Geospatial Tools for FLR Opportunities Analysis

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PRESENTATION OUTLINE

- Importance of restoration opportunities mapping
- Major mapping approaches
- Sources of spatial data for restoration mapping
- Basic tools for restoration mapping

Why restoration mapping?

- Identify major areas of restoration potential within the assessment area.
- Categorize these opportunity areas (e.g. by general type of restoration (wide-scale, mosaic, protective) or by priority (high, medium, low).
- Assess which restoration interventions would be most appropriate for these areas (e.g. agroforestry on steep slopes, natural regeneration of forest land).

Major mapping approaches

- Knowledge mapping
- Digital mapping

Knowledge Mapping (KM)

- Involve analytical workshops for assessment and creating maps manually
- Captures undocumented local and technical insights
- Important when there is limited or no data for criteria and indicators

Key steps for KM

1. Sub-dividing target area into polygons that are characterized by similar types of land use and land-use challenges
2. Specific suitable and feasible restoration opportunities
3. Estimating individual portfolios of restoration interventions by polygon;
4. Gauging the feasibility of implementing these portfolios
5. Reviewing and revising the restoration options; and
6. Digitizing the results.

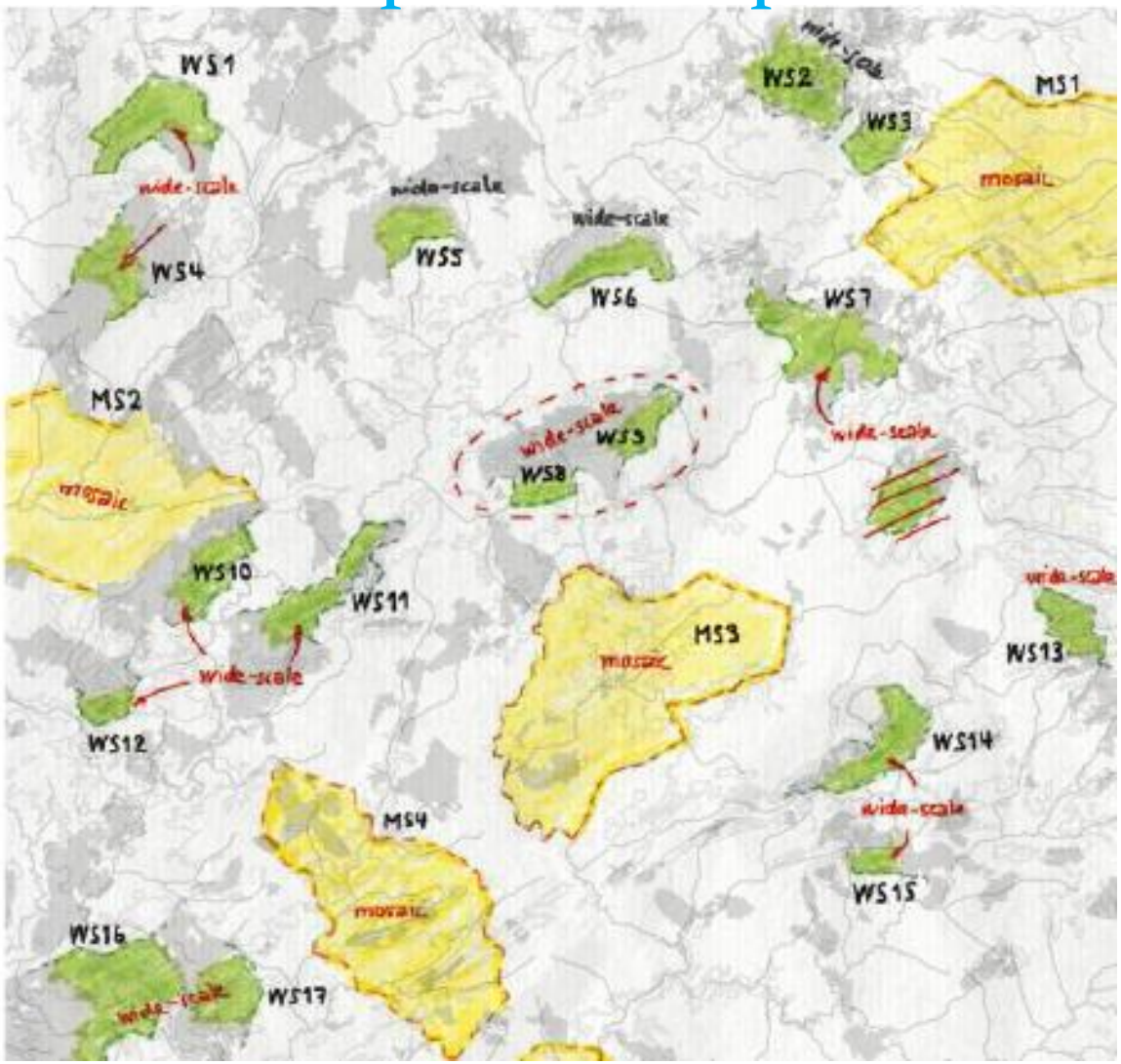
Preliminaries for KM

- A base map of the target area eg. Land degradation map or google earth images
- A scaled quadrant for estimating areas on a map;
- A list of criteria to use in the designation of polygons to different categories of intervention
- A set of polygon description forms
- Any supplementary information (e.g. thematic maps, statistics, reports, etc.

Delineation of restoration opportunities

- Unavailable/unsuitable areas for restoration
- Restoration opportunities for protective functions eg. Steep sloppy areas and water catchment areas
- Wide scale restoration eg. Forestland
- Mosaic type of restoration-land use mix types

An Example of KM product



Digital Mapping

- Uses digital Geographical Information System (GIS) datasets to identify priority sites for restoration
- GIS system creates, manages, analyzes and maps all types of data to create a synthesized information
- Require GIS expert to undertake analysis of spatial data

Critical steps in digital mapping

1) Identification of restoration opportunities
2) Identify data layers to quantify where restoration opportunities exist
3) Sourcing of GIS data sets (Biophysical and social economics)
4) Reclassify GIS datasets into priority categories for restoration (Levels of degradation or fire risk classes)
5) Combine all datasets
6) Apply algorithm for identifying specific restoration opportunities by intervention type.

Sources of data sets for restoration mapping

- National/Local data sets
  - -More accurate and precise
  - -Not readily available
  - -Sometimes may be available but not accessible

- Global data sets
  - -Not very accurate
  - -Readily available
  - -May require processing skills
  - -Calibration by local data normally recommended

Biophysical data

- Soil conditions, rainfall, slope, water quality
- Current land cover, historical land cover, land degradation, deforested trends
- Wildfire occurrence, fire hotspots
- Protected areas, biodiversity hotspots, endangered species ranges,
- Forest species richness, stand density, timber growth data

Social economics data

- Poverty levels, population density, population change in forest adjacent areas, gender issues
- Current land-use, private ranches, community conservation areas, land ownership, community-managed forests
- Infrastructural development e.g. road networks

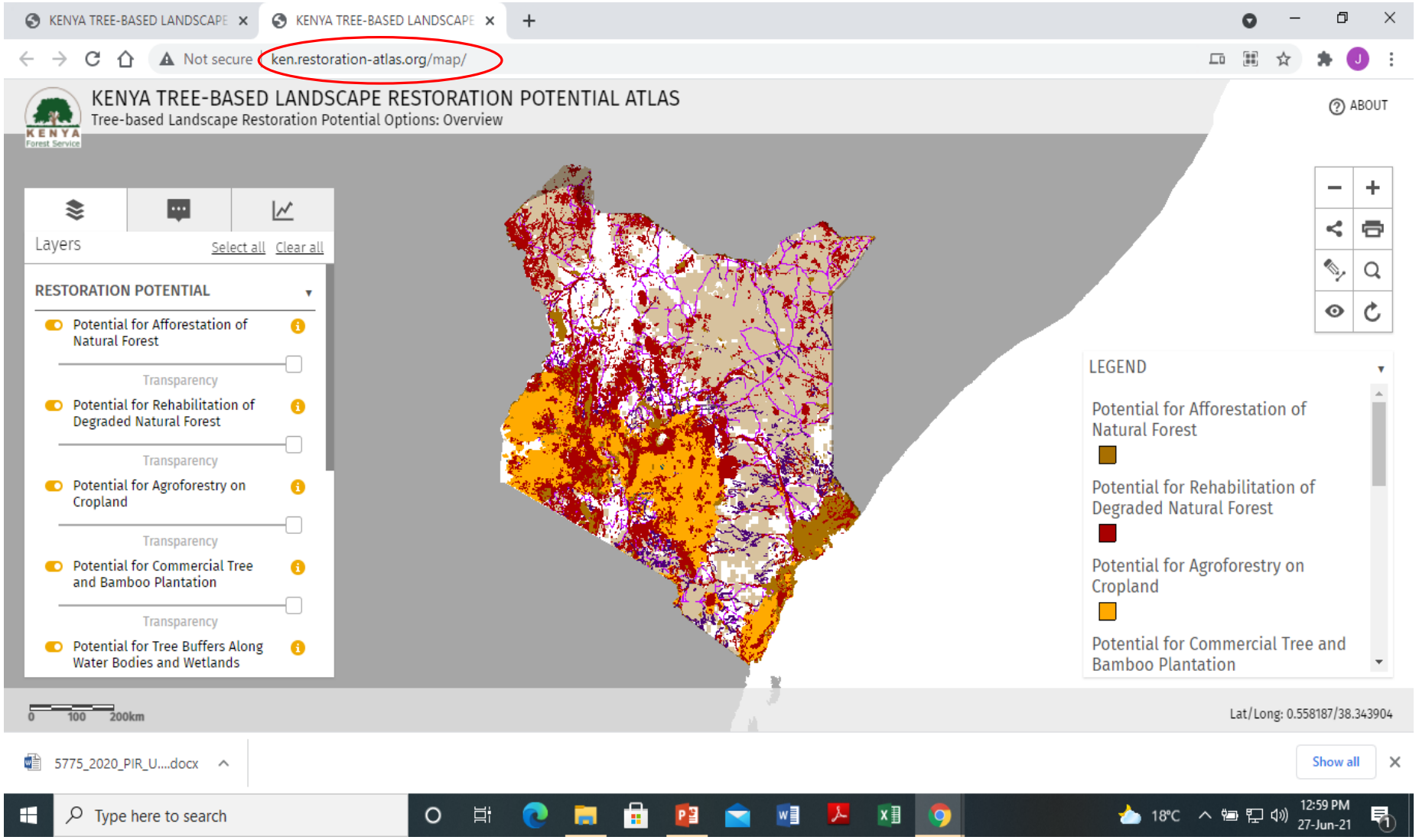
Local sources of spatial Data

- Kenya National Bureau of Statistics- OPEN DATA PORTAL https://knbs.or.ke/visualizations/
- Kenya Open data https://www.opendata.go.ke/
- World Resources Institute https://www.wri.org/data/kenya-gis-data
- African Open Data Networks https://opendatabarometer.org/africa-open-data-network-lab/
- Regional Center for Mapping Resources for Development https://www.rcmrd.org

Local sources of spatial data….

- Kenya Forest Service
  https://landportal.org/book/datasets
  http://ken.restoration-atlas.org/map

- System for Land Based Emissions Estimation in Kenya (SLEEK) On-going development
- Kenya Forestry Research Institute; Knowledge Management Portal- An overview to be presented in this training
- Kenya Meolological Department (KMD)- At a cost


KENYA TREE-BASED LANDSCAPE
KENYA TREE-BASED LANDSCAPE
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ken.restoration-atlas.org/map/
KENYA TREE-BASED LANDSCAPE RESTORATION POTENTIAL ATLAS
Tree-based Landscape Restoration Potential Options: Overview
ABOUT
Layers
Select all
Clear all
RESTORATION POTENTIAL
Potential for Afforestation of Natural Forest
Transparency
Potential for Rehabilitation of Degraded Natural Forest
Transparency
Potential for Agroforestry on Cropland
Transparency
Potential for Commercial Tree and Bamboo Plantation
Transparency
Potential for Tree Buffers Along Water Bodies and Wetlands
LEGEND
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Potential for Rehabilitation of Degraded Natural Forest
Potential for Agroforestry on Cropland
Potential for Commercial Tree and Bamboo Plantation
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Global sources of spatial data

- Global Forest Watch- degradation, emissions, biomass, land cover changes

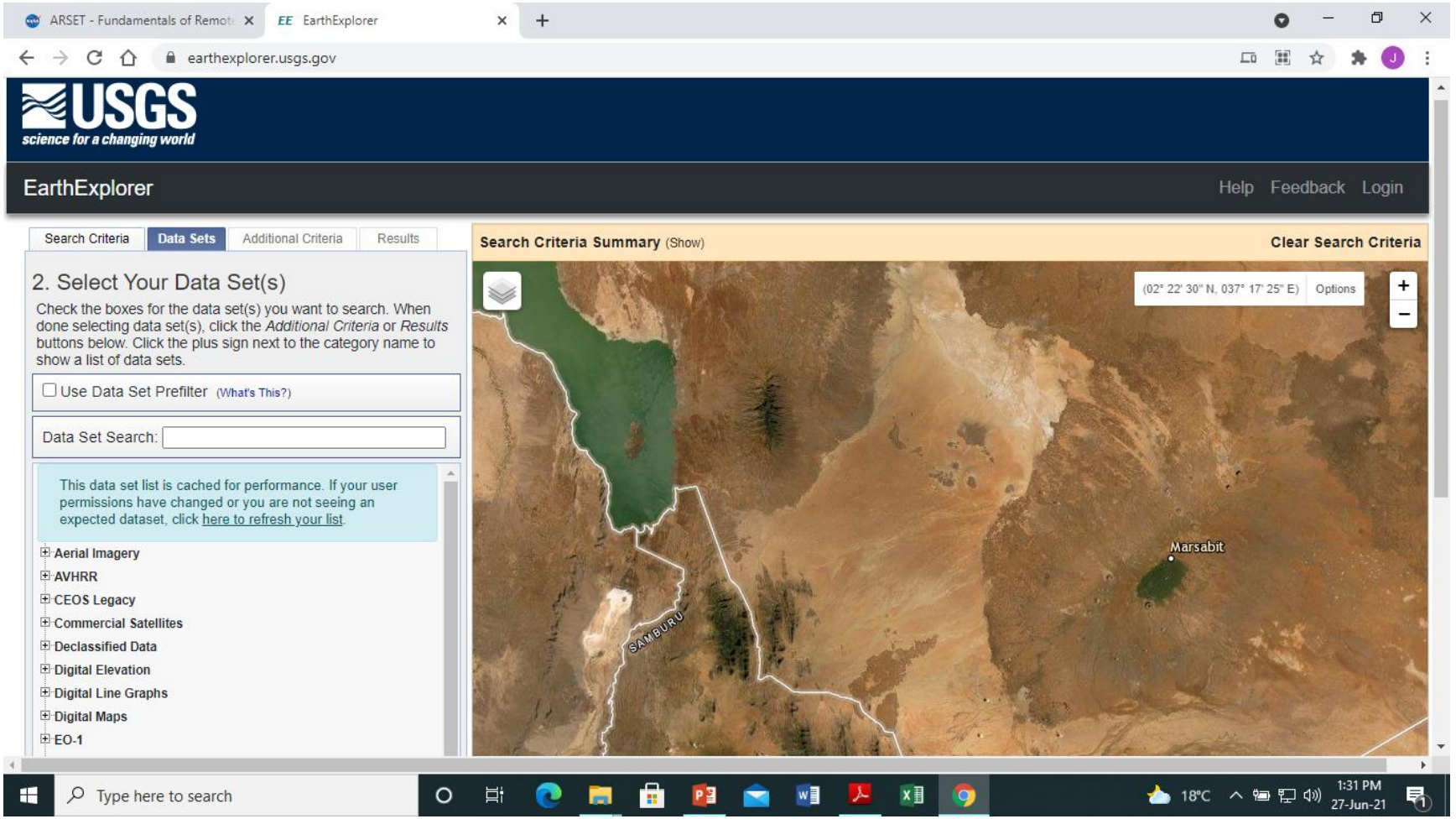
https://data.globalforestwatch.org/documents/120dce192e754c8084f61eee6a2d9edf/about

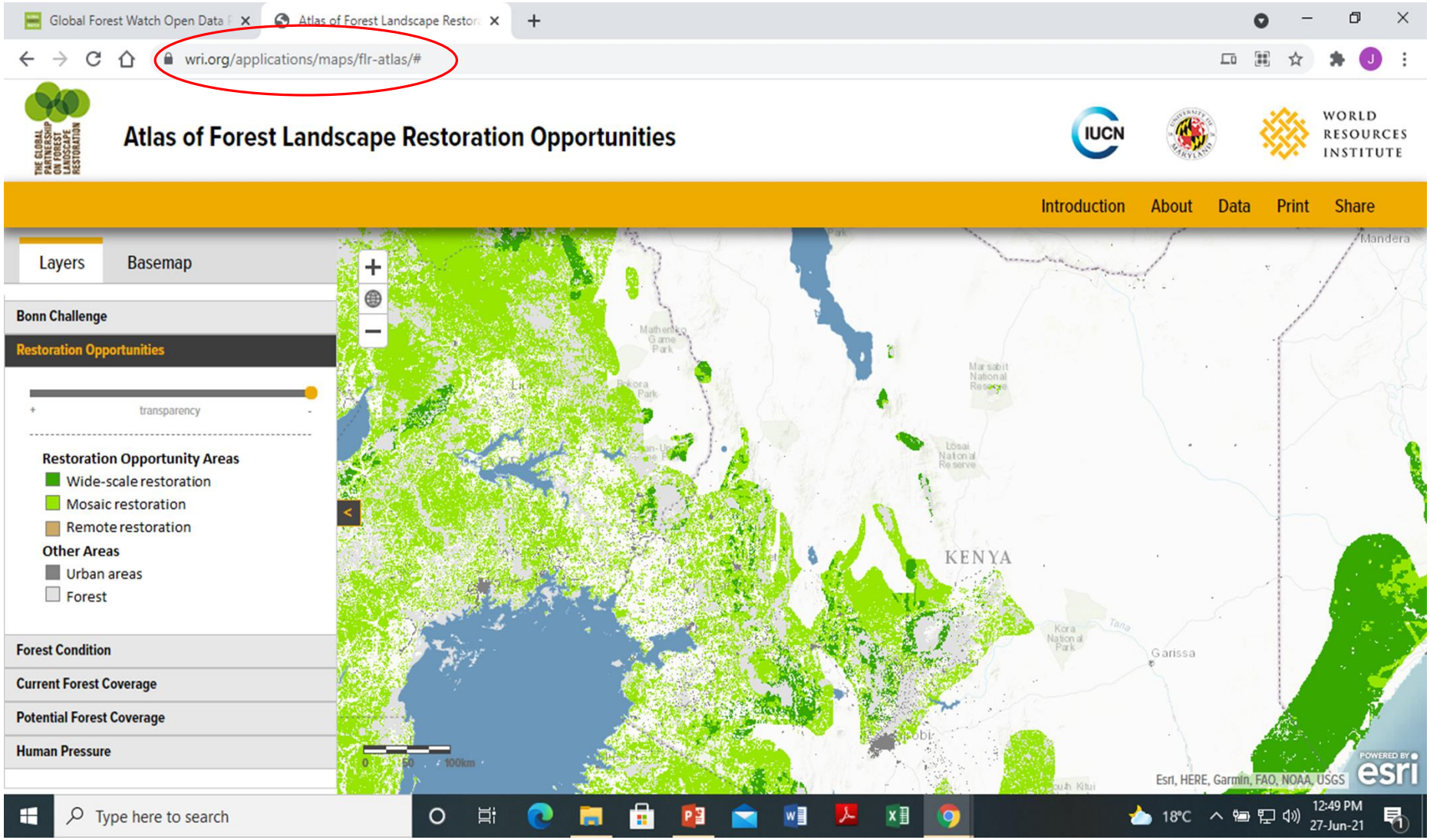
- Forest Landscape restoration opportunities- WRI

https://www.wri.org/applications/maps/flr-atlas/#

Global sources of spatial data

- Satellite images https://earthexplorer.usgs.gov/




Global Forest Watch Open Data
Atlas of Forest Landscape Restor
wri.org/applications/maps/flr-atlas/#
Atlas of Forest Landscape Restoration Opportunities
THE GLOBAL PARTNERSHIP ON FOREST LANDSCAPE RESTORATION
IUCN
WORLD RESOURCES INSTITUTE
Introduction
About
Data
Print
Share
Layers
Basemap
Bonn Challenge
Restoration Opportunities
transparency
Restoration Opportunity Areas
Wide-scale restoration
Mosaic restoration
Remote restoration
Other Areas
Urban areas
Forest
Forest Condition
Current Forest Coverage
Potential Forest Coverage
Human Pressure
KENYA
Mandera
Garissa
Esri, HERE, Garmin, FAO, NOAA, USGS
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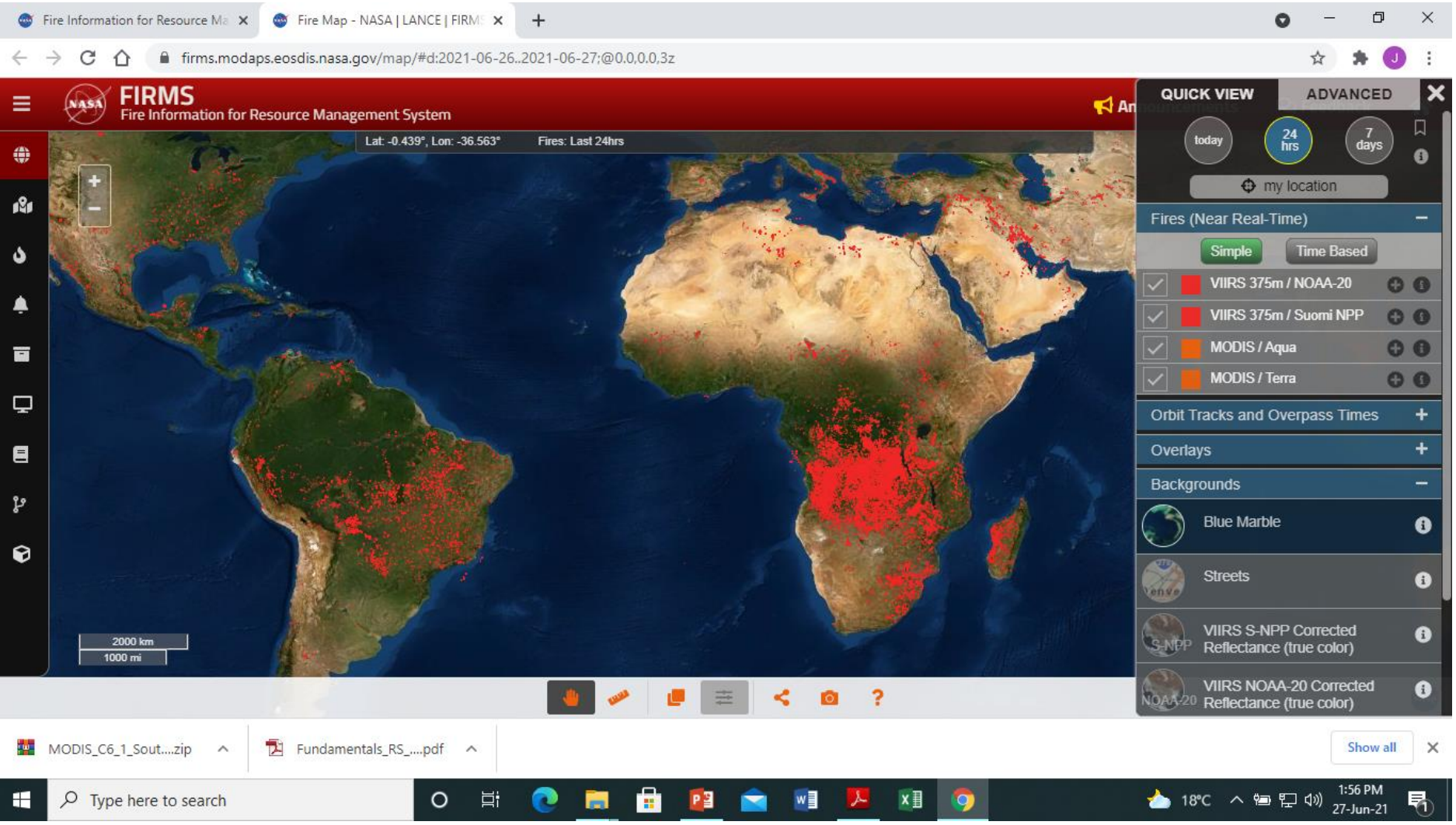
Fire Information for Resource Management System (FIRMS)

https://earthdata.nasa.gov/earth-observation-data/near-real-time/firms



Climate engine-web application

- On-Demand Cloud Computing and Visualization of Climate and Remote Sensing Data

http://climateengine.org/

- Comprehensive set of variables that provide early warning indicators of climate impacts such as drought monitoring, agriculture& ecosystems and wildfire

- Spatial and temporal analysis

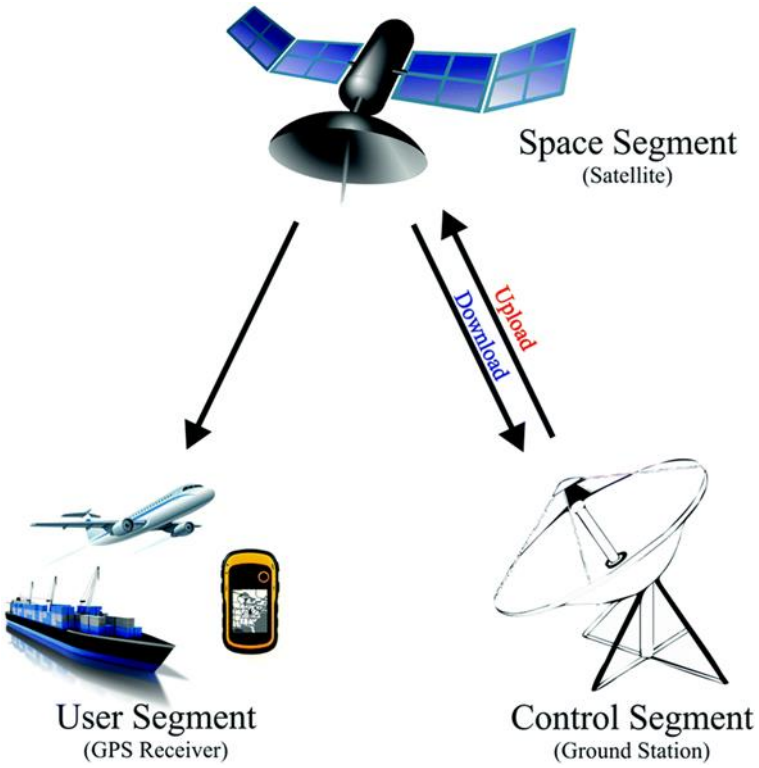
Just an example

Basic tools for restoration mapping

1)Global Positioning System

- Navigation system using satellites, a receiver and algorithms to synchronize location, velocity and time data for air, sea and land travel
- Consist of the space segment, the control segment, and the user segment
- Gives 3 D data namely: latitudes, longitudes and altitude

The principle



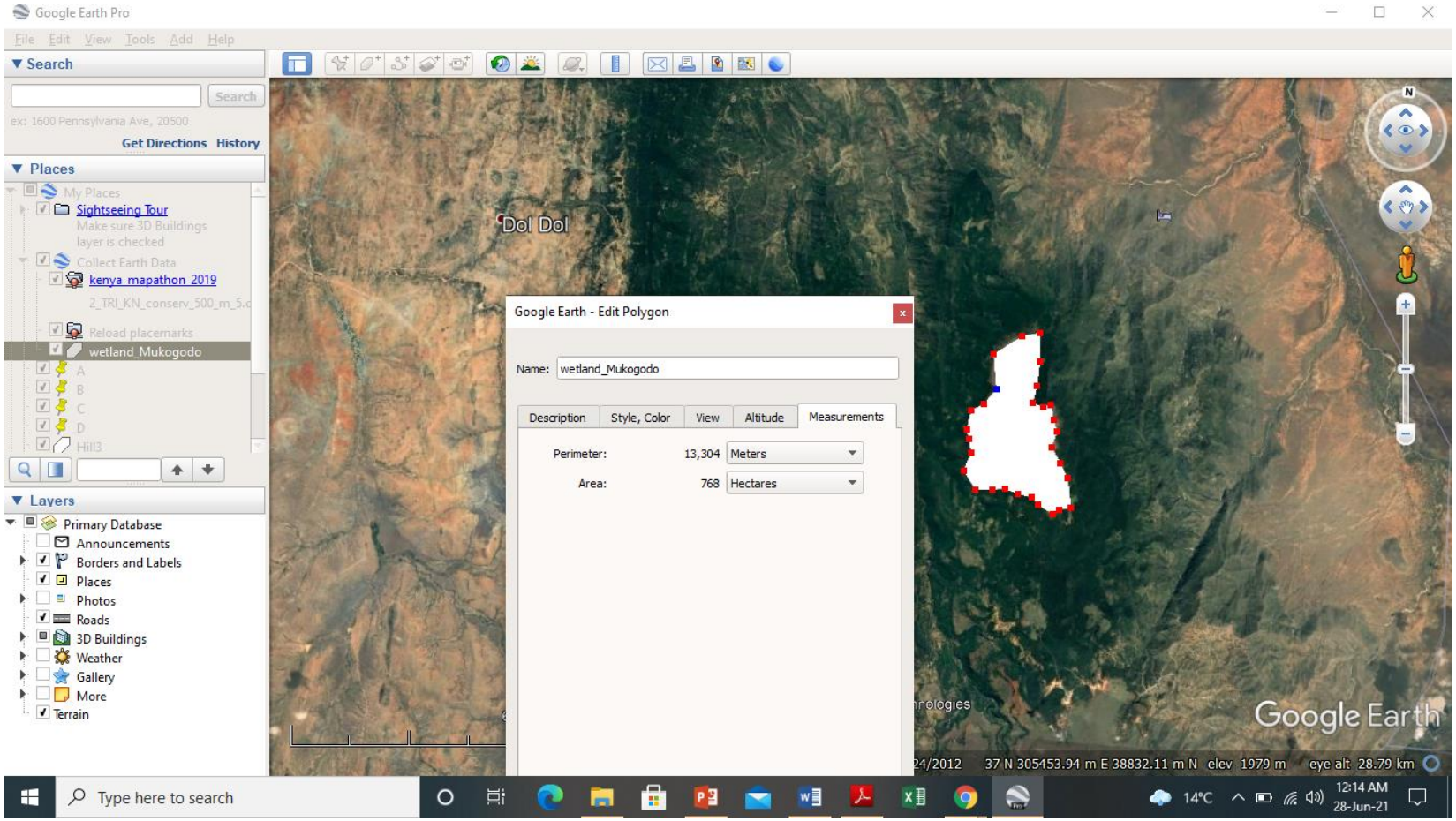
Types of GPS

Basic tools for restoration mapping…

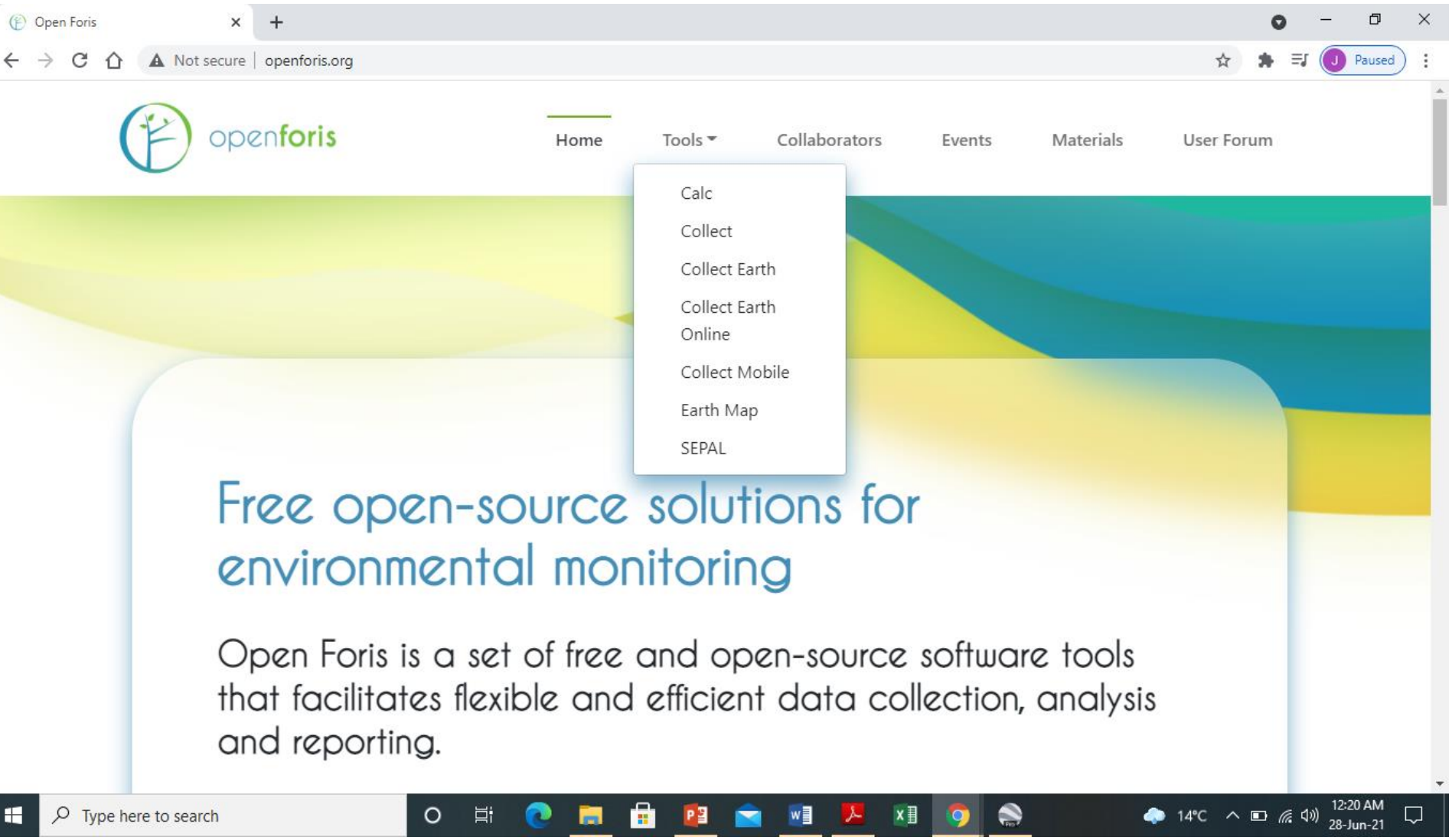
2) Google Earth; Google earth Pro; Google earth engine

- Computer program that renders a 3D representation of Earth based primarily on satellite imagery
- The program maps the earth by superimposing satellite images, aerial photography, and GIS data
- Google Earth now covers more than 98 percent of the world
- A good tool for creating stratification areas and calculating area of restoration

Basic tools for restoration mapping.....



3) FAO Open Foris tools



Open Foris

Not secure | openforis.org

Paused

Arena

Coming soon

Collect

Easy and flexible survey design and data management

Collect Mobile

Intuitive data collection and validation in the field

Calc

Efficient and collaborative data analysis and results dissemination

Collect Earth

Easy and flexible survey design and data management

Collect Earth Online

Online Land Monitoring tool for crowd-sourcing of augmented visually interpreted data

Earth Map

The power of Google Earth Engine without coding. A user friendly tool for complex land monitoring

SEPAL

System for earth observation, data access, processing, analysis for land monitoring

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4) GIS sofwares-Open sofwares

QGIS

https://qgis.org/en/site/forusers/download.html

GRASS GIS – Geospatial data management, vector and raster manipulation - developed by the U.S. Army Corps of Engineers

SAGA GIS (System for Automated Geoscientific Analysis) – Tools for environmental modeling, terrain analysis, and 3D mapping

GIS sofwares-Commercial

- ENVI – image analysis, exploitation, and hyperspectral analysis
- ERDAS IMAGINE –image analysis, exploitation, and hyperspectral analysis
- ArcMap/ArcGIS
- MapInfo

Questions, comments, consultancies

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