth Engine • Introduction to the Code Editor • Fundamentals of JavaScript Programming • Working with Image collections • Image Processing • Import/Export Application 1: Surface water monitoring 	<p>Day 4: Applications of Google Earth Engine in Water Resources</p> <ul style="list-style-type: none"> • Application 2: Land use/Land cover mapping for a river basin • Application 3: Time series analysis of precipitation data • Application 4: Flood mapping with Synthetic Aperture Radar (SAR) data • Application 5: Drought monitoring with MODIS data • Building interactive applications to communicate results to stakeholders.

Day 5 & Day 6: Drone Survey and DGPS

<p>Day 5: Drone survey and DGPS</p> <ul style="list-style-type: none">• Introduction to Drone Technology and Applications in Civil Engineering• Overview of drone technology• Applications of drones in civil engineering• Introduction to drone surveying• Regulations and safety considerations for drone operations• Basics of Drone Operations• Understanding drone components and their functions• Basic drone flight controls• Drone flight practice session (practical)• Introduction to Differential GPS (DGPS)• Basics of GPS and DGPS• Importance of DGPS in drone surveying• DGPS setup and operation• DGPS Observations in Survey (Practical)• Field session on DGPS observations• Data collection and interpretation	<p>Day 6: Drone survey and DGPS</p> <ul style="list-style-type: none">• Drone Survey Planning• Understanding survey requirements• Planning a drone survey: flight paths, altitude, overlap, etc.• Using drone survey planning software• Drone Survey Execution (Practical)• Conducting a drone survey• Data collection and storage• Data Processing and Analysis• Introduction to photogrammetry• Processing drone survey data• Analysing and interpreting results• Applications of Drone Survey Data in Civil Engineering• Creating topographic maps• Volume calculations for earthworks• Infrastructure inspection• Monitoring construction progress• Introduction to LiDAR and its applications in civil engineering• Using drones for thermal imaging and its applications
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Note: Faculty Resource Persons will be drawn from ACIWRM and KERS staff. Two external faculty will be hired.