

# Open Foris Initiative

Free and Open Source Tools and Methods for  
Data Collection, Analysis and Reporting

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FAO-FIN Forestry Team

Adapted by Adam Gerrand for presentation

GIZ inventory workshop Jakarta 17/3/2016



openforis is a suite of 5 tools to help you collect and process forest plot and image data



Collect



Collect  
Mobile



Collect  
Earth



Calc

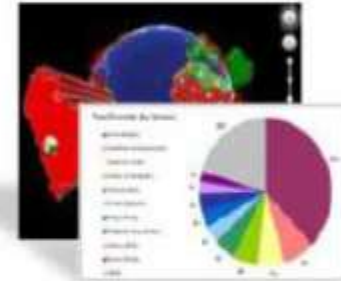
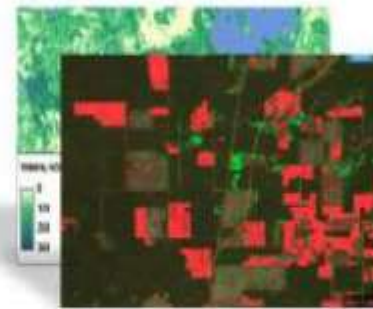
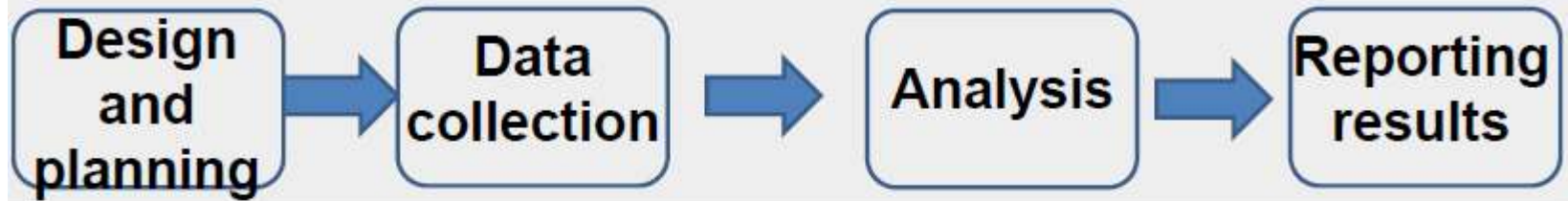


Geospatial  
Toolkit



openforis

# Using Open Foris tools



Open Foris Tools



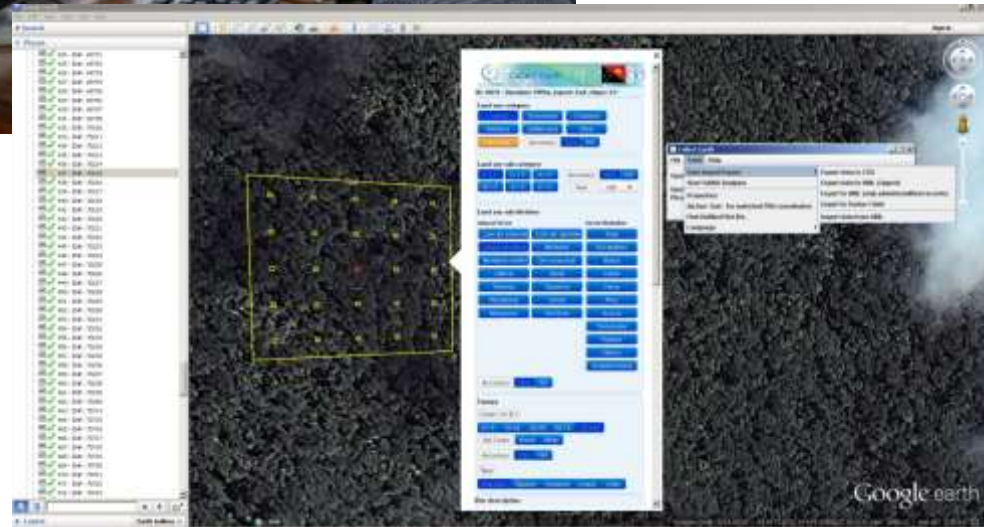


# Collect tool

For Office



For field use



## ➤ For Office

Collect desktop is a flexible tool for office or field camp based inventory data entry. Customizable validation rules minimize data entry errors and feedback reports help to identify potential problems.

## ➤ For Field

Collect Mobile is an easy to use Collect client for mobile Android devices. Entering the data already in the field can significantly improve the quality of the data and reduce time needed for data cleansing.

## ➤ For Fast Delivery

Collect Earth is an interactive image interpretation tool which uses Google Earth interface. Collect Earth allows you to collect land cover and land use information in the fastest possible way and with minimum GIS experience.



## Main Features

- Easy-to-use interface for complex surveys
- Survey designer
  - From scratch/using template
  - Validation rules – checks your data in the field to reduce mistakes
- Data entry interface generated automatically
- Standard workflow: entry, cleansing, analysis
- Server / desktop



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LC classes, admin regions, main regions, ..  
Species lists % sites



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COLLECT

**Survey Designer**

Survey language: English

Record type: cluster

Form version: [ ]

Preview Export summary

**Definitions**

View mode: Entry Form

- Cluster
  - cluster\_no
  - cluster\_accessibility
  - cluster\_starting\_position
- time\_study
- cluster\_remarks
- Plot

**Number attribute** Path: /cluster/cluster\_no

**General**

Name: cluster\_no

Is key?:

Type:  Integer  Real

Calculated:

Multiple:

Required:

Relevant expression: [ ] Hide when not relevant:

**Units of measurement:**

Is default?	Unit	Decimal digits

**Labels and description**

Single instance (en): Cluster No.

List heading (en): [ ]

Field number (en): [ ]

General info



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COLLECT MOBILE





## Collect Mobile - Main Features

- Field-data collection using Collect survey
- On-the-fly validation
- Export collected data to Collect Desktop
- Android 4+ phones and tablets



# Objectives

- Support large, complex, surveys
- Simple and efficient to use
- Optimize for field use
- Use device camera and GPS
- Focus on data quality
- **Data safety** – some advantages over paper, but also some risks

- Validation in the field
- Integrated code and species lists
- Easy backups
- Saves typing in handwritten forms



Show CollectEarth video (8 minutes)

[https://www.youtube.com/watch?v=FxOCck\\_c5CU](https://www.youtube.com/watch?v=FxOCck_c5CU)



Visual interpretation tool for land use/cover classification



COLLECT EARTH

Google earth engine  
a google.org project

Google fusion tables  
beta

bing™ maps

SAIKU 

CUTTING EDGE OPEN SOURCE ANALYTICS

 PostgreSQL

 SQLite

11000101010  
0101000011110101  
10101110011010110101  
10101110111011  
000111101010011  
11011101010110101  
0001010101110011110  
0101000011110101001101  
001101011010100101  
00001101011  
000011110101  
111010101

Google Earth

File Edit View Tools Add Help

Search

Places

- My Places
- Temporary Places
- Collect Earth Data
  - Ghana lulucf ipcc
    - 8x8\_Ashanti.ced
      - 1 - ID#: 173374
      - 2 - ID#: 177214
      - 3 - ID#: 177222
      - 4 - ID#: 177254
      - 5 - ID#: 177262
      - 6 - ID#: 177286
      - 7 - ID#: 180998
      - 8 - ID#: 181006
      - 9 - ID#: 181014
      - 10 - ID#: 181062
      - 11 - ID#: 181070
      - 12 - ID#: 181078
      - 13 - ID#: 181086
      - 14 - ID#: 181094
      - 15 - ID#: 181102
      - 16 - ID#: 181110
      - 17 - ID#: 181118
      - 18 - ID#: 181126
      - 19 - ID#: 181134
      - 20 - ID#: 184846
      - 21 - ID#: 184854
      - 22 - ID#: 184862
      - 23 - ID#: 184870
      - 24 - ID#: 184894
      - 25 - ID#: 184902
      - 26 - ID#: 184910
      - 27 - ID#: 184918
      - 28 - ID#: 184926



openforis COLLECT EARTH

GHANA

ID: 173374 - Elevation: 145m, Aspect: 288°, Slope: 0°

Land use category

Forest	Grassland	Cropland
Wetland	Settlement	Other
No Data	Accuracy	YES NO

Land use sub-category

F > F	C > F	Accuracy	YES NO
G > F	W > F	Year	N/A
S > F	O > F		

Land use sub-division

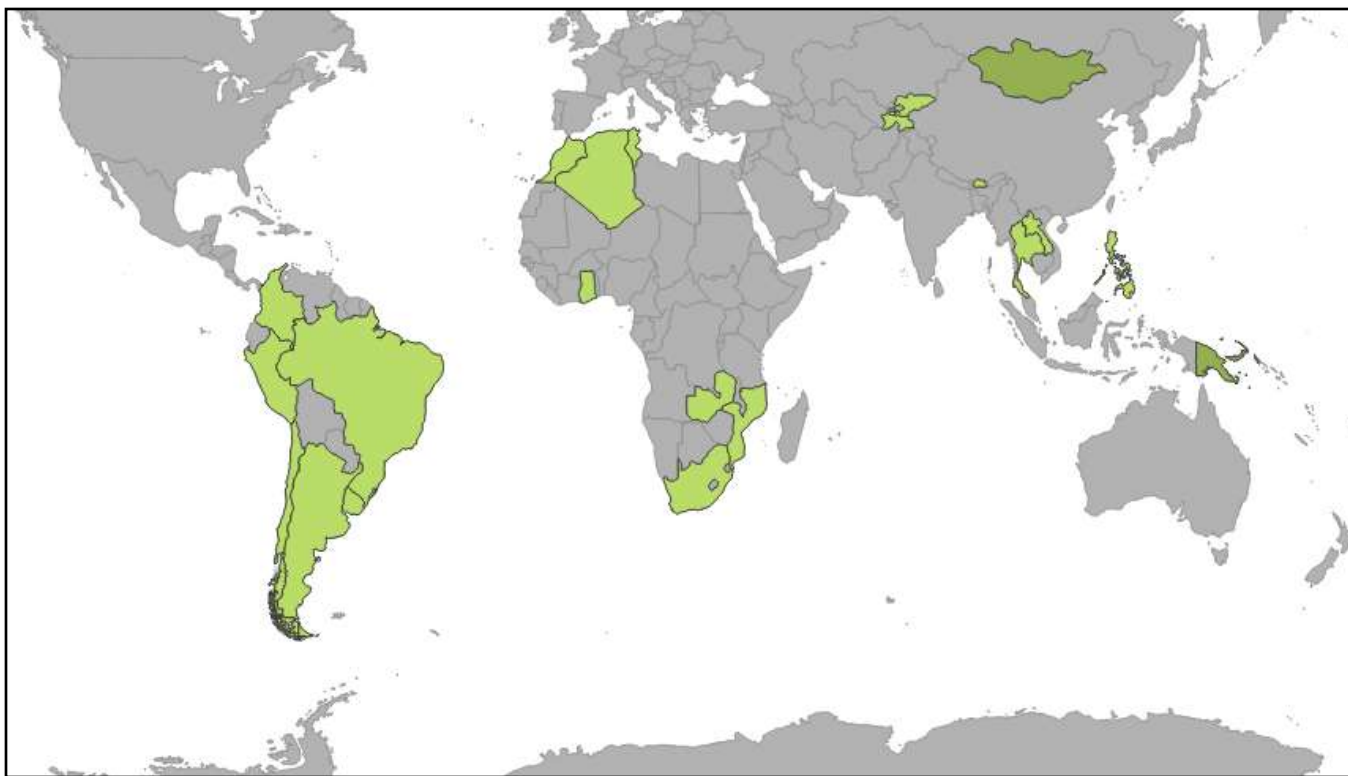
Natural Forest

Wet Evergreen	Moist Evergreen
Moist semi-deciduous	Dry semi-deciduous
Upland Evergreen	Southern Marginal



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# Widely used: 21+ countries



ICI BMU funded: Algeria, Argentina, Bhutan, Brazil (implementing partner), Chile, Colombia, Ghana, Kyrgyzstan, Lao People's Democratic Republic, Morocco, Mozambique, Peru, Philippines, South Africa, Tajikistan, Thailand, Tunisia, Uruguay, Zambia

Norway funded: Mongolia, Papua New Guinea



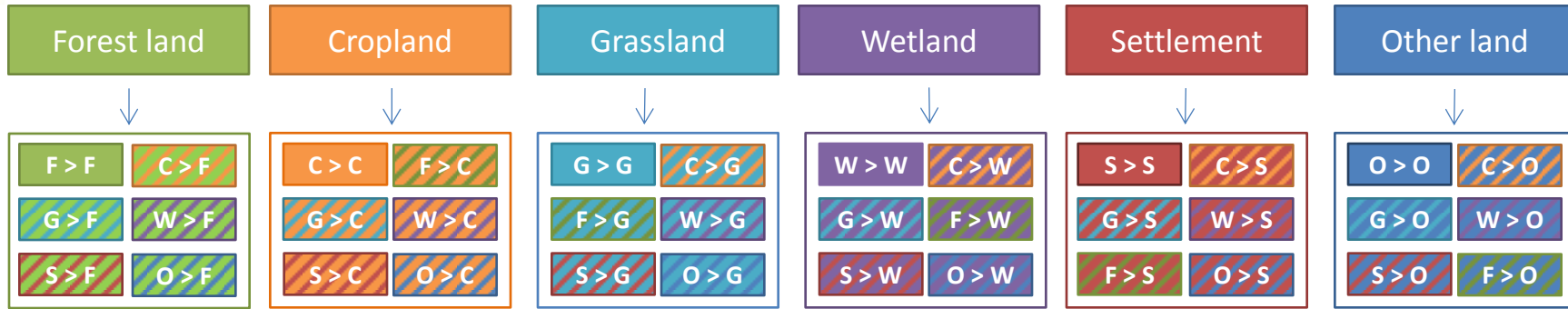




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# Ghana LU scheme

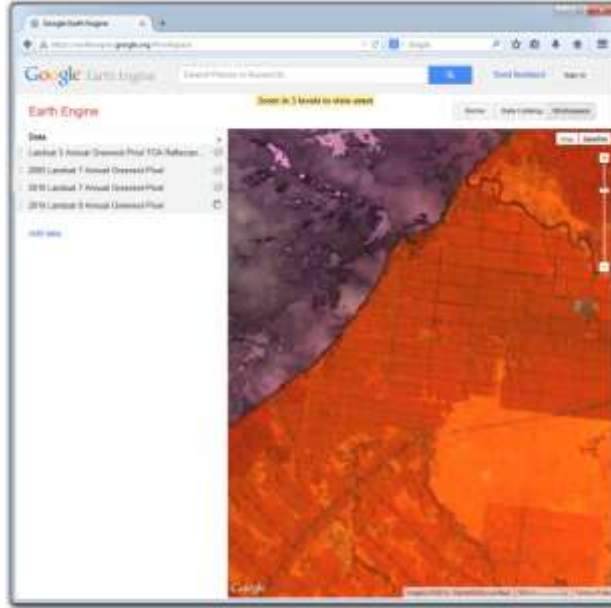
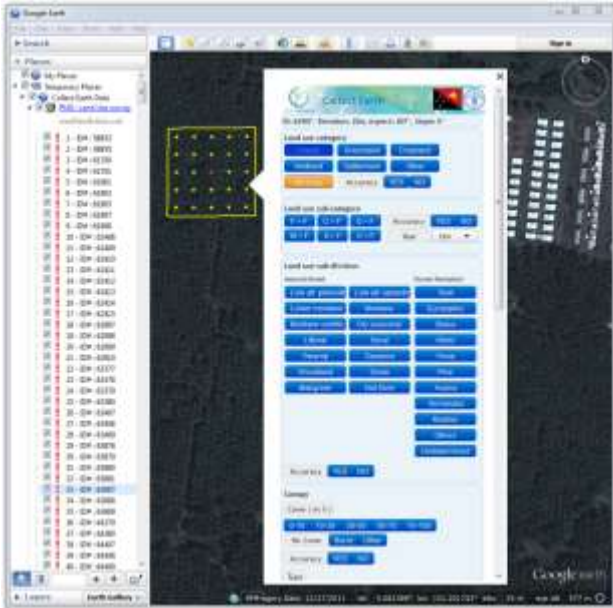
IPCC  
LU



National land use  
sub-divisions



# Geo-synchronized





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# Easy data analysis and charts

Saiku - Next Generation

127.0.0.1:8181

Unsaved query (1)

Cubes

- Select a cube
- Select a cube
- CollectEarth (collectEarth)
- Plot

Measures

Columns: Category

Rows: Region

Filter:

Mode:

Legend: CENTRAL, CHIMBU, EAST NEW BRITAIN, EAST SEPIK

Settlement

Grassland

Forest

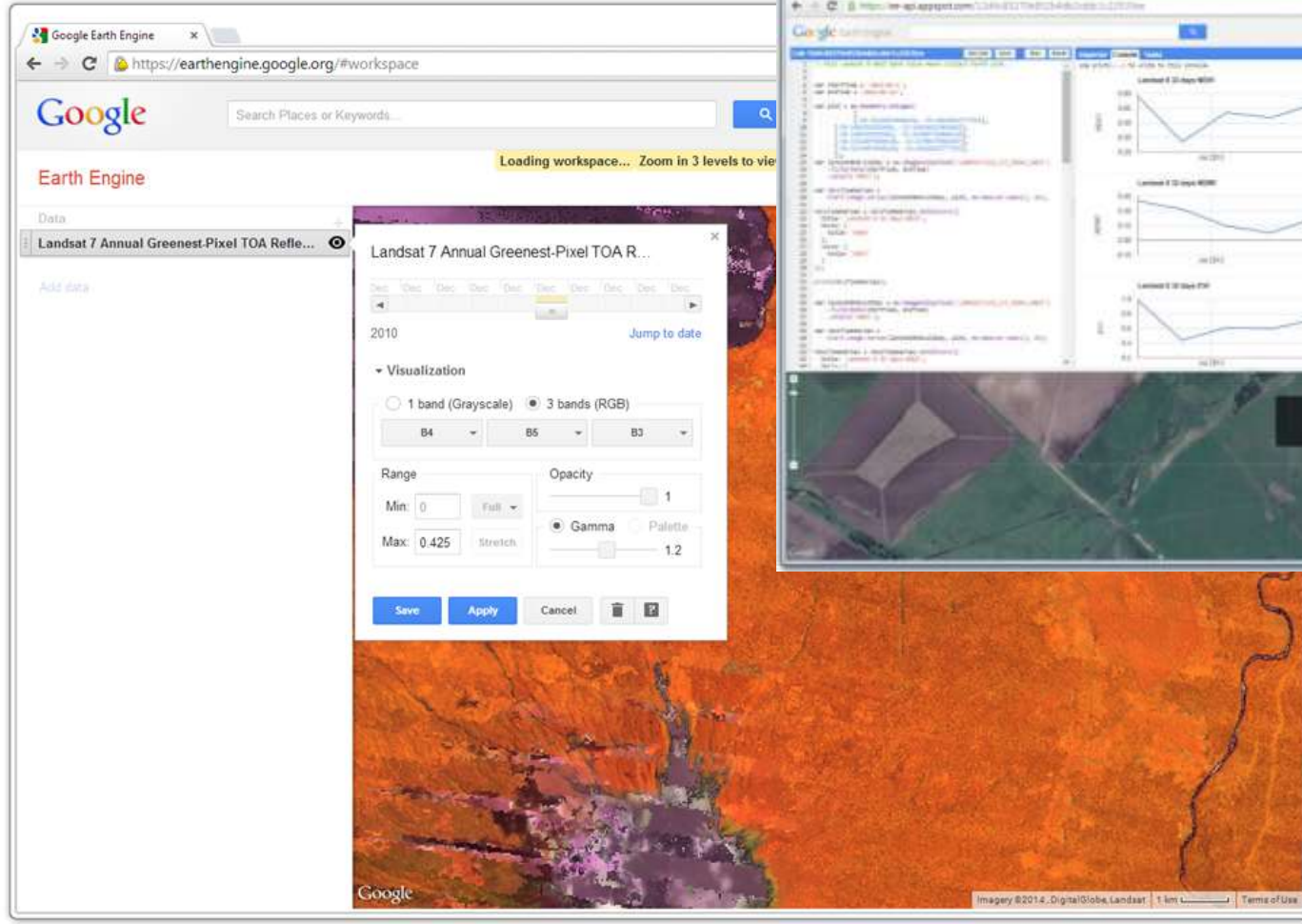
	37	125	1	4		15
Jiwaka	125	1	4			15
MADANG	198	9	3	1	3	28
MANUS	65	5	1		4	12
MILNE BAY	90	11	5		8	30
MOROBE	237	14	2	2	1	32
NEW IRELAND	34	1			1	10
NORTH SOLOMONS	66					8



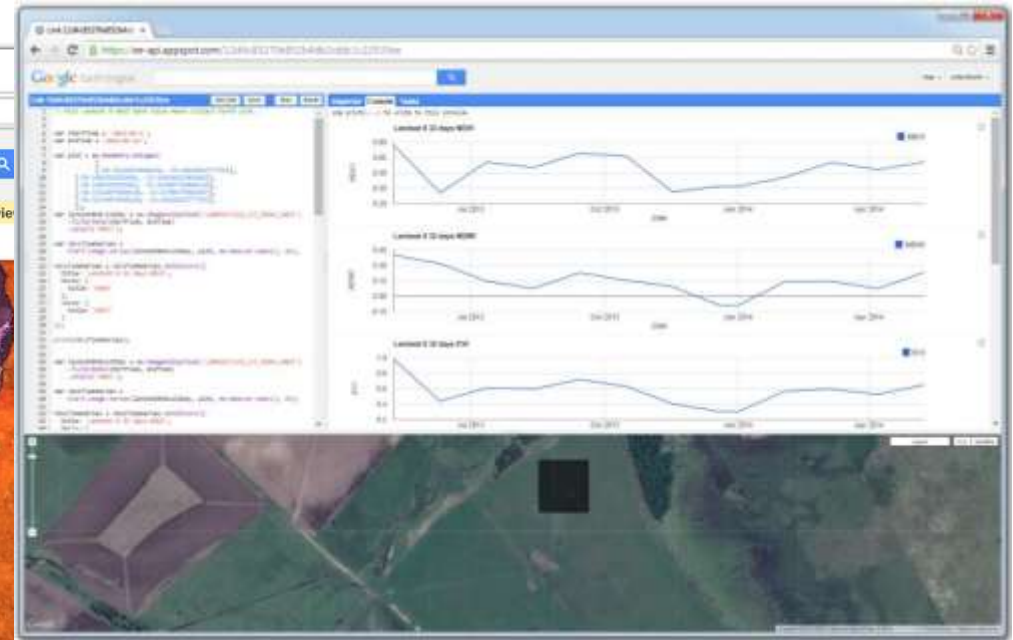
# Advanced features

With Google Earth Engine  
e.g. LANDSAT greenest pixel

e.g. analysis of NDVI or EVI over time



The screenshot shows the Google Earth Engine workspace. A panel titled "Landsat 7 Annual Greenest-Pixel TOA R..." is open, displaying a satellite image of a landscape. The panel includes a "Data" section with "Add data" and "Landsat 7 Annual Greenest-Pixel TOA R..." listed. Below this is a "Visualization" section with options for "1 band (Grayscale)" and "3 bands (RGB)". The "3 bands (RGB)" option is selected, with bands B4, B5, and B3 chosen. The "Range" section shows "Min: 0" and "Max: 0.425" with a "Full" dropdown and a "Stretch" button. The "Opacity" section shows a slider set to 1 and a "Gamma" button. At the bottom of the panel are "Save", "Apply", "Cancel", and help icons. The main workspace shows a satellite image of a landscape with a black square indicating the selected area. The bottom of the workspace shows "Imagery ©2014, DigitalGlobe, Landsat" and a "1 km" scale bar.



# Example of using Collect-Earth

## Forest and land use in PNG 2013,

## Gewa Gamoga

<http://www.fao.org/about/meetings/asia-pacific-forestry-week/streams/stream-2-programme/en/>



Food and Agriculture Organization  
of the United Nations

Google™ Custom Search

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English

## Asia-Pacific Forestry Week



[Programme](#)

[Get involved](#)

[News](#)

[Streams](#)

[FAQs](#)

[Posters](#)

[Champions](#)

[Photo contest](#)

[Cartoon contest](#)

[Poem contest](#)

[Stream 1 programme](#)

[Stream 2 programme](#)

[Stream 3 programme](#)

[Stream 4 programme](#)



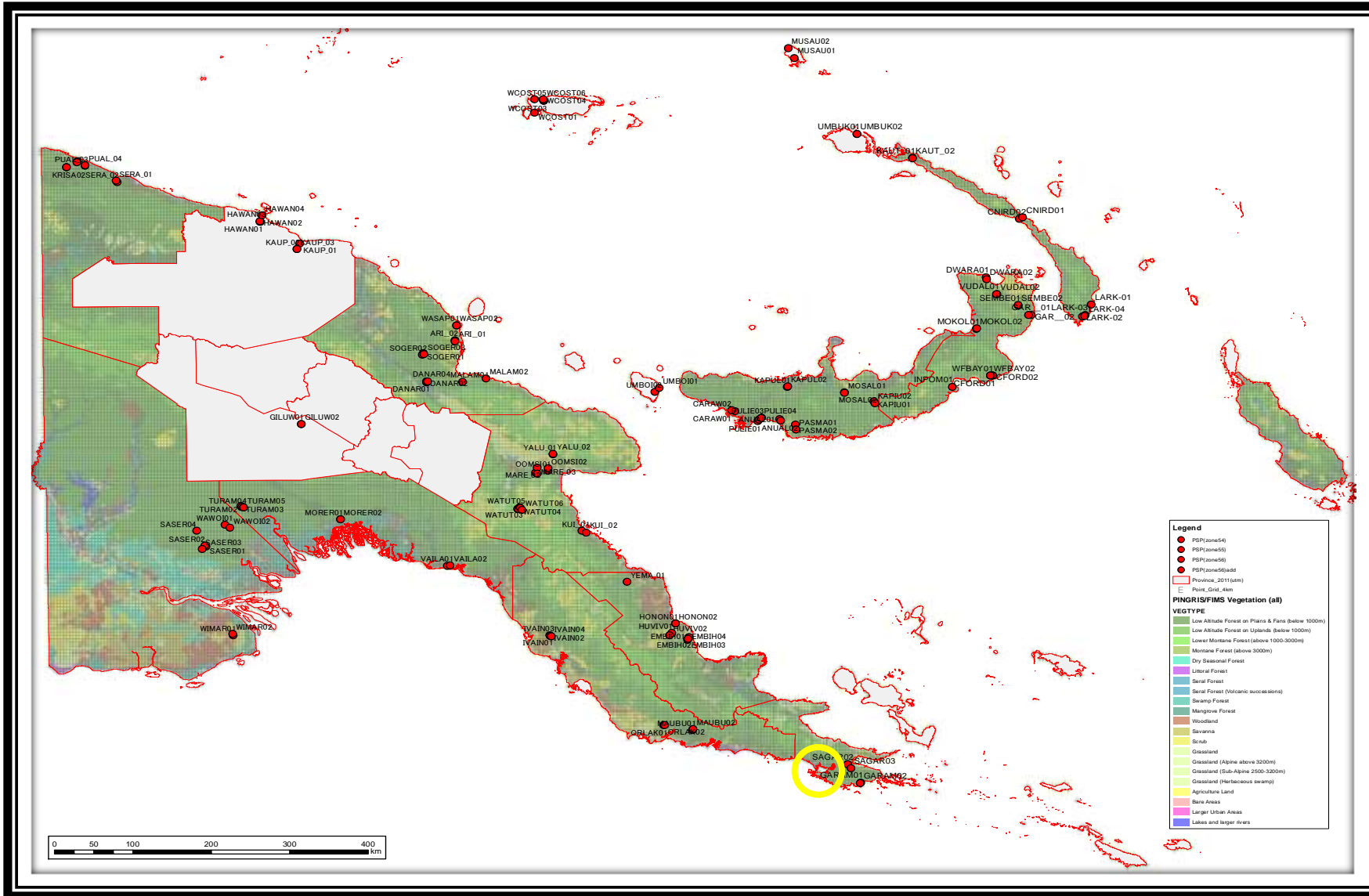
Stream 2: Tackling climate change - challenges and opportunities

Draft programme

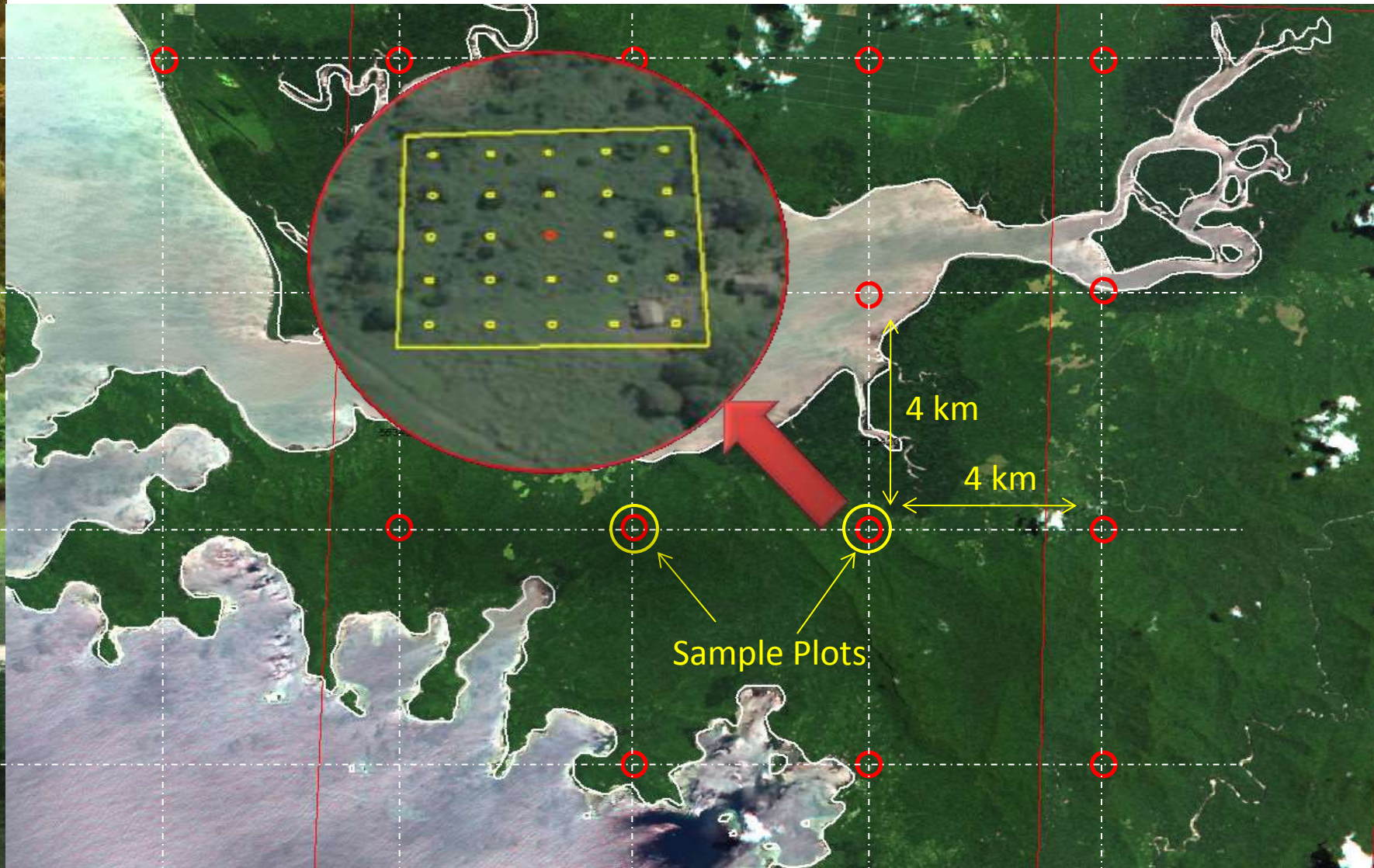
[print version Vers. 16 Feb]



# 4x4 km systematic grid over all PNG - 25,279 "plots"



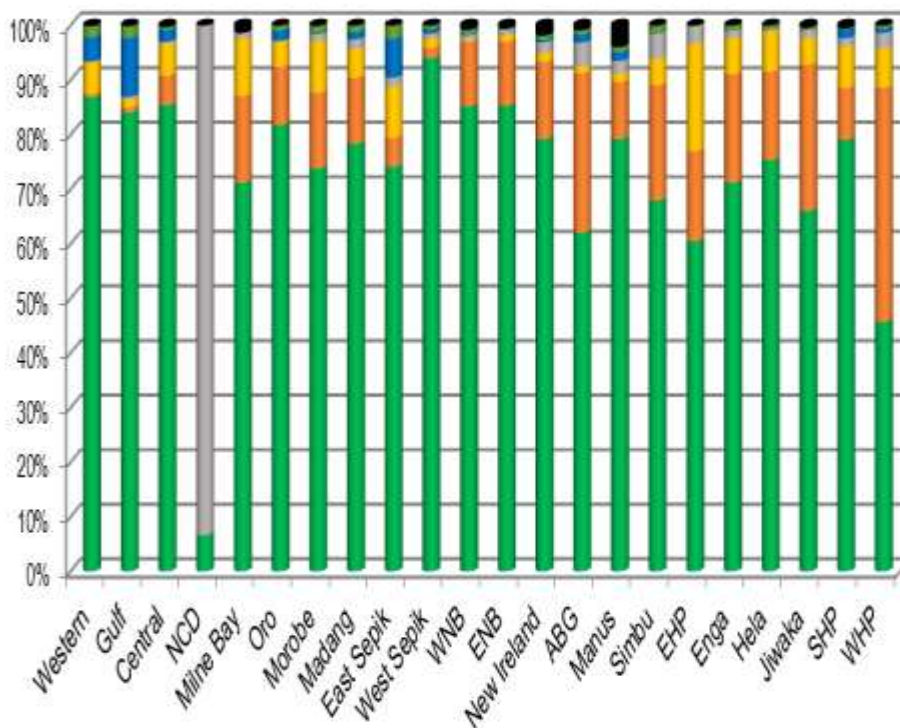
# Landscape detail of Rapid Eye image coverage with sample plots distribution



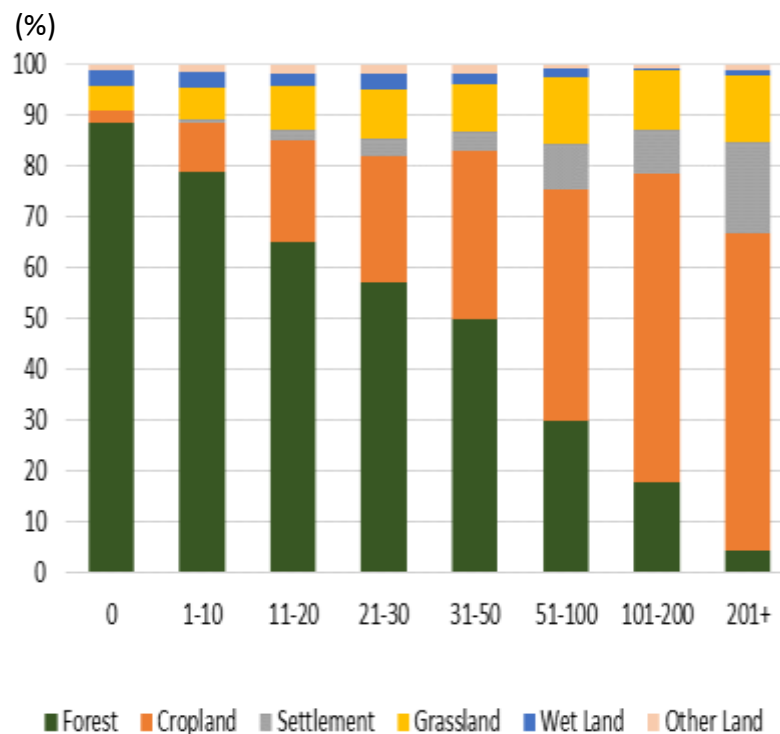
# Results: Land use in Provinces

1. More cropland in WHP & ABG
2. Subsistence Agriculture is common in all provinces except WNB where Palm Oil is prevalent

1. There is strong correlation between the proportions of land use and population density.
2. With increase of population density;
  - settlement & cropland increase
  - forest decrease



Land use composition in each province in PNG.

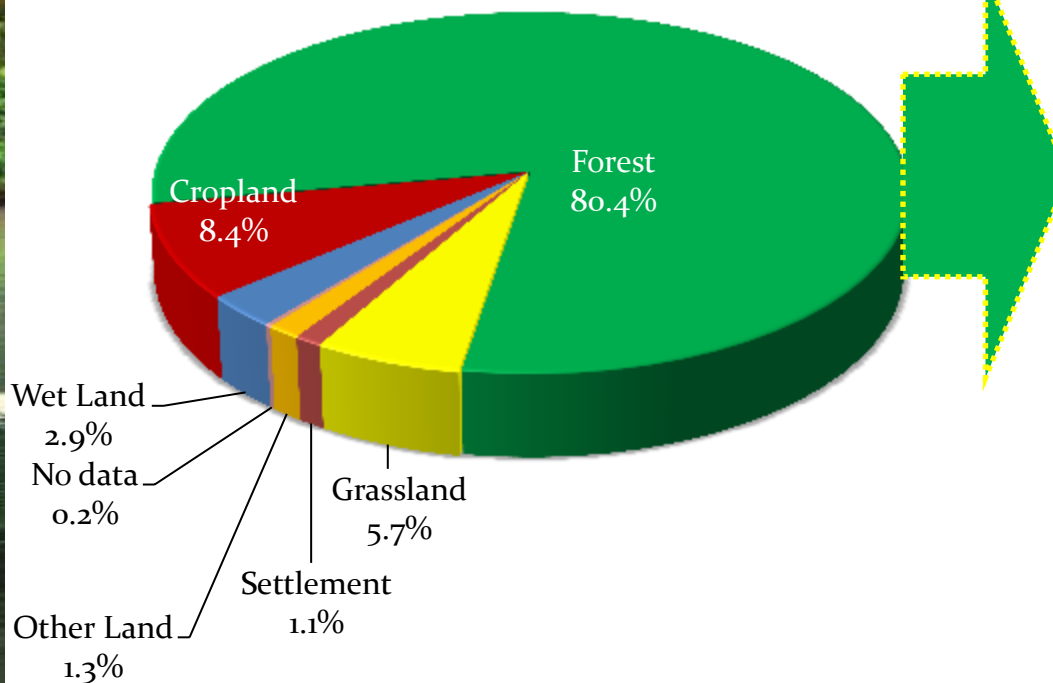




# Key Message

## PNG now has the capacity to monitor:

1. PNG's Forest, Land Use & Land Use Change
2. REDD+ activities



This information is useful for:

1. Policy & Measures
2. Forest Stratification for future NFI
3. REL/RL



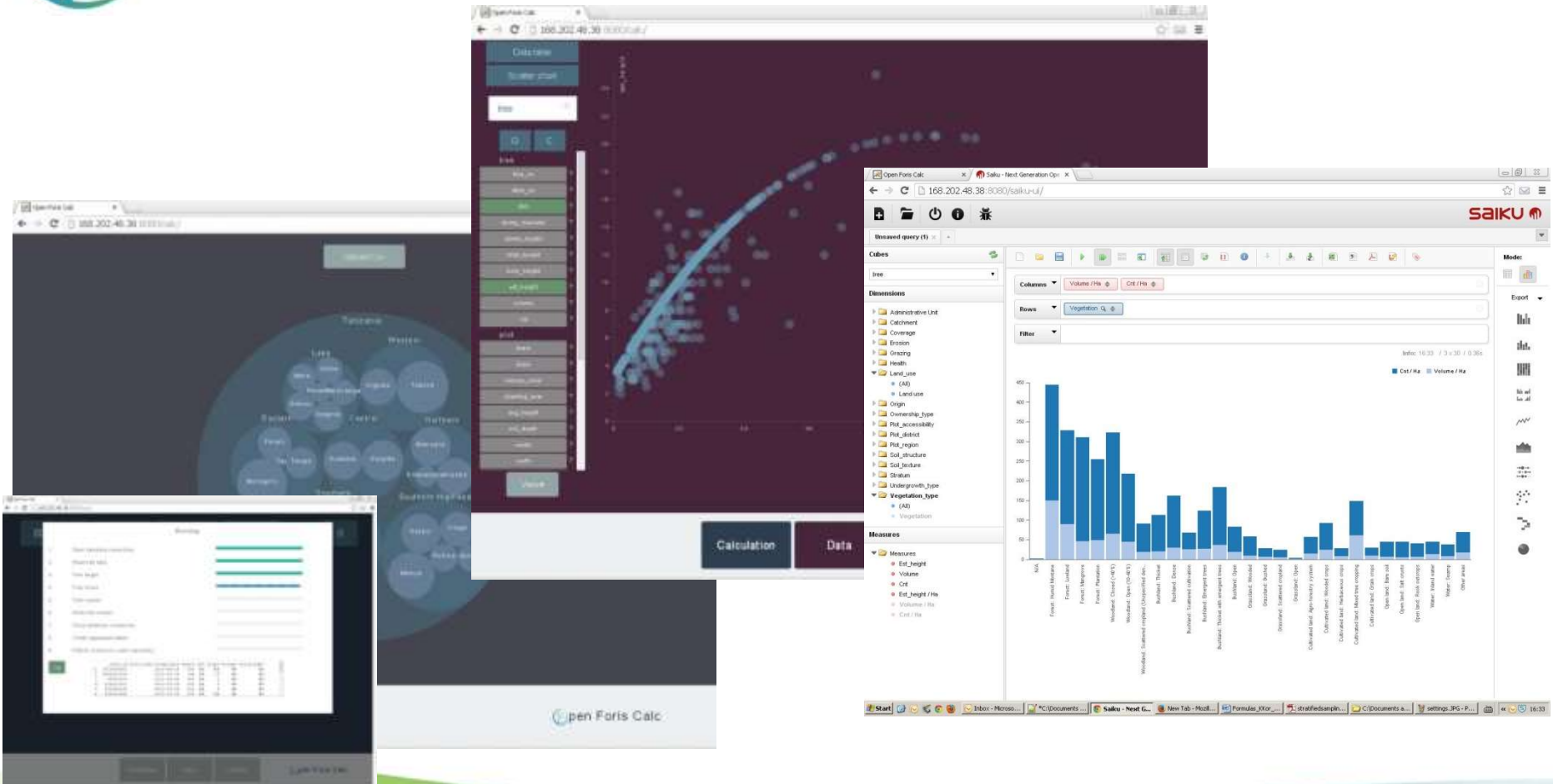
# openforis CALC



11000101010  
00101000011110101  
11010111001101011010  
1101011010111011  
110000111101010011  
1100111001110101011010  
110001010101110011110  
00101000011110101001101  
001101011010100101  
11010001101011  
000011110101  
111010101



# openforis Calc



## Easy Import

Calc is a fully customizable tool for facilitated data analysis. You can import data directly from Collect, import external equations and build complex processing chains.



## For experts and end-users

Calc is designed for both experts and end-users. Whereas the experts can build the processing chains, end users can just hit play and repeat the calculation processes.



## Reporting

Calc results can be presented using Saiku Analytics. This allows easy reporting and presenting the results in both tabular and graphical form.





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# Easy data analysis and charts

Open Foris Calc x Saku - Next Generation Op... x

168.202.48.38:8080/saiku-ui/

SAIKU

Unsaved query (1) x

Cubes: tree

Dimensions:

- Administrative Unit
- Catchment
- Coverage
- Erosion
- Grazing
- Health
- Land\_use
  - (All)
  - Land use
- Origin
- Ownership\_type
- Plot\_accessibility
- Plot\_district
- Plot\_region
- Soil\_structure
- Soil\_feature
- Stratum
- Undergrowth\_type
- Vegetation\_type
  - (All)
  - Vegetation

Measures:

- Est\_height
- Volume
- Cnt
- Est\_height / Ha
- Volume / Ha
- Cnt / Ha

Columns: Volume / Ha, Cnt / Ha

Rows: Vegetation Q

Filter:

Info: 16:33 / 3 x 30 / 0.36s

Vegetation Type	Volume / Ha	Cnt / Ha
N/A	0	0
Forest: Hybrid Mitrane	150	240
Forest: Lowland	90	240
Forest: Mangrove	45	265
Forest: Plantation	45	205
Woodland: Closed (>40%)	65	260
Woodland: Open (10-40%)	45	175
Woodland: Scattered employed (Unspecified des...)	25	65
Bushland: Thickset	25	90
Bushland: Dense	30	130
Bushland: Scattered cultivation	30	40
Bushland: Emergent trees	30	90
Bushland: Thickset with emergent trees	35	140
Bushland: Open	25	65
Grassland: Mixed	10	50
Grazingland: Bushed	10	20
Overland: Scattered employed	10	15
Grassland: Open	10	10
Cultivated land: Agro-forestry system	10	45
Cultivated land: Wooded crops	25	65
Cultivated land: Herbaceous crops	10	20
Cultivated land: Mixed tree cropping	60	90
Cultivated land: Grain crops	10	25
Open land: Bare soil	10	35
Open land: Salt crusts	10	35
Open land: Rock outcrops	10	35
Water: Island water	10	35
Water: Swamp	10	35
Other areas	10	65

Mode:

Export

Start | Inbo... | \*C:\Documents... | Saiku - Next G... | New Tab - Moz... | Formulas\_KKor... | stratifiedsampl... | C:\Documents a... | settings.JPG - P... | 16:33

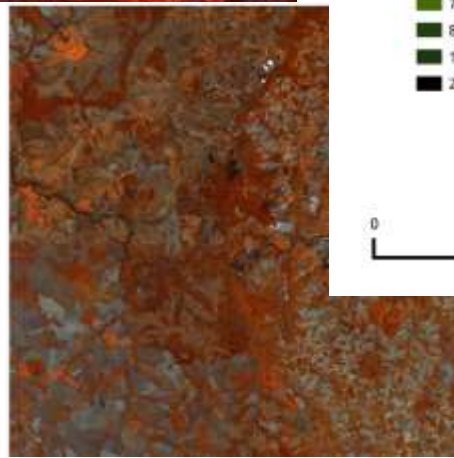
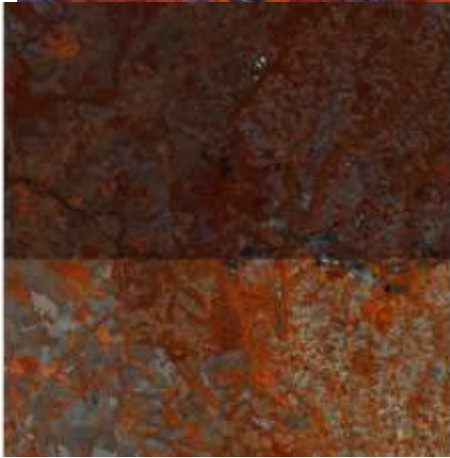
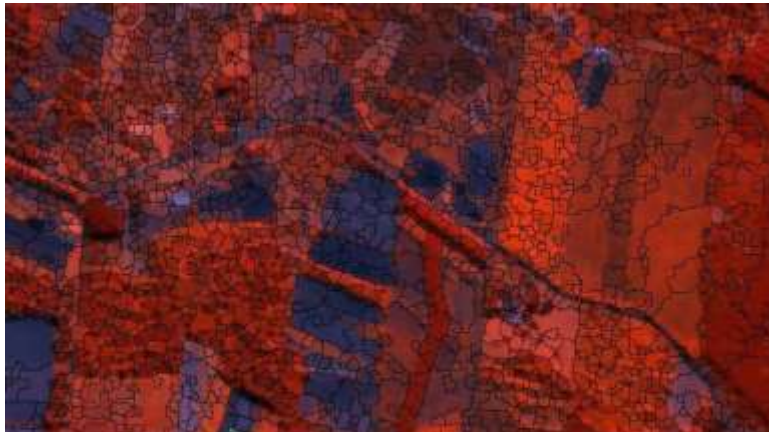


openforis  
GEOSPATIAL  
TOOLKIT

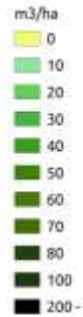


## What does the Geospatial toolkit do?

- for automating processes
- ~ 70 programs / scripts written in C,C++, awk, bash, perl and python
- Image arithmetics, classification, segmentation, sample generation, raster2vector, histogram, gap-filling, filtering, knn, change detection, pixel value extractor, ...



## NAFORMA



0 10 km



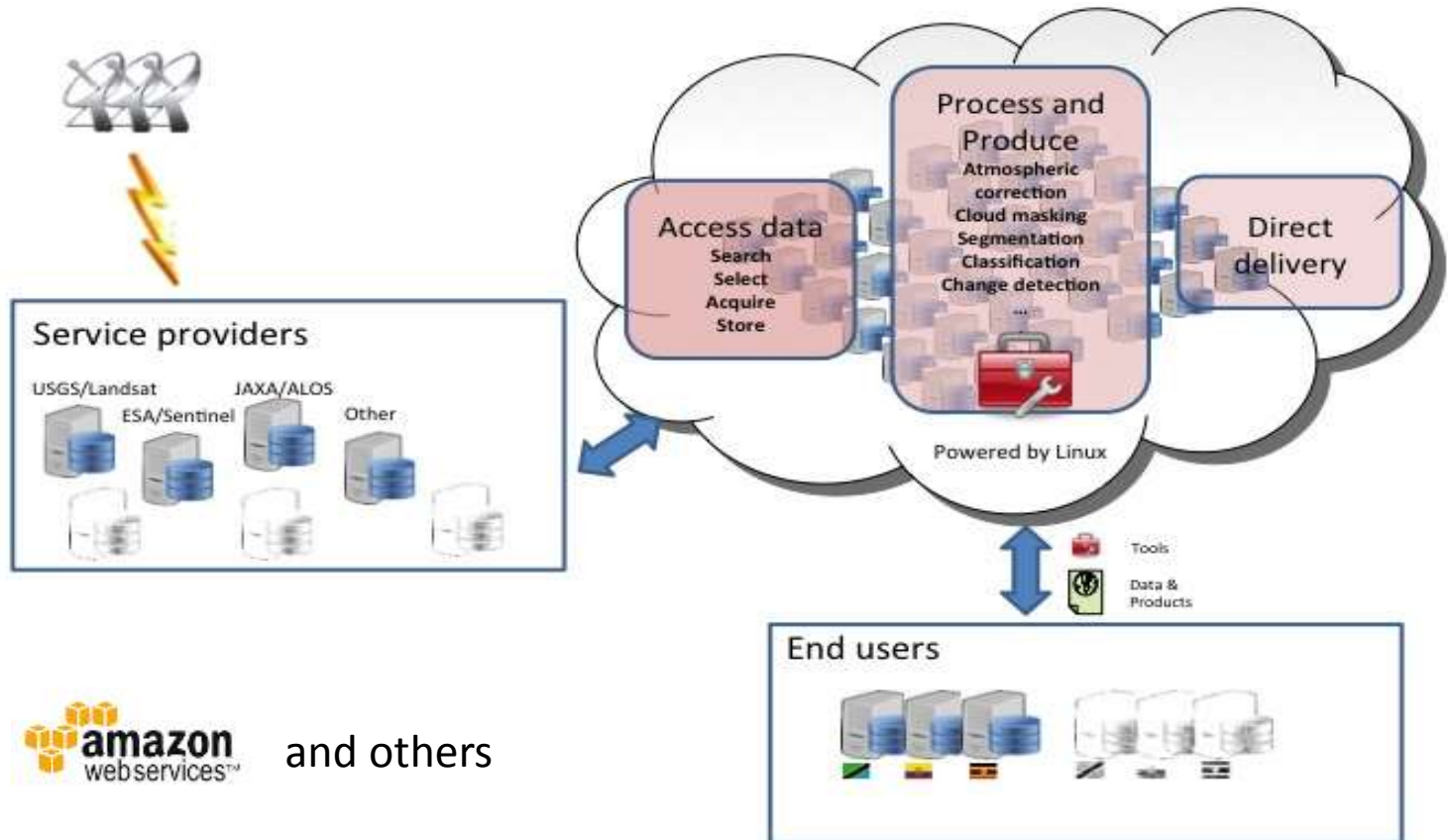
➤ **Efficient image analysis**  
a collection of professional image processing tools which allow automatic processing of different kinds of images.

➤ **From pre-processing to mapping**  
tools for every image processing phases from pre-processing to calculation of forest resources of given area.

➤ **On low cost-hardware and on the cloud**  
When combined with a cloud computing interface, can be used to process massive amounts of data.

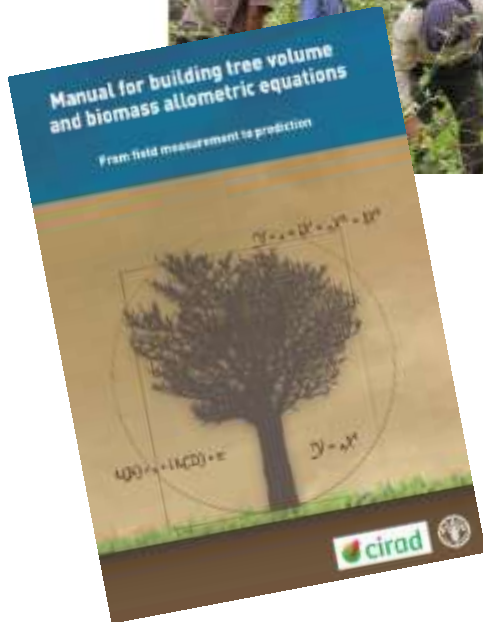


# Satellite data storage and processing system in the “cloud”





<http://www.globallometree.org/>



Technical Report - doi: 10.3832/ifer0901-006

## GlobAllomeTree: international platform for tree allometric equations to support volume, biomass and carbon assessment

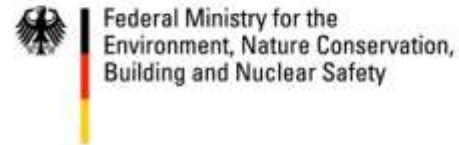
Matieu Henry <sup>(1)</sup>, Antonio Bombelli <sup>(2)</sup>, Carlo Trotta <sup>(3)</sup>, Alfredo Alessandrini <sup>(2)</sup>, Luca Birigazzi <sup>(1)</sup>, Gael Sola <sup>(1)</sup>, Ghislain Vieilledent <sup>(4)</sup>, Philippe Santenoise <sup>(1)</sup>, Fleur Longuetaud <sup>(7)</sup>, Riccardo Valentini <sup>(2-3)</sup>, Nicolas Picard <sup>(4)</sup>, Laurent Saint-André <sup>(5-6)</sup>

GlobAllomeTree is an international platform for tree allometric equations. It is the first worldwide web platform designed to facilitate the access of the tree allometric equation and to facilitate the assessment of the tree biometric characteristics for commercial volume, bio-energy or carbon cycling. The webplatform presents a database containing tree allometric equations, a software called Fantallometrik, to facilitate the comparison and selection of the equations, and documentation to facilitate the development of new tree allometric models, improve the evaluation of tree and forest resources and improve knowledge on tree allometric equations. In the Fantallometrik software, equations can be selected by country, ecological zones, input parameters, tree species, statistic parameters and outputs. The continuously updated database

# Resource partners



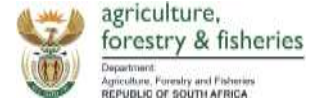
Supported by:



based on a decision of the German Bundestag



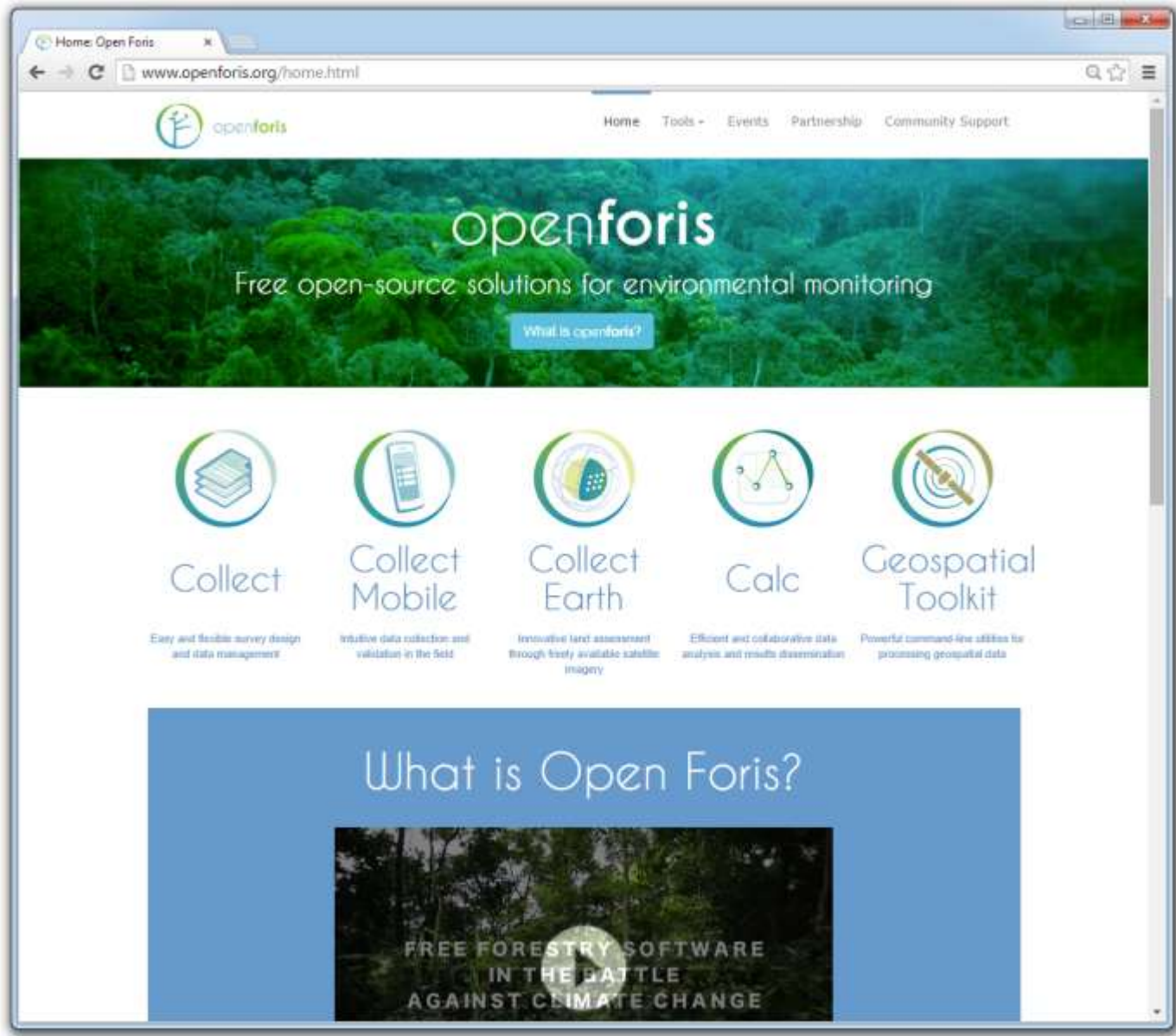
# Contributors/Users



ENVIRONMENTAL  
PROTECTION  
AGENCY, GHANA



More info: [www.openforis.org](http://www.openforis.org)



The screenshot shows the Open Foris website homepage. The browser address bar displays "www.openforis.org/home.html". The navigation menu includes "Home", "Tools", "Events", "Partnership", and "Community Support". The main banner features the "openforis" logo and the text "Free open-source solutions for environmental monitoring", with a "What is openforis?" button. Below the banner are five tool icons: "Collect" (survey design), "Collect Mobile" (field data collection), "Collect Earth" (satellite imagery), "Calc" (data analysis), and "Geospatial Toolkit" (geospatial processing). A video player at the bottom is titled "What is Open Foris?" and contains the text "FREE FORESTRY SOFTWARE IN THE BATTLE AGAINST CLIMATE CHANGE".

Home: Open Foris

www.openforis.org/home.html

openforis

Home Tools Events Partnership Community Support

openforis

Free open-source solutions for environmental monitoring

What is openforis?

Collect

Collect Mobile

Collect Earth

Calc

Geospatial Toolkit

Easy and flexible survey design and data management

Intuitive data collection and validation in the field

Innovative land assessment through freely available satellite imagery

Efficient and collaborative data analysis and results dissemination

Powerful command-line utilities for processing geospatial data

What is Open Foris?

FREE FORESTRY SOFTWARE  
IN THE BATTLE  
AGAINST CLIMATE CHANGE

