

Introduction to GIS using QGIS

## January, 2025

Requirements

- A computer with a GIS software(QGIS)
- Basic computer skills
- Speak and understand the English language

# Overview

The "Introduction to GIS using QGIS" training is designed to provide participants with a foundational understanding of Geographic Information Systems (GIS) and how to utilise QGIS, an open-source GIS software, for spatial data management, analysis, and visualisation. The goal is to equip learners with the practical skills to manipulate geospatial data, create maps, and perform essential GIS tasks professionally.

## Target Audience:

This training is tailored for beginners; students, IT professionals, urban planners, environmental scientists and any individuals or organizations interested in working with geospatial data for analysis, decision-making, or policy formulation.

## Training Duration:

The training is structured for 5 days, with a combination of lectures, hands-on exercises, and real-world case studies.

### Learning Outcomes:

By the end of this training, participants will be able to:

- 1. Understand the basics of GIS, including spatial data types, projections, and coordinate systems.
- 2. Navigate the QGIS interface and access essential tools for data analysis.
- 3. Manage geospatial data, including importing, exporting, and editing vector and raster datasets.
- 4. Perform basic spatial analyses such as buffering, overlaying, and querying data.
- 5. Create and design maps with layout customization for printing or sharing.
- 6. Apply QGIS tools for decision-making in practical contexts such as urban planning, environmental management, and infrastructure development.

## Training Topics:

- 1. Introduction to GIS concepts:
  - Definition of GIS.
  - Importance and applications of GIS.
  - Key components of GIS.
  - Spatial data types: vector and raster.
  - Overview of geospatial technology trends.
- 2. Getting started with QGIS:
  - Overview of QGIS and its capabilities.
  - Installing and configuring QGIS.
  - Understanding the QGIS interface (toolbars, menus, panels).
  - Managing projects, layers, and symbology.

#### 3. Working with spatial data:

- Importing and exporting geospatial data (Shapefiles, GeoJSON, CSV).
- Coordinate systems and projections.
- Basic data management (attribute tables, editing features).
- Layer symbology
  - i. Single
  - ii. Categorised
  - iii. Graduated
  - iv. Rule-based
  - v. Clusters
- Layer labelling
  - i. Placement

- ii. Scale-dependent
- iii. Mask
- iv. Buffer
- Spatial data queries
  - i. Select by expression
  - ii. Select by location
  - iii. Select by value

# 4. Geospatial Analysis:

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- Vector analysis (Geoprocessing)
  - i. Buffer
  - ii. Clip
  - iii. Dissolve
  - iv. Difference
  - Raster analysis
    - i. Raster calculator
    - ii. Masking
- Field Calculator
- 5. Creating spatial data (Layers)
  - Creating new shapefiles/layers
    - i. Points
    - ii. Lines
    - iii. Polygons
  - Layer editing

# 6. Cartography and Map Design

- Elements of map-making (scale, legend, titles).
- Creating professional map layouts.
- Exporting maps for sharing (PDF, PNG, etc.)

# 7. Map Automation

- Using Atlas to automate map creation
- Layer filtering in atlas
- Custom labels on maps

Training Approach:

- **Hands-on exercises**—Each session will include guided exercises that allow participants to apply the concepts learned in practical scenarios.
- **Case studies** Real-world examples will illustrate how GIS is applied across various industries.
- Interactive learning Participants will engage in discussions, Q&A sessions, and group activities to enhance understanding.

# **Assessment & Certification:**

Participants will be evaluated through practical exercises and a final project, in which they demonstrate the skills learned. Successful participants will receive a certificate recognising their proficiency in GIS using QGIS.

