

CC303 - GIS for Environmental Management, EIA and Audit Course

Course Duration: 10 Days

Training Fee: KSH 80,000 | USD 800

Course Registration: [Register Here>>](#)

1.0. Introduction



Geospatial technology is now being used extensively at global scale. These technologies are used for multi-disciplinary applications, monitoring, surveillance, management and mitigation of the problems occurring at global stage. An environmental Impact Assessment (EIA) is an assessment of the possible impacts that a proposed project may have on the environment, consisting of the environmental, social and economic aspects. Environmental impact assessment ensures

that decision makers consider the environmental impacts when deciding whether or not to proceed with a project. The application of Geographic Information Systems (GIS) in Environmental Management and Environmental Impact Assessment (EIA) and Audit process has gained substantial momentum over the past few years. Analyzing developments in their spatial context during the initial stages of the EIA process expedites the identification of potential aspects and impacts that may have to be assessed while the process goes on. Potential risk factors may be identified upfront and presented to the client to assess the viability of proceeding with the project. This approach is time and cost saving.

1.1. Course Overview

This course focuses on the use of GIS and Remote Sensing to organize and present spatial data in a way that allows effective environmental management planning. Decision makers and planners can use GIS to organize and present spatial data in a more effective way. Remote Sensing Technology is an excellent tool that is increasingly used in the detection, description, quantification and monitoring environmental changes. Remote Sensing in combination with Geographical Information Systems (GIS) and fieldwork data collection, is an effective environment management platform adopted by environmentalists.

1.2. Course Objectives

This course will enable the participants:

- i. To expose the participants to data capture, input, manipulation and display by Geographical Information System.
- ii. To introduce the application of GIS and Remote Sensing in environmental management.
- iii. To introduce participants to the role GIS plays in the (EIA) process.
- iv. To develop a sound basis for understanding the operation of GIS and Remote Sensing in environmental management.
- v. To demonstrate to participants, the use of GIS in identifying and analyzing potential impacts of projects in the environment.

- vi. Familiarizing with different methods and techniques for Spatial Multicriteria Analysis (SMCA) for EIA.

1.3. Course Content/Outline

i. Introduction to GIS and Remote Sensing in EIA Context:

- Definition and purpose of Environmental Impact Assessment (EIA);
- Components of GIS and Remote Sensing;
- Introduction to GIS software used for EIA.

ii. Geospatial Technologies for Environmental Mapping:

- Planning for a GIS system installation;
- GIS Data sources for environmental management, EIA and Audit;
- GPS data collection for environmental management, EIA and Audit;
- GIS data collection using mobile devices;
- GIS database design, creation and management;
- Working with GIS data (raster, vector and tabular data);
- Rasterization and vectorization processes;
- Map projections and coordinate systems;
- GIS data output or data presentation;
- Relating information from different sources;
- Map preparation and presentation.

iii. Spatial Multi-Criteria Decision Analysis using GIS:

- Basic concepts of decision theory and problem structuring;
- Methodological steps in MCA and SMCA:
 - *Value Function and Weight Assessment;*
 - *Criteria Aggregation;*
 - *Sensitivity Analysis;*
 - *Result Presentation etc.*
- Overview of main MCA and SMCA methods;
- AHP and OWA procedures;
- Using Decision Support Systems (DSS) and GIS-based DSS.

iv. Case Studies for SMCA:

- Site location or Identification;
- Land use and land cover;
- Land Suitability analysis;
- Distance to areas of population;
- Local area demographics;
- Proximity to transport and road infrastructure;
- Environmentally sensitive areas.

v. Use of GIS to Identify and Analyze Potential Impacts:

- Pre-classification of Digital Image Processing;
- Satellite Image classification;
- Image processing and interpretation;
- Vegetation Mapping and Monitoring;
- Analyzing Change detection using ENVI.

vi. GIS Modeling for Environmental Application:

- Introduction to GIS modeling and applications;
- Taxonomy of Environmental Models in the Spatial Sciences;
- Geographic Data for Environmental Modeling and Assessment;
- Applications of Remote Sensing and GIS in Wildlife Mapping and Modeling;
- Biodiversity Mapping and Modeling;
- Approaches to Spatially Distributed Hydrological Modeling in a GIS Environment.

vii. Participatory GIS Approaches to Environmental Impact Assessment:

- Participatory learning and action (PLA);
- Participatory GIS-Approach for Socioeconomic Data Collection and Impact Identification;
- Participatory learning and action (PLA);
- Participatory mapping tools (Mental and ground mapping, participatory sketch mapping, and transect mapping and participatory 3D modelling);
- Use of Open Source web-based resources such as OpenStreetMap and Google Maps for participatory mapping.

viii. Case Study: GIS for Decision Support in Environmental Management

- Use of GIS and remote sensing in Communicating audit results;
- GIS as a tool for spatial, urban and regional planning;
- Use of GIS and remote sensing in analyzing audit results.

1.4. Expected Learning Outcomes

On completion of this course, the participants are expected to:

- i. Apply the geo-information and earth observation techniques in support of sound and effective environmental management in a given locality.
- ii. Acquire knowledge and skills needed for the collection, interpretation, and management of spatial information, using remote sensing and geographic information systems, to support planning and decision-making processes in environmental management.
- iii. Acquire skills using Geospatial tools that help in conducting sound EIA and EA processes.
- iv. Obtain the insights on Modern day geo-technologies e.g. GIS for environmental Management thus helps in understanding the effects of disasters on environment from an inter-disciplinary aspect on mitigating them.

- v. Get acquainted with GIS and other geo-techniques to provide project specific solutions in the field of environmental management, EIA and EA realms.

1.5. Training Tools (Hardware and Software)

1. Android Smartphone;
2. A Laptop or PC;
3. Satellite images;
4. ENVI Software;
5. ILWIS Software;
6. ArcGIS & Q-GIS;

1.6. Training Style and Approach

- ❖ On-site instructor-led training;
- ❖ On-line self-paced training (optional);
- ❖ Use of PowerPoint Slides;
- ❖ Fieldwork Exercises;
- ❖ Use of Case Study Videos.

