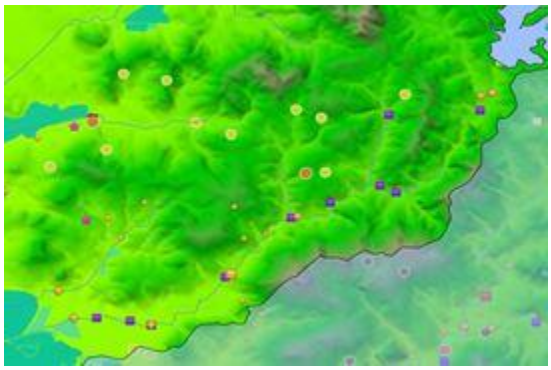
CC316 - GIS for Water, Sanitation and Hygiene (WASH) Program

Course Duration: 10 Days
Training Fee: KSH 80,000 | USD 800
Course Registration: **Register Here>>**

1.0. Introduction



Water-related challenges in developing countries are not limited to water supply and sanitation services. Water shortages experienced by users across the region is plagued with chronic cycles of flooding and drought that are increasing in frequency and severity, in part exacerbated by climate change, and coupled with population growth, significant upland watershed destruction, and non-equitable distributed of water resources. There is the need in improving access to water, increasing community capacity to manage and better use water resources, improving water supply infrastructure in arid and semi-arid areas, improving water sanitation and hygiene practices, as well as protecting watersheds.

1.1. Course Overview

GIS in WASH programmes integration helps in implementing target-based interventions as it helps creating model of complex environment in a simpler and easier way for you to understand the environment and make proper and informed decisions. Free open source GIS software for both desktop and web application is opening up possibilities for capturing and processing geographical data, and then publishing maps via the internet.

1.2. Course Objectives

The focus of water sanitation and hygiene (WASH) programmes is promoting good environmental and personal hygiene in order to improve and protect health. By completing this course, the participants will be able to:

i. Evaluate the spatial and non-spatial data requirements in Water Sanitation and Hygiene (WASH).
ii. Use Geographical Information System (GIS) and Remote Sensing (RS) as tools for monitoring and evaluation of WASH projects activities.
iii. Assess the spatial data availability and its use/applications in WASH programs.
iv. Understand the importance of Spatial Data Infrastructure (SDI) in monitoring the WASH programs.
v. Use the participatory GIS (PGIS) to manage the WASH programs at community level.
vi. Carry out advanced water and sanitation modeling using GIS and remote sensing tools.
vii. Collect spatial and non-spatial data using modern GIS Mobile data gathering tools.

viii. Carry out basic GIS data analysis and processing using statistical software packages e.g. R, SPSS etc.
ix. Design and implement their own GIS projects that integrate remote sensing data, GPS-based field information in a proper geospatial framework.

1.3. Learning Environment

The learning and teaching strategies will follow student centered mode. Through the lectures, in-depth reading and group discussions, the participants will acquire advanced knowledge about application of Geo-technology in managing WASH projects/programs. The participants will develop skills to use Geospatial techniques for data collection, acquisition, processing and analyses of ground-based data as well as Geospatial intelligence including remote sensed and UAV/drone data. In this training, we shall employ an 70-20-10 approach i.e. 70% of the time for practicals, 20% for theory whilst 10% will be used for fieldwork.

1.4. Course Content/Outline

Module 1 - Introduction (GIS and GNSS)

i. **Introduction and Definitions of Key Concepts:** Review of WASH definitions and concepts; Introduction to GIS, GPS and remote sensing concepts.
ii. **Introduction to GIS Software (QGIS):** Principles of GIS; Components of GIS Systems; GIS Capabilities and Functions in the context of WASH; Spatial Data Infrastructure in WASH.
iii. **GNSS and GIS:** GPS, GLONASS, Galileo and GIS Principles; Introduction to GPS and Global Navigation Satellites; GPS configurations, capturing data from surveys; Integrating field GPS data into a GIS database; Facilitated Field exercises in GPS Data Collection in WASH.

Module 2 - GIS Data Management and Topologies

i. **GIS Data Management:** Data Sources in GIS for WASH; Working with GIS Data; Attributes manipulation in GIS; Tabular data in GIS - import/add and editing tables in GIS; GIS database creation; GIS database management; Facilitated Practical exercises in working with spatial Databases (Geo-databases).
ii. **GIS Topologies:** Definition of topologies; Creating data topologies; Line and polygon topologies; editing and cleaning data topological errors; managing GIS data in a geodatabase container.

Module 3 - Cartography and Case Study

i. **Development and Presentation of Maps:** GIS Mapping; Styling and symbolization; Mapping resources/Project activities; Facilitated practical exercises in map making and presentation using the project's data; Basic analysis and Geoprocessing; Online Mapping – Google Maps and Fusion Tables.
ii. **Case Study - GIS Application in Water Quality Testing:** Identify and map critical areas of land use and reveal trends that affect water quality; GIS to monitor water levels, water usage, and watch for trends, case study Use of GIS for mapping river contamination.

Module 4 - Participatory GIS for WASH

i. **Participatory GIS for WASH:** Use of Mobile Smartphones for GIS filed data Collection and mapping in WASH programs.
ii. **Spatial Multi-Criteria Evaluation (SMCE):** Spatial Multi-Criteria analysis using Remote Sensing tools and its application in WASH.
iii. **Case Study - GIS, RS and GNSS:** GIS and Remote Sensing as tools in monitoring and evaluation of WASH projects.

Module 5 - Statistical Data Analysis for WASH

i. **Statistical Data Analysis:** Introduction to Excel program; Data Entry and Management with Excel; Manipulating data using formulas; Preparing data for analysis; Creating a list; Outlining and Sorting data; Entering Data: Data Forms; Finding Records Using Criteria; Filtering Data; Data Auditing; Data validation.
ii. **Pivot Tables:** Introduction to Excel Pivot tables; Frequency Tables; Two Way Tables; Any Order Tables; Graphing Qualitative Data; Graphing Quantitative Data; Descriptive Statistics; Basic Inferential Statistics Tests; Basic Regression Analysis; Tabulations and Graphics; Statistical Data Analysis with Excel; Data Quality reporting.

1.5. Expected Learning Outcomes

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

i. Obtain solid skills and experience is application of geo-information and earth observation tools/techniques in crime mapping, analysis and reporting.
ii. Acquire Geo-skills needed for collection, interpretation & management of spatial information, using mobile GIS apps/GPS to support WASH programs/projects.
iii. Acquire hands-on skills and expertise in the use various GIS-based WASH platforms such as EpiCollect5, Survey123, GIS software, GIS/Google web mapping; GIS dashboards for WASH project presentations amongst other platforms.
iv. Get acquainted with relevant GIS and other Geospatial techniques to provide project specific solutions in the field of Water, Sanitation and Hygiene.

1.6. Training Materials (Hardware and Software)

1. A Laptop or PC;
2. Satellite/drone images;
3. EpiCollect5 App;
4. ArcGIS Online;
5. GIS Operation Dashboard;
6. ArcGIS & Q-GIS;

1.7. Training Style and Approach

1. On-site instructor-led training;

2. On-line training (optional);
3. Use of PowerPoint Slides;
4. Practicals/Fieldwork Exercises;
5. Use of Case Studies on GIS for WASH.

1.8. Who Should Attend?

The training targets professionals from the following industries and sectors:

- Public health;
- Environmentalists;
- M&E Experts;
- Program Managers;
- Civil and Water Engineers;
- Epidemiologists;
- Quantitative Health Geographers;
- Exposure Scientists;
- Students and Risk Assessors.