Remote Sensing for Forestry and Vegetation Management Training Course

Professional Development Training Course Outline

Category	GIS	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Remote Sensing and Geographic Information Systems (GIS) have revolutionized **precision forestry** and **sustainable vegetation management** by offering unparalleled capabilities for monitoring, analysis, and decision-making. This intensive training course will equip participants with the essential **geospatial intelligence** to harness these advanced technologies. From **satellite imagery analysis** to **LiDAR applications** and **drone mapping**, participants will gain practical skills to address pressing environmental challenges, enhance operational efficiency, and contribute to **climate change mitigation** and **biodiversity conservation**. Remote Sensing for Forestry and Vegetation Management Training Course emphasizes hands-on experience with **open-source tools** and real-world **case studies**, fostering a deep understanding of data acquisition, processing, and interpretation in forestry and ecological contexts.

The increasing demand for accurate, timely, and scalable information on forest resources and global vegetation dynamics underscores the critical role of remote sensing. This course delves into cutting-edge techniques for **forest health monitoring**, **deforestation detection**, **biomass estimation**, and **wildfire risk assessment**. By integrating **machine learning algorithms** and **cloud computing platforms** with diverse remote sensing datasets, participants will learn to generate actionable insights for **adaptive management strategies**. This specialized training is designed to empower professionals to leverage **Earth observation data** for impactful contributions to **natural resource management**, **land-use planning**, and achieving **REDD+ objectives**.

Programme Curriculum

Remote Sensing for Forestry and Vegetation Management Training Course

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Course Duration

5 days

Course Objectives

1. Master remote sensing fundamentals and GIS principles for forestry applications.
2. Acquire proficiency in satellite imagery acquisition and data preprocessing from various platforms
3. Implement land cover classification and change detection analysis for forest monitoring.
4. Utilize vegetation indices (NDVI, EVI) for forest health assessment and stress detection.
5. Apply LiDAR data processing for 3D forest structure mapping, tree height estimation, and biomass assessment.
6. Perform time-series analysis to track deforestation rates and forest degradation patterns.
7. Employ remote sensing for wildfire mapping, burn severity assessment, and post-fire recovery monitoring.
8. Integrate drone-based remote sensing for high-resolution imagery and localized vegetation management.
9. Develop skills in forest inventory mapping and species identification using spectral signatures.
10. Understand the role of remote sensing in carbon sequestration monitoring and REDD+ MRV (Measurement, Reporting, and Verification).
11. Apply machine learning and AI in remote sensing for enhanced data analysis and predictive modeling.
12. Utilize cloud-based geospatial platforms (e.g., Google Earth Engine) for scalable forest monitoring.
13. Create compelling geospatial visualizations and interactive dashboards for effective stakeholder communication.

Organizational Benefits

- Provides data-driven insights for **strategic forest management**, **resource allocation**, and **conservation planning**.
- Reduces the need for extensive field surveys through **rapid, large-scale data acquisition** and **automated analysis**.
- Enables **accurate and timely tracking** of forest change, health, and carbon stocks for regulatory compliance and funding.
- Facilitates **proactive identification** of wildfire threats, pest outbreaks, and illegal logging activities.
- Supports the implementation of **precision forestry techniques** for optimizing sustainable timber harvesting and reforestation efforts.
- Fosters inter-departmental and inter-organizational collaboration through shared **geospatial intelligence platforms**.
- Equips staff with **cutting-edge technologies** and methodologies, positioning the organization as a leader in **environmental stewardship**.

Target Audience

1. Forest Managers and Planners
2. Environmental Scientists and Ecologists
3. Conservation Practitioners
4. GIS Analysts and Specialists
5. Researchers and Academics.
6. Climate Change Specialists
7. Government Officials
8. Agricultural Extension Officers

Course Outline

Module 1: Foundations of Remote Sensing and GIS for Forestry

- Introduction to **Remote Sensing** and **Geographic Information Systems (GIS)**.
- Electromagnetic Spectrum, sensor types, and spectral signatures of vegetation.
- Spatial data models: raster vs. vector, coordinate systems, and projections.
- Overview of **geospatial software** and data sources
- **Case Study:** Delineating forest boundaries and non-forest areas using freely available satellite imagery for a regional forest management unit.

Module 2: Satellite Image Acquisition and Preprocessing

- Accessing and downloading satellite imagery
- **Image preprocessing techniques**: radiometric correction, atmospheric correction, geometric correction.
- Image enhancement techniques: stretching, filtering, and band combinations for visual interpretation.
- Introduction to **cloud-based processing** workflows.
- **Case Study:** Preprocessing a time-series of Sentinel-2 images to prepare for **deforestation detection** in a specific forest concession.

Module 3: Forest Cover Mapping and Land Use Change Detection

- **Supervised and unsupervised classification** algorithms for land cover mapping.
- Accuracy assessment techniques: confusion matrices, Kappa coefficient.

- **Change detection methodologies**: image differencing, post-classification comparison, time-series analysis.
- Mapping **forest fragmentation** and connectivity.
- **Case Study:** Quantifying the extent of forest loss due to agricultural expansion over a decade in a tropical region using multi-temporal Landsat imagery.

Module 4: Forest Health and Vegetation Stress Monitoring

- Calculation and interpretation of **Vegetation Indices**
- Monitoring **forest health decline** due to pests, diseases, and drought using spectral anomalies.
- Mapping **vegetation stress** and vigor.
- Integration of meteorological data with remote sensing for environmental impact assessment.
- **Case Study:** Identifying areas affected by bark beetle outbreaks in a coniferous forest using time-series NDVI anomalies from high-resolution satellite data.

Module 5: LiDAR and 3D Forest Structure Analysis

- Introduction to **LiDAR (Light Detection and Ranging)** principles and data types (point clouds).
- Processing **LiDAR data** for Digital Elevation Models (DEMs) and Digital Surface Models (DSMs).
- Extracting **forest structural attributes**: tree height, canopy cover, stand volume, and biomass.
- Applications of **LiDAR in forest inventory** and **precision forestry**.
- **Case Study:** Estimating above-ground biomass in a mixed forest using airborne LiDAR point cloud data and allometric equations.

Module 6: Remote Sensing for Wildfire Management

- Using remote sensing for **pre-fire fuel mapping** and **wildfire risk assessment**.
- **Active fire detection** and monitoring using thermal imagery (MODIS, VIIRS).
- **Burn severity mapping** with indices like dNBR (differenced Normalized Burn Ratio).
- Assessing **post-fire vegetation recovery** and erosion potential.
- **Case Study:** Mapping the extent and severity of a recent wildfire event and identifying areas prone to post-fire erosion using Sentinel-2 and Landsat data.

Module 7: Advanced Applications and Emerging Technologies

- Introduction to **Machine Learning and Deep Learning** for **image classification** and object detection in forestry.
- Utilization of **Google Earth Engine (GEE)** for large-scale **geospatial analysis** and visualization.
- **Drone-based remote sensing** for **precision agriculture** and **localized forest monitoring**.
- Integration of **ground-truthing data** with remote sensing products.
- **Case Study:** Automating tree species classification in an urban forest using **deep learning techniques** on drone imagery.

Module 8: Geospatial Communication and Reporting

- Designing effective **thematic maps** for various audiences.
- Creating **interactive web maps** and dashboards for data dissemination.
- Data storytelling with **geospatial visualizations**.

- Ethical considerations and data privacy in remote sensing applications.
- **Case Study:** Developing an interactive web dashboard showcasing **forest change trends** and **carbon stock estimates** for a protected area, targeting policymakers and funding agencies.

Training Methodology

This course employs a **blended learning approach** combining theoretical lectures with extensive **hands-on practical exercises** and **real-world case studies**. Participants will engage in:

- **Interactive Lectures:** Presenting core concepts, methodologies, and applications.
- **Software Demonstrations:** Live demonstrations of industry-standard and **open-source geospatial software** (QGIS, Google Earth Engine).
- **Practical Labs:** Step-by-step exercises to reinforce learning and build proficiency in data processing and analysis.
- **Case Study Analysis:** In-depth discussion and application of remote sensing techniques to solve practical problems in forestry and vegetation management from various global contexts.
- **Group Discussions & Problem Solving:** Fostering collaborative learning and critical thinking.
- **Individual Project Work:** Participants will apply learned skills to a small project, simulating real-world scenarios.
- **Expert Q&A Sessions:** Opportunities to interact with instructors and clarify concepts.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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