GIS TRAINING FOR BEGINNERSA ND INTERMEDIATE GIS USERS

1. **NON-GIS (BEGINNERS)**

Duration: 5 Days
Target Group: Extension workers, community development officers, project assistants, foresters, data collectors, NGO staff, entry-level government officers, clerks, and field technicians with no prior GIS experience.

Training Goals

1. Introduce GIS concepts and mapping skills
2. Enable trainees to read, interpret and create basic maps
3. Train participants in GPS data collection
4. Introduce drone technology fundamentals (NOT flying yet)
5. Produce simple maps for reporting and decision-making

DAY 1: Introduction to GIS & Spatial Data

Topic

- What is GIS?
- Spatial vs non-spatial data
- Types of geographic data (vector, raster)
- Coordinate systems (WGS84, UTM)
- Map components (legend, scale bar, north arrow)
- Applications of GIS in Malawi (agriculture, land use, DRM, forestry)

Practical Exercises

- Explore QGIS and ArcGIS interface
- Load simple vector layers (roads, villages, boundaries)
- Identify different feature classes

DAY 2: Basic Data Handling in QGIS and ArcGIS

Topics

- Installing and navigating QGIS and ArcGIS software
- Layer properties, symbology, transparency
- Attribute tables & querying data
- Adding basemaps (Google, OSM)

Practical Exercises

- Styling a land use layer
- Querying “villages in TA X”
- Saving styled layers

DAY 3: Map Making for Beginners

Topics

- Labelling features (point/line/polygon)
- Classification (single symbol, graduated)
- Creating a map layout
- Adding titles, logos, legend, scale bar
- Exporting maps (PDF, PNG)

Practical Exercises

- Create a basic village map
- Produce a land cover map

DAY 4: Introduction to GPS

Topics

- GPS basics
- Collecting coordinates
- Accuracy vs precision

Practical Exercises

- Collect point coordinates around the training venue
- Import GPS data into QGIS and ArcGIS
- Map the collected points

DAY 5: Introduction to Drone Technology (Concept Level)

Note: Beginners will ONLY learn theory

Topics

- What is a drone/UAV?
- Parts of a drone (frame, gimbal, camera, battery, sensors)
- Types of drones used in GIS (Multi-rotor, Fixed wing)
- Drone applications in Malawi:
    - Agriculture
    - Disaster response
    - Land surveying
    - Environmental monitoring
- Basics of flight planning (height, overlap, ground sampling distance)
- Drone regulations in Malawi (MACRA, DCA)
- Simple interpretation of drone imagery

Expected Output for Beginners

- Basic maps (PDF)
- GPS-collected points mapped in QGIS and ArcGIS
- Knowledge of drone capabilities

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2. **INTERMEDIATE GIS USERS**

Duration: 11 Days
Target Group: District planning officers, environmental officers, agriculture officers, DRM personnel, land survey assistants, ESIA practitioners, researcher, land clerk and monitoring & evaluation officers.

Training Goals

1. Strengthen spatial analysis skills
2. Enable trainees to digitize and create clean datasets
3. Teach georeferencing and advanced symbology
4. Introduce DEM analysis and geoprocessing
5. Train on drone data workflows and basic photogrammetry
6. Produce professional maps for reports

DAY 1: GIS Refresher & Data Creation

Topics

- GIS concepts refresher
- Coordinate reference systems
- Data quality & standards
- Digitizing techniques
- Editing tools (cut, merge, reshape)

Practical Exercises

- Digitize land parcels from high-resolution imagery
- Create attribute tables & fill data

DAY 2: Georeferencing & Raster Handling

Topics

- What is georeferencing?
- Control points
- Raster reclassification
- Raster mosaicking

Practical Exercises

- Georeferencing old maps or scanned layout plans
- Reclassify land cover layers

DAY 3: Spatial Analysis Essentials

Topics

- Buffer analysis
- Clip, intersect, union
- Distance analysis
- Practical examples:
    - Distance to health facilities
    - Identifying flood zones
    - Service catchment mapping

Practical Exercises

- Buffer all boreholes within 1 km
- Clip land use by Traditional Authority
- Generate settlement proximity analysis

DAY 4: DEM & Terrain Analysis

Topics

- Understanding Digital Elevation Models
- Slope and aspect
- Hillshade
- Watershed extraction basics

Practical Exercises

- Create a slope map
- Extract a small watershed
- DEM-based flood risk mapping

DAY 5 - 6: DRONE TECHNOLOGY (PRACTICAL LEVEL)

Topics

- Drone flight parameters (GSD, overlap, altitude)
- Safety protocols
- Malawi drone regulations (MACRA, DCA, permits)
- Introduction to photogrammetry (Agisoft/Pix4D general concepts)
- Orthomosaic, DSM, DTM concepts

Practical Exercises

- **(If drone available)**
    - Sample flight plan using DroneDeploy/MapPilot
    - Simulated flight on software
- **Data demonstration (trainer data)**
    - Load drone orthomosaic into QGIS or ArcGIS
    - Visualize DSM/DTM

DAY 7 - 10: Remote Sensing & Image Processing

Topics

- Basic remote sensing (Landsat/Sentinel imagery)
- Satellite image acquisition
- Pre-processing (cloud masking, atmospheric correction)
- Land use/land cover classification
- Supervised & unsupervised classification
- NDVI & vegetation indices

DAY 11: Map Production & Final Project

Topics

- Advanced symbology
- Multi-layer maps
- Map templates
- Exporting and reporting standards (for ESIA, planning, agriculture)

Final Project (Group Work)

Each group produces a map using:

- Digitized data
- Drone orthomosaic
- Spatial analysis
- DEM results
- Layout design

Expected Output for Intermediate Users

- Clean digitized datasets
- Georeferenced maps
- Spatial analysis outputs
- Drone-based map interpretation
- Professional quality final map layout