Food and Agriculture Organization of the United Nations

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

The International Climate Initiative (IKI)

Collect Earth

an innovative tool

Danilo Mollicone

Ingredients for the success:

1) Open source software

2) Developed on Google technology

3) Rely of existing open source software (e.g. Saiku)

4) Learning from what is working

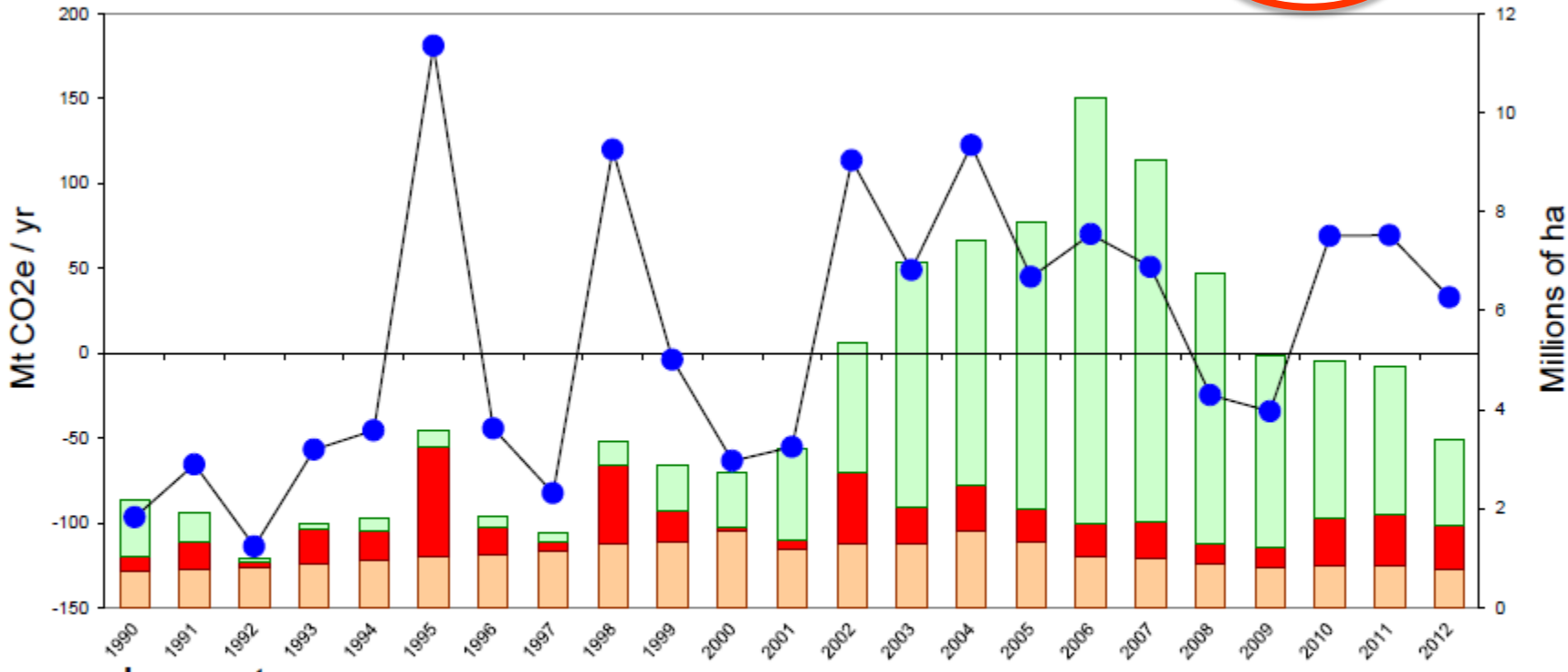
5) A clear strategy from measurements to submission under

Learning from what is working:

Collect Earth has been developed
by learning from experiences from Annex I countries reporting activity data under UNFCCC

Canada's forest C balance as reported to UNFCCC

Carbon Emissions and Area distribution, FL > FL



Insects

Fire

Harvest (C in harvested wood instantly oxydized to atmosphere)

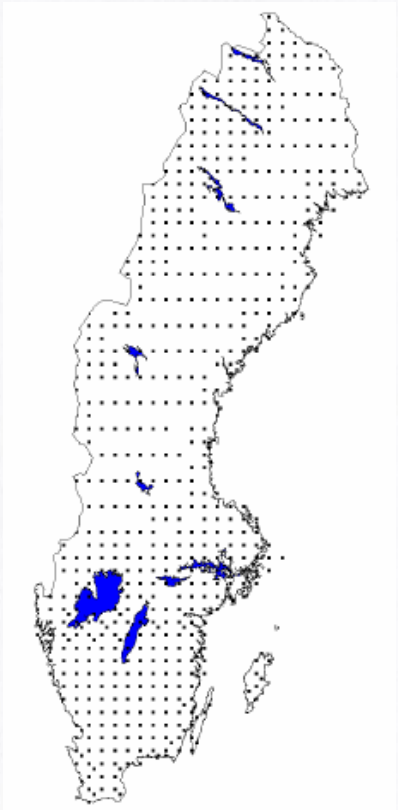
Emissions

Source: Updated after Stinson et al. 2011, NRCan 2014

All Annex I countries use IPCC Approach 3 to assess activity data:

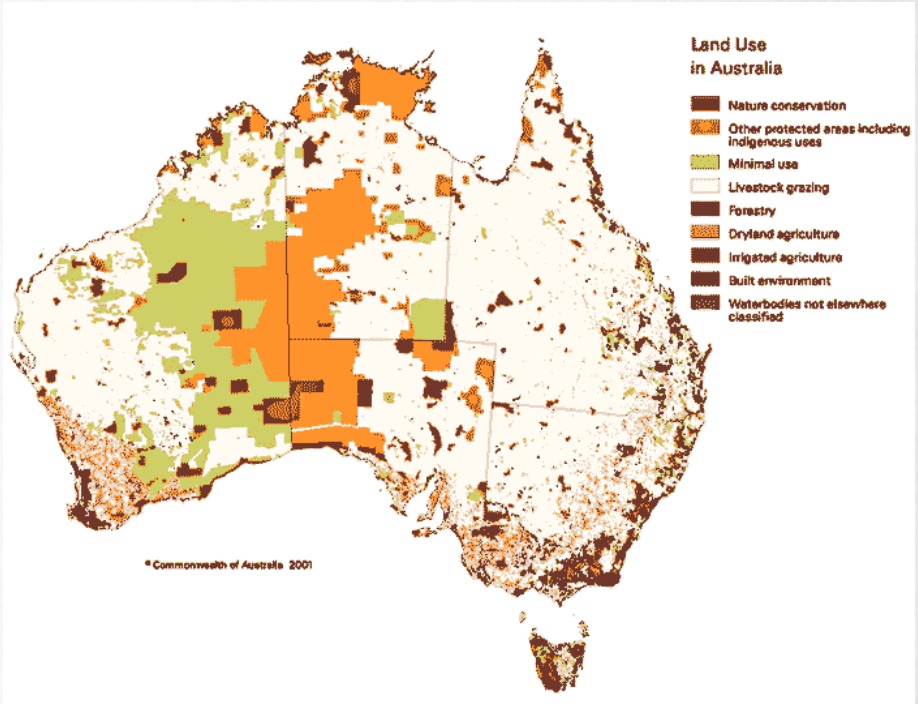
40 countries use
mainly sampling approaches

Sweden



2 countries use
mainly wall to wall approaches

Australia

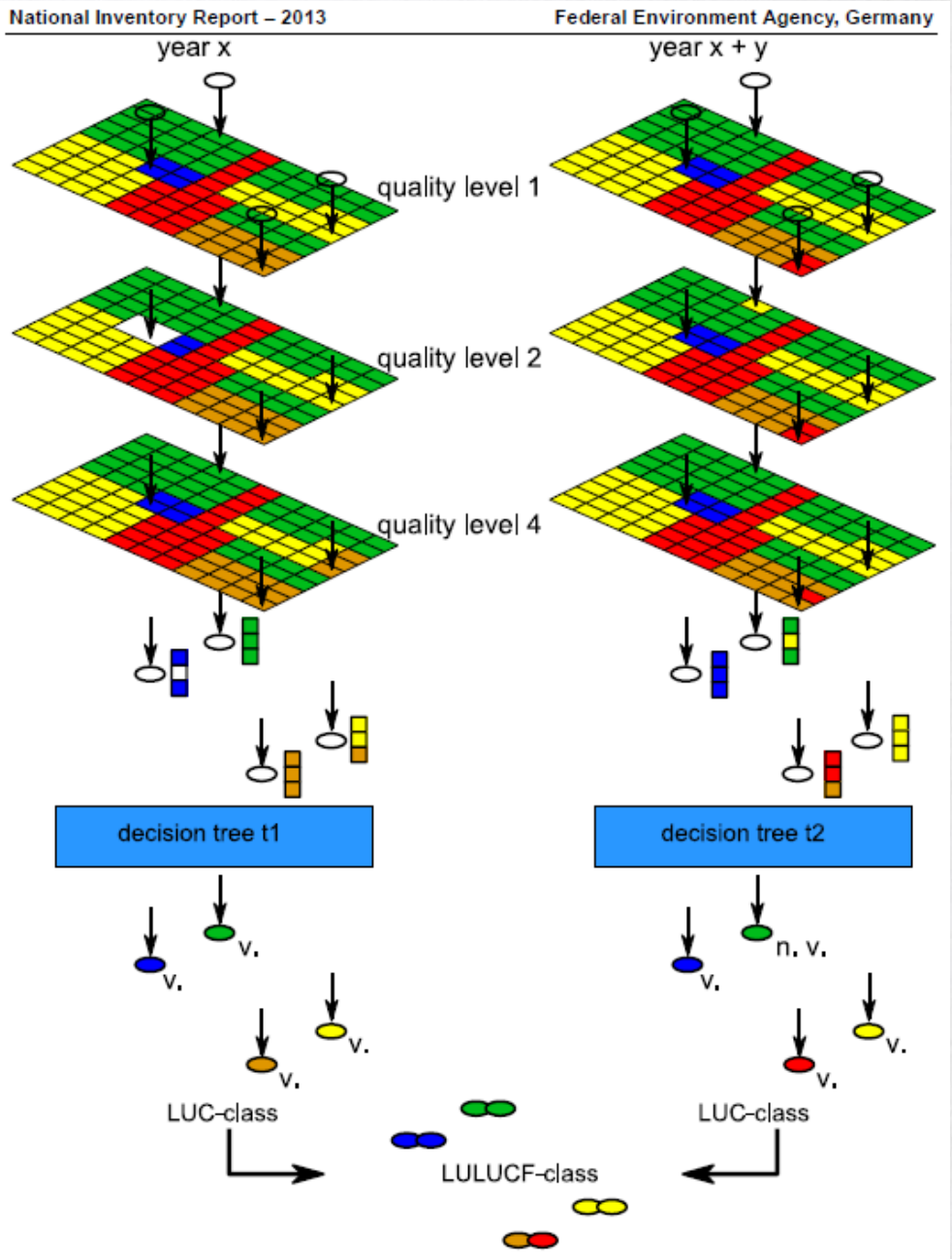


National Inventory Report
Germany

Schematic representation of allocation of sample points to a land-use category

GHG NIR Germany 2013
http://unfccc.int/national_reports/annex_i_ghg_inventories/national_inventories_submissions/items/7383.php

The National Forest Inventory surveys the state of forests, and of forest production potential, on a large scale throughout Germany, using a standardised sampling procedure. The National Forest Inventory is a terrestrial sampling inventory that uses permanently marked sample points in a 4 km x 4 km basic grid whose resolution, at the request of the Länder, has been increased on a regional basis

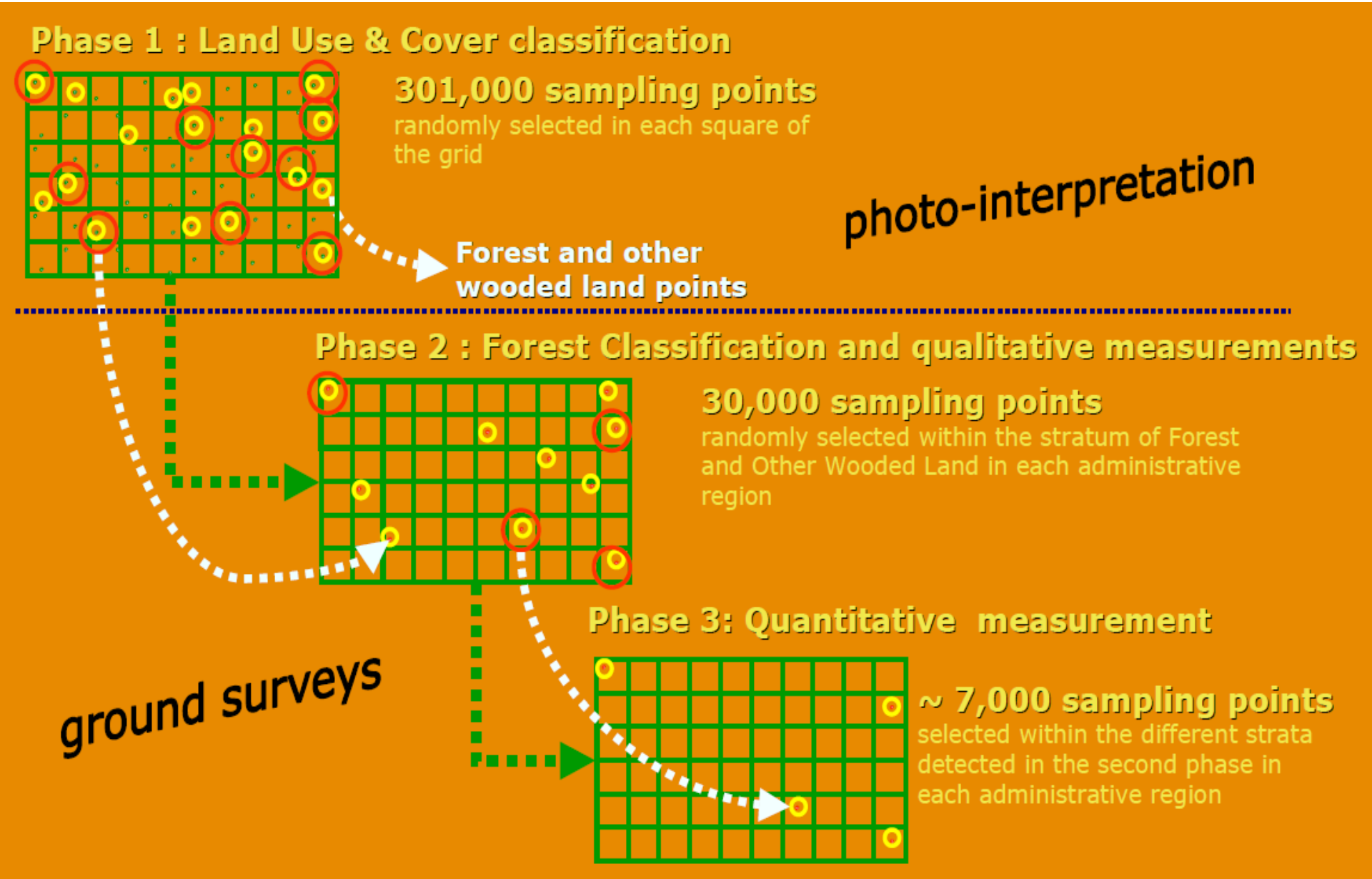


The Italian sampling system (within NFI)

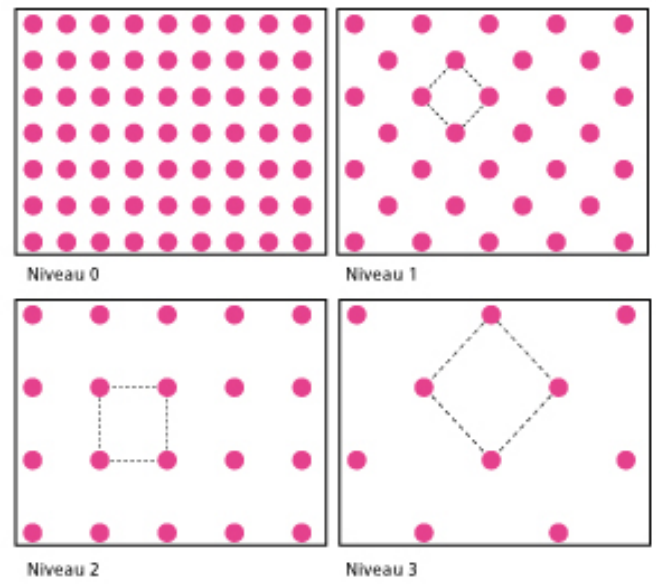
IFNI85
30,000 sampling units
Aligned Systematic Sampling
One-phase Sampling Design

INFC2005
300,000 sampling units
Unaligned Systematic Sampling
Three-phase Sampling Design

The Italian multi-phase sampling system (within NFI)



France NFI multi-phase sampling design



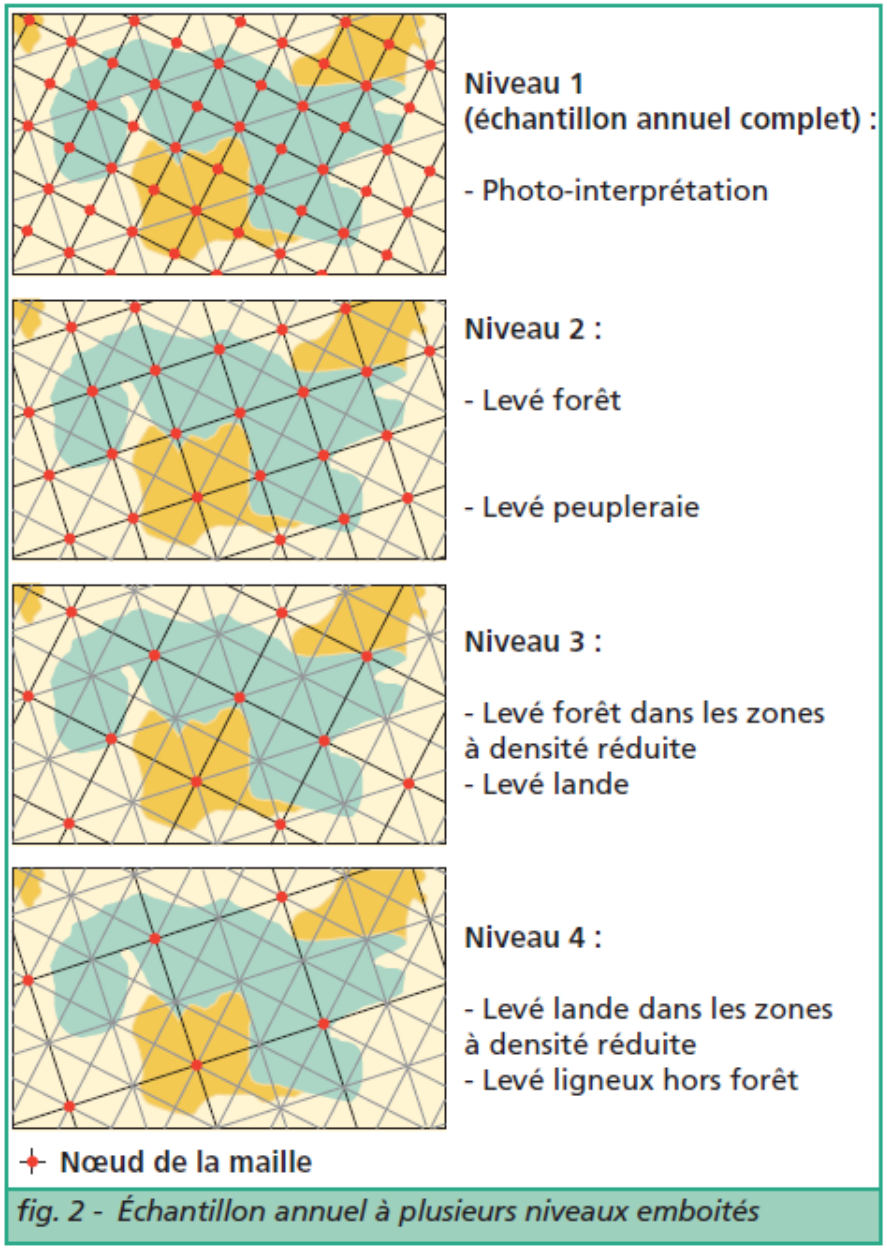
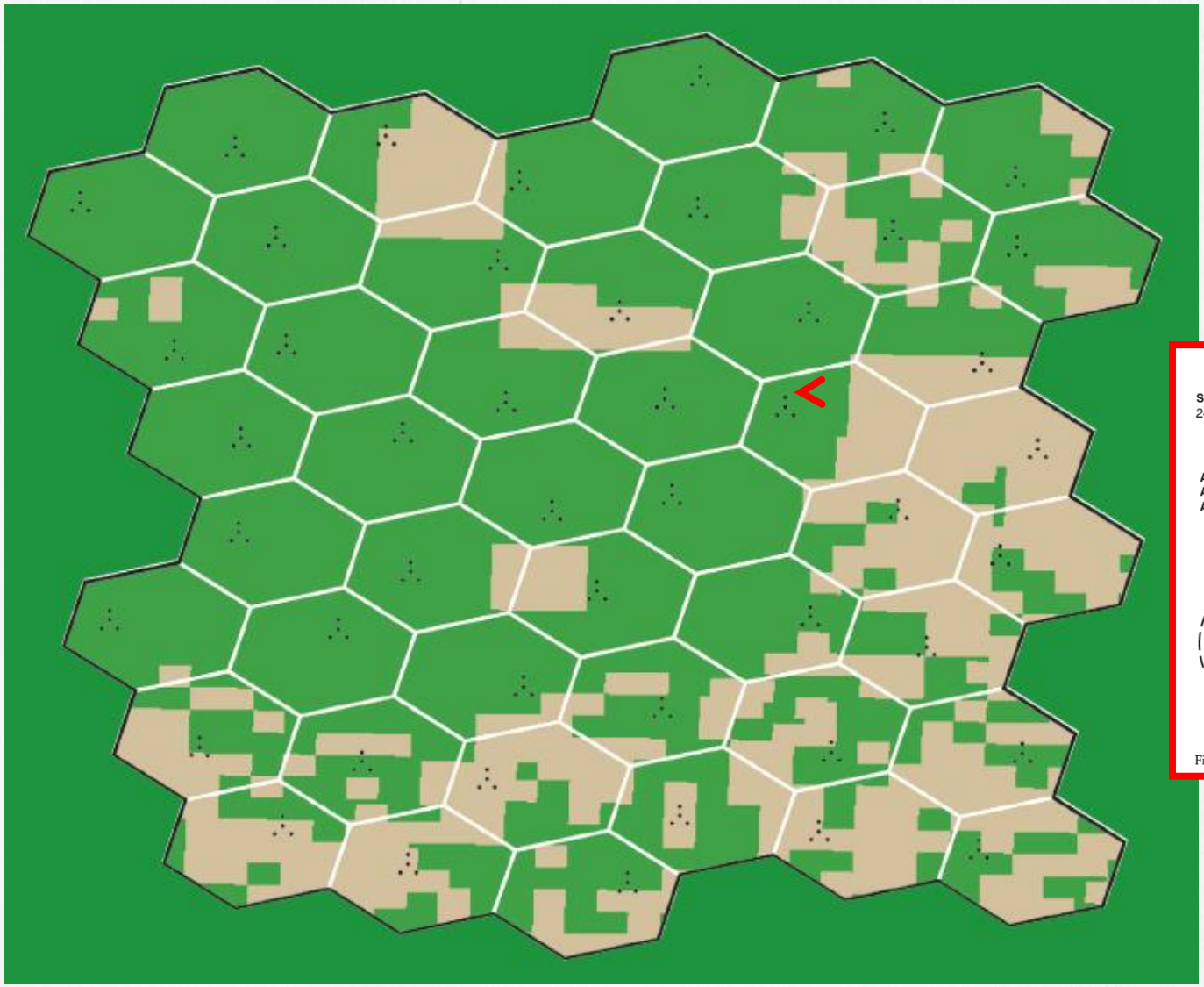


fig. 2 - Échantillon annuel à plusieurs niveaux emboités

USA NFI multi-phase sampling design



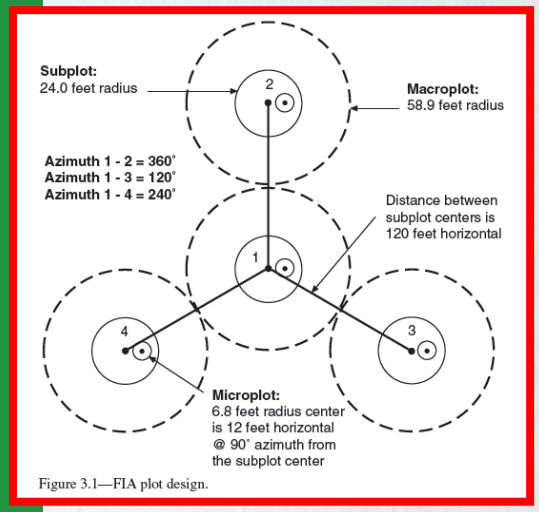


Figure 3.1—FIA plot design.

USA NFI multi-phase sampling design

Table 2.1—Summary of general attributes associated with FIA Phase 1, Phase 2, and Phase 3 sampling

Attribute	Phase 1	Phase 2	Phase 3
Sample type	Photo point or satellite pixel	Ground plot, subset of Phase 1	Ground plot, subset of Phase 2
Sample configuration	Point or pixel	Cluster of four 1/300-acre micro-plots, four 1/24-acre subplots, and optional four 1/4-acre macroplots	Same as Phase 2[a]
Purpose	Stratification[b] of the landscape for the purpose of variance reduction	Samples FIA traditional attributes of interest, primarily related to tree species of all sizes	Samples FIA traditional attributes of interest,[c] plus additional attributes associated with forest health
Tesselation method	Supplemental regional grid superimposed over the population of interest[d]	Systematic national hexagonal cell grid	Systematic national hexagonal cell grid (subset of Phase 2 grid)
Base-grid intensity	At the discretion of each FIA unit	One plot per every 6,000-acre hexagonal cell	One plot per every 1/16 6,000-acre hexagonal cell (i.e., one per 96,000 acres)

NFI Sampling design in Czech Republic

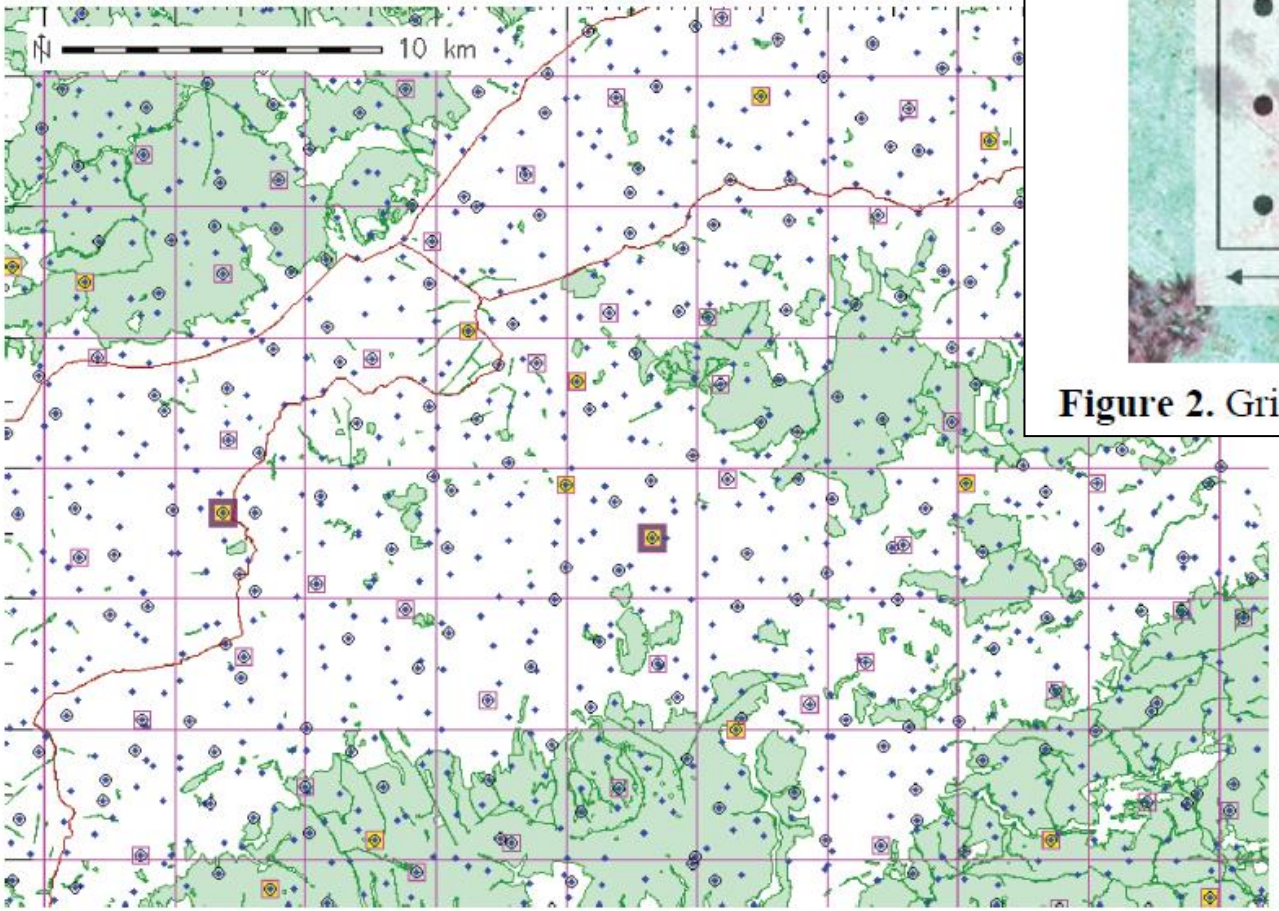


Figure 1. Czech NFI2 sampling grid.

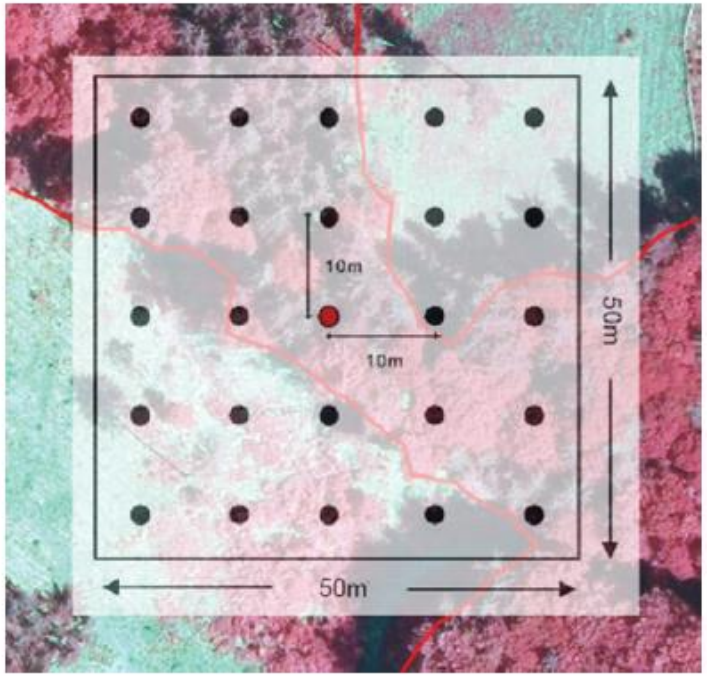


Figure 2. Grid points in the interpretation quadrate

The photogrammetric assessment will take part on a four times denser sample grid, with a limited set of acquired variables.

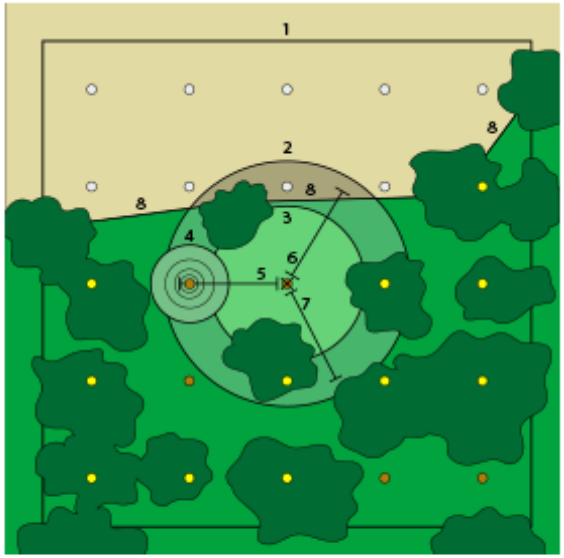
About the NFI
Inventory
Purpose
Methods
inventory concept
aerial photo interpretation
field survey
Organisation
Content
Implementation
Projects
Results
Services
Publications
Glossary / dictionary
Contact

Inventory concept

There are more than 500 million trees in Switzerland - far too many to investigate individually. Random sampling, however, yields adequate information. For that purpose a 1km-grid was mapped over Switzerland in the first NFI. The intersections defined the location of the sample plots in the forest.

Since the second NFI, only half of these plots, roughly 6500, have been located in the field. The grid, which originally had a mesh size of 1 km, was extendend to 1.4 km. To compensate for this reduction, the aerial photos were interpreted in a grid of 500 m.

The same methods have been carried out since switching from a periodic to a continuous survey in the fourth NFI, but the sample plots are now located over a period of nine years. Thereby another ninth of the sample plots, which are evenly distributed all over Switzerland, are surveyed every year.



1 NFI3 sample plot
2 circle for survey of trees with a DBH greater than 36 cm.
3 circle for survey of trees with a DBH greater than 12 cm
4, 5 circle for survey of young forest
5, 6, 7 transect for survey of deadwood
X sample plot center

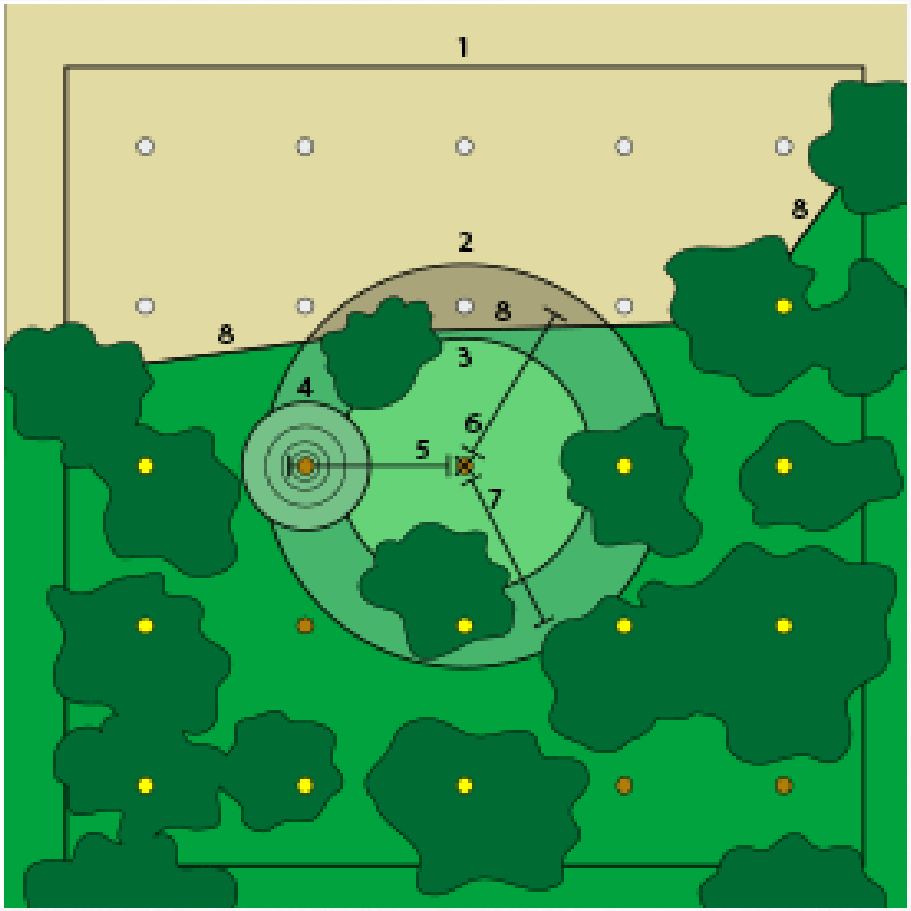
Movie of the first NFI (1983) (in German)

Circles and radii of sample plots

The center of the sample plot is marked by a metal pole in the ground. Roughly 130,000 sample trees were measured in the NFI1 and marked so as they can be found again in later inventories. Thanks to the exact sketches, about 98% of the sample plots could be found directly during the NFI2 without having to search for them. In the NFI4, the position of the centers of the sample plots are located exactly with a GPS.

Within a 200 m^2 circle, every tree which has a diameter larger than 12 cm is recorded, and within a 500 m^2 circle, every tree which has a diameter larger than 36 cm is recorded. These diameters are measured at a height of 1.3 m (diameter at breast height DBH). The radii are 7.98 m (r_1) and 12.62 m (r_2) on level terrain.

Swiss NFI sampling design



First Phase

1 Visual interpretation of NFI3 sample plots

Second Phase

2 circle for survey of trees with a DBH greater than 36 cm.

3 circle for survey of trees with a DBH greater than 12 cm

4, 5 circle for survey of young forest

5, 6, 7 transect for survey of deadwood

X sample plot centre

Collect Earth:

1) Open source software

2) Developed on Google technology

3) Rely of existing open source software (e.g. Saiku)

The *Open Foris Initiative* launched in October 2014. Five tools, and others on the way

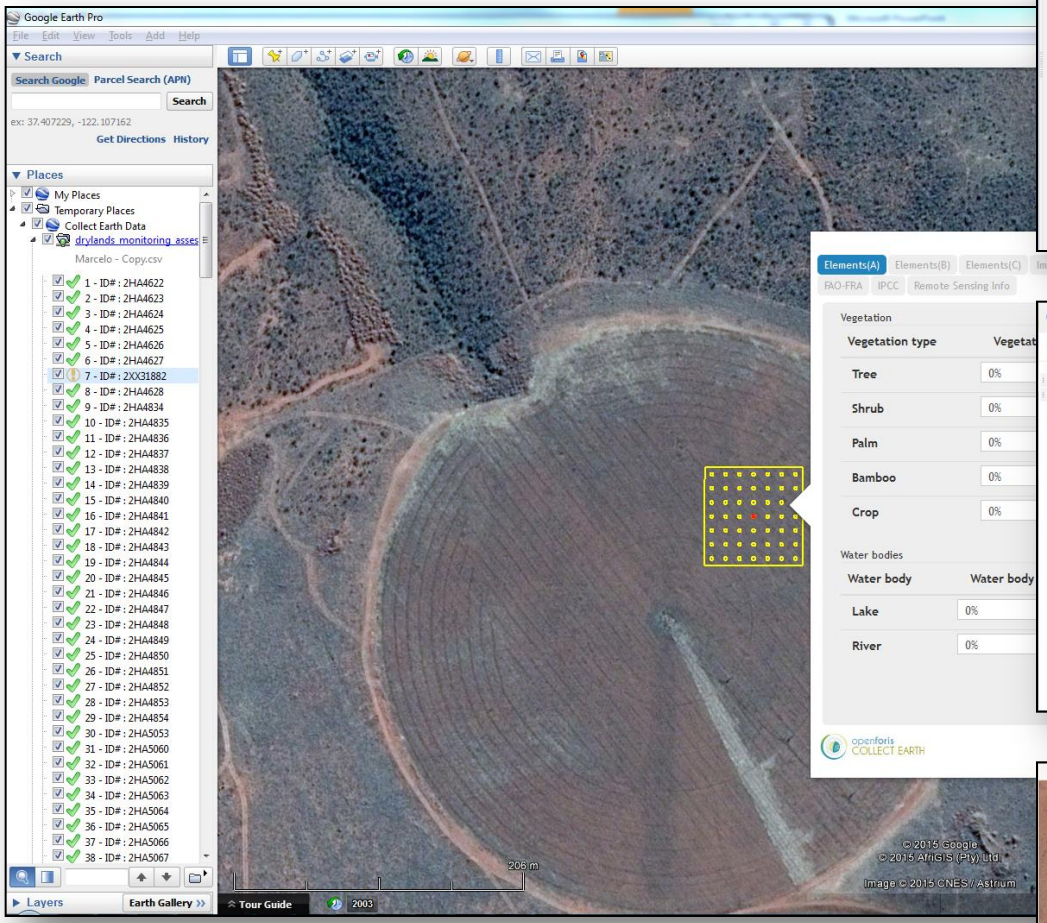
www.openforis.org

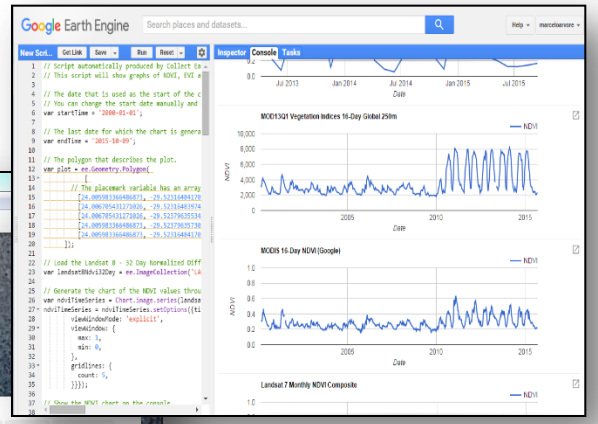
openforis COLLECT EARTH

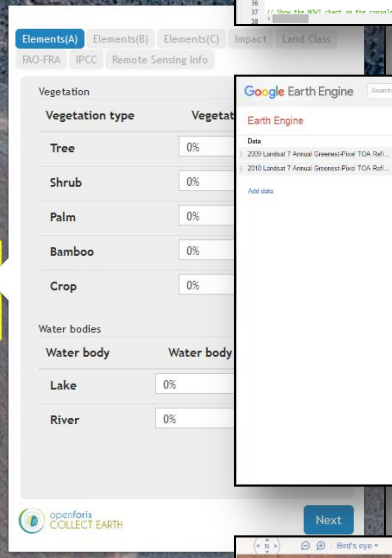
STRUCTURE

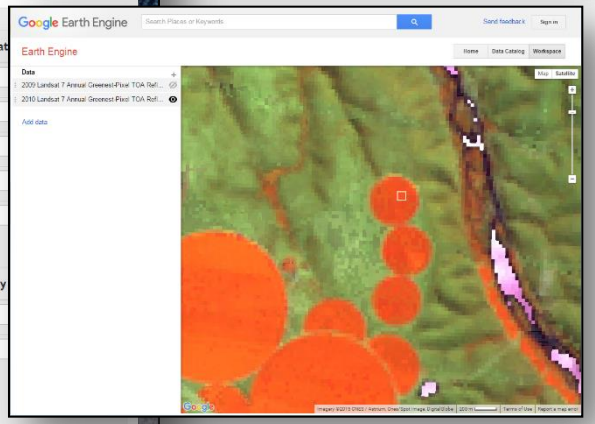
COLLECT EARTH

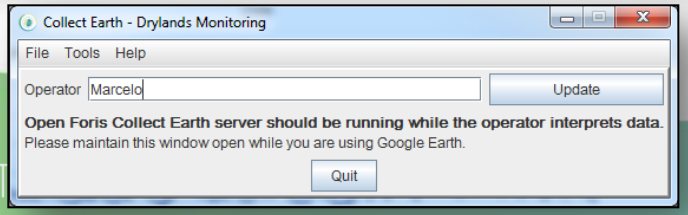
AN OPEN SOURCE TOOL FOR AUGMENTED VISUAL INTERPRETATION

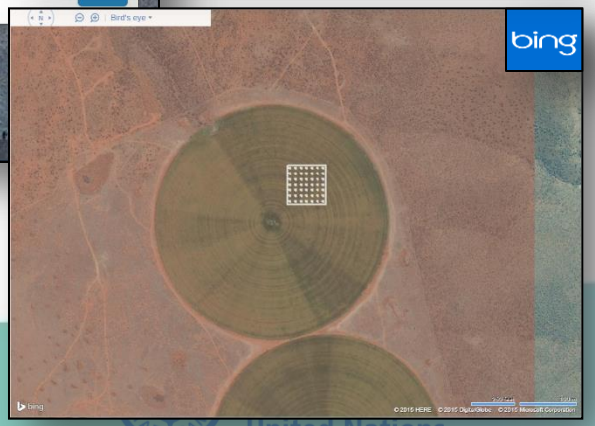












remote sensing

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Author | Section: --
Article Type: all | Special Issue: all | Advanced | Search

MDPI 20 years | IMPACT FACTOR 3.036

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Remote Sens. **2016**, *8*(10), 807; doi:10.3390/rs8100807 (registering DOI) Open Access Article

Collect Earth: Land Use and Land Cover Assessment through Augmented Visual Interpretation

Adia Bey [1,*], Alfonso Sánchez-Paus Díaz [1], Danae Maniatis [2,3], Giulio Marchi [1], Danilo Mollicone [1], Stefano Ricci [1], Jean-François Bastin [1,4], Rebecca Moore [5], Sandro Federici [1], Marcelo Rezende [1], Chiara Patriarca [1], Ruth Turia [6], Gewa Gamoga [6], Hitofumi Abe [1], Elizabeth Kaidong [6] and Gino Miceli [5]

1 Food and Agricultural Organization of the United Nations, Forestry Department, Rome 00154, Italy
2 United Nations Development Programme, Bureau for Policy and Programme Support, New York, NY 10017, USA
3 School of Geography and the Environment, University of Oxford, Oxford OX1 3QY, UK
4 Landscape Ecology and Plant Production Systems Unit, Université Libre de Bruxelles, Brussels 1050, Belgium
5 Google, Mountain View, CA 94043, USA
6 Papua New Guinea Forest Authority, Boroko 111, Papua New Guinea

* Author to whom correspondence should be addressed.

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Abstract

2017 TRAVEL AWARDS FOR POSTDOCS AND PHD STUDENTS

PUBLISH YOUR DATA SET IN OUR OPEN ACCESS JOURNAL data AND ENHANCE ITS VISIBILITY

DEPOSIT DATA | PUBLISH ARTICLE | PUBLISH DATA DESCRIPTOR

MDPI

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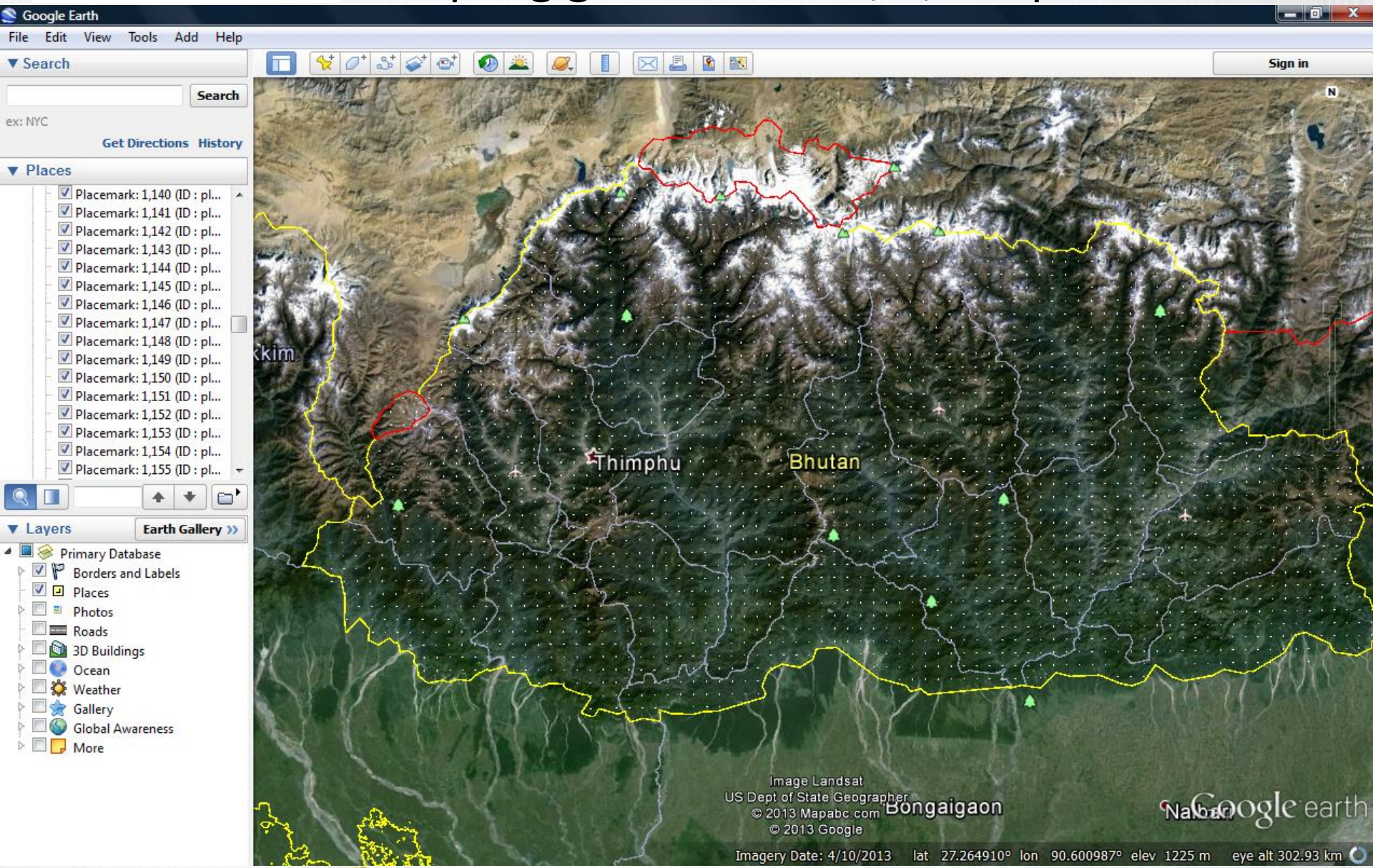
COLLECT EARTH

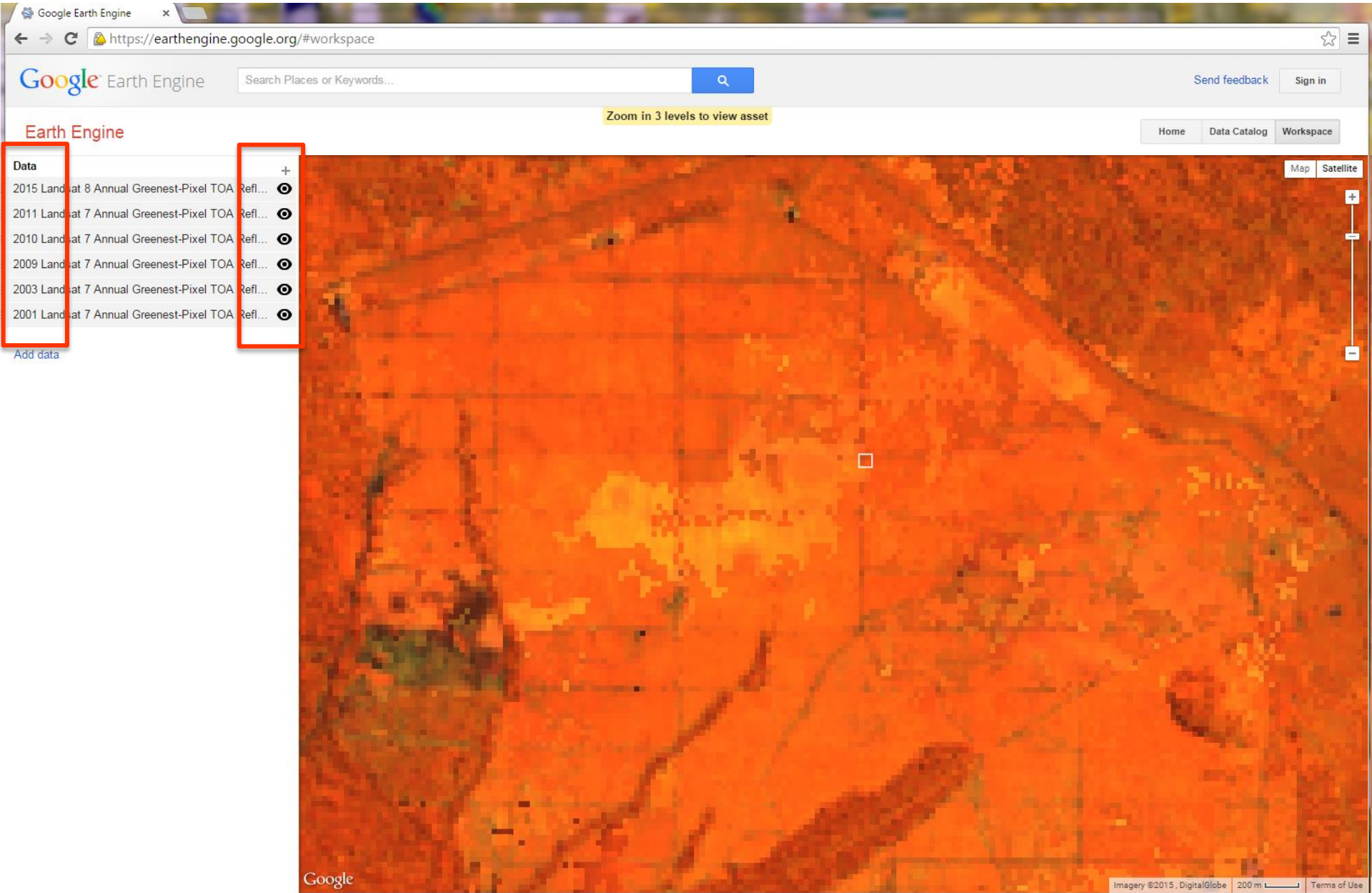
Food and Agriculture Organization of the United Nations

openforis COLLECT EARTH

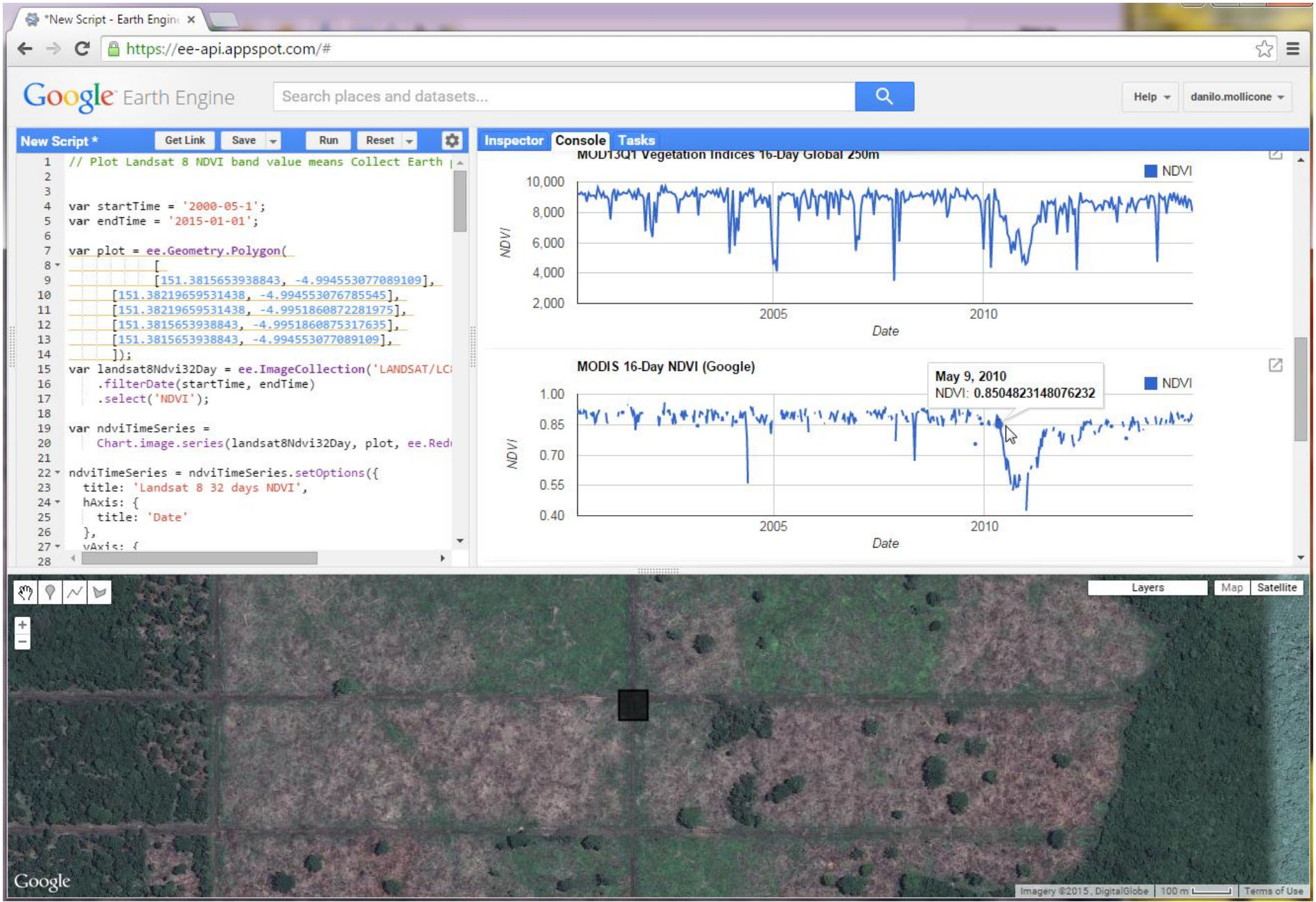
sampling grid in Bhutan, 8,000 points



openforis COLLECT EARTH in Google Earth Engine



openforis COLLECT EARTH in Google Earth Engine Playground



Kyrgyzstan FULL 13368

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Edited on June 2, 2015

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Feature map

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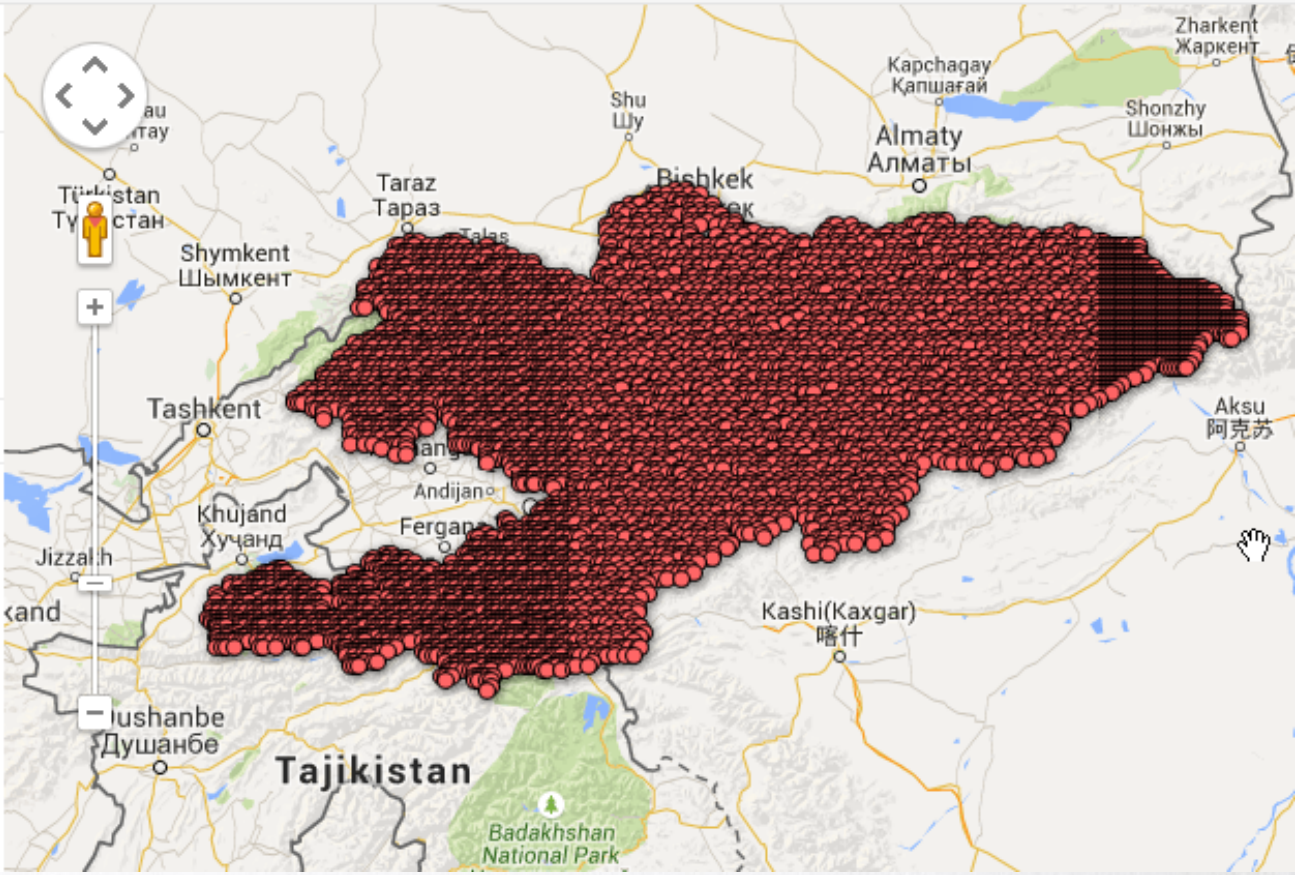
Change info window...

Heatmap



A clear strategy up to submission to UNFCCC:

ACTIVITY DATA → openforis COLLECT EARTH

↓

EXPANSION FACTORS → National data (e.g. NFI), IPCC EFDB, Fire Emission Calculator, etc..

↓

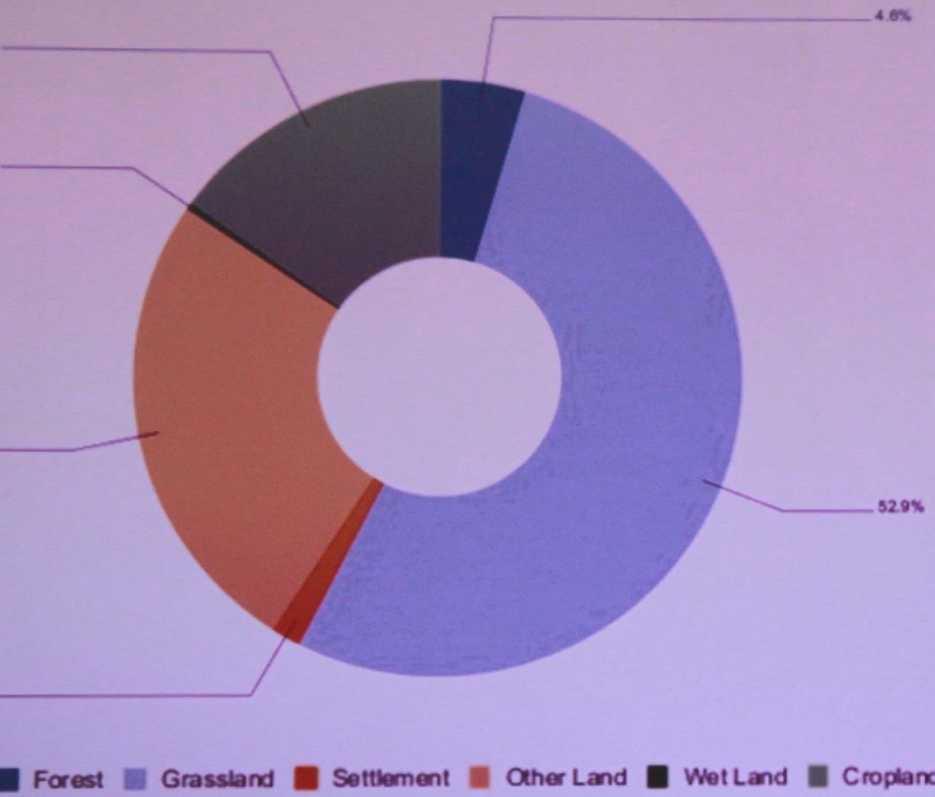
GHG Inventory → Agriculture and Land Use National Greenhouse Gas Inventory Software

↓

Submission by NAIIS Web Application / REDD+ Platform (UNFCCC)

Niger, Action Against Desertification

площадь по категориям землепользования



площадь по категориям землепользования

Category	Area (HA)	%	km2
Forest	52 042	4,55%	52042,13318
Grassland	605 17	52,93%	605175,663
Settlement	17 843	1,56%	17843,01709
Other Land	289 949	25,36%	289949.
Wet Land	4 461	0,39%	4460.
Cropland	173 969	21%	1739
	1 143 440	100,00	1143

COLLECT EARTH

Kyrgyzstan

Tanzania

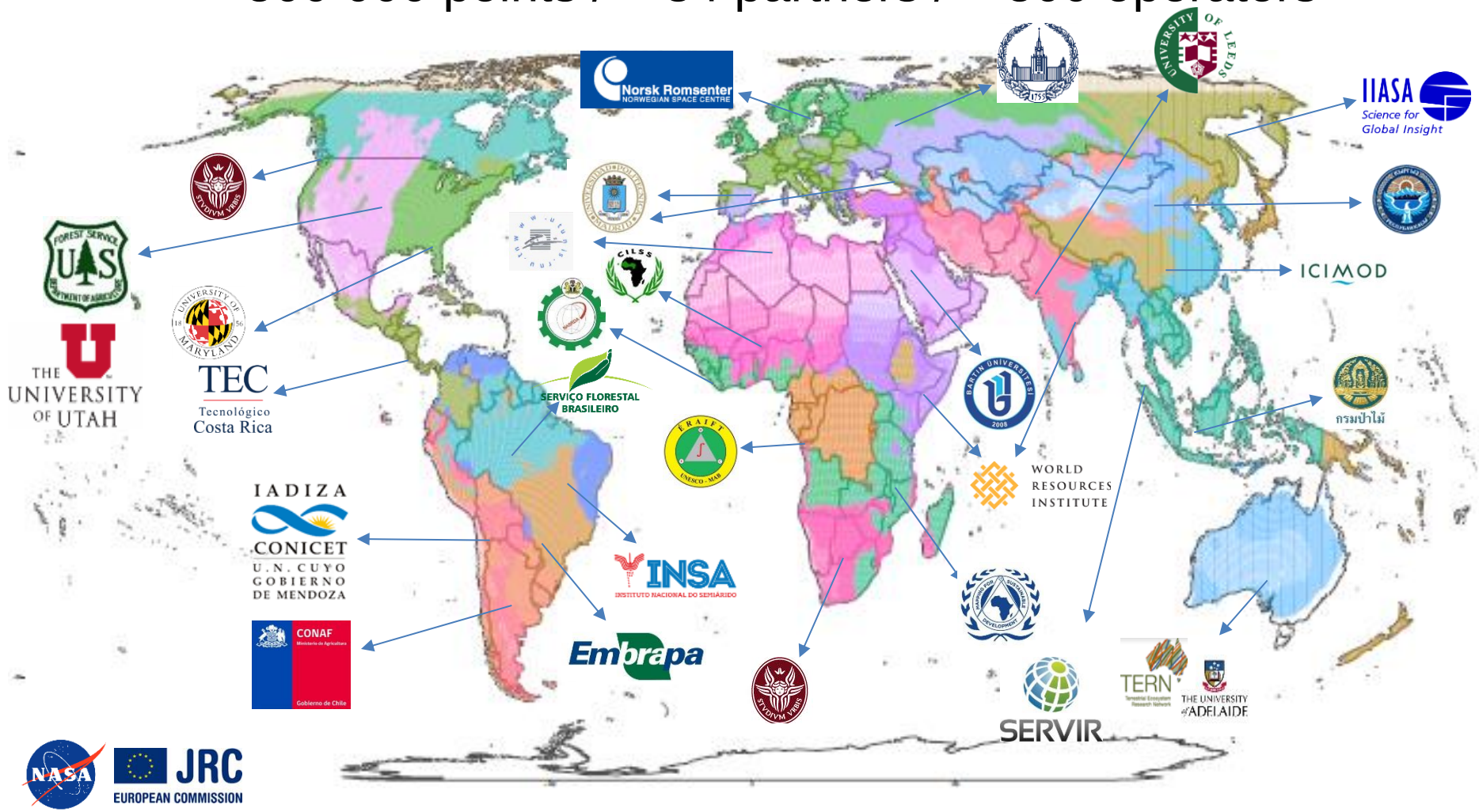
Chile

LUOD

Land Use Open Data

LOUD PARTNERS

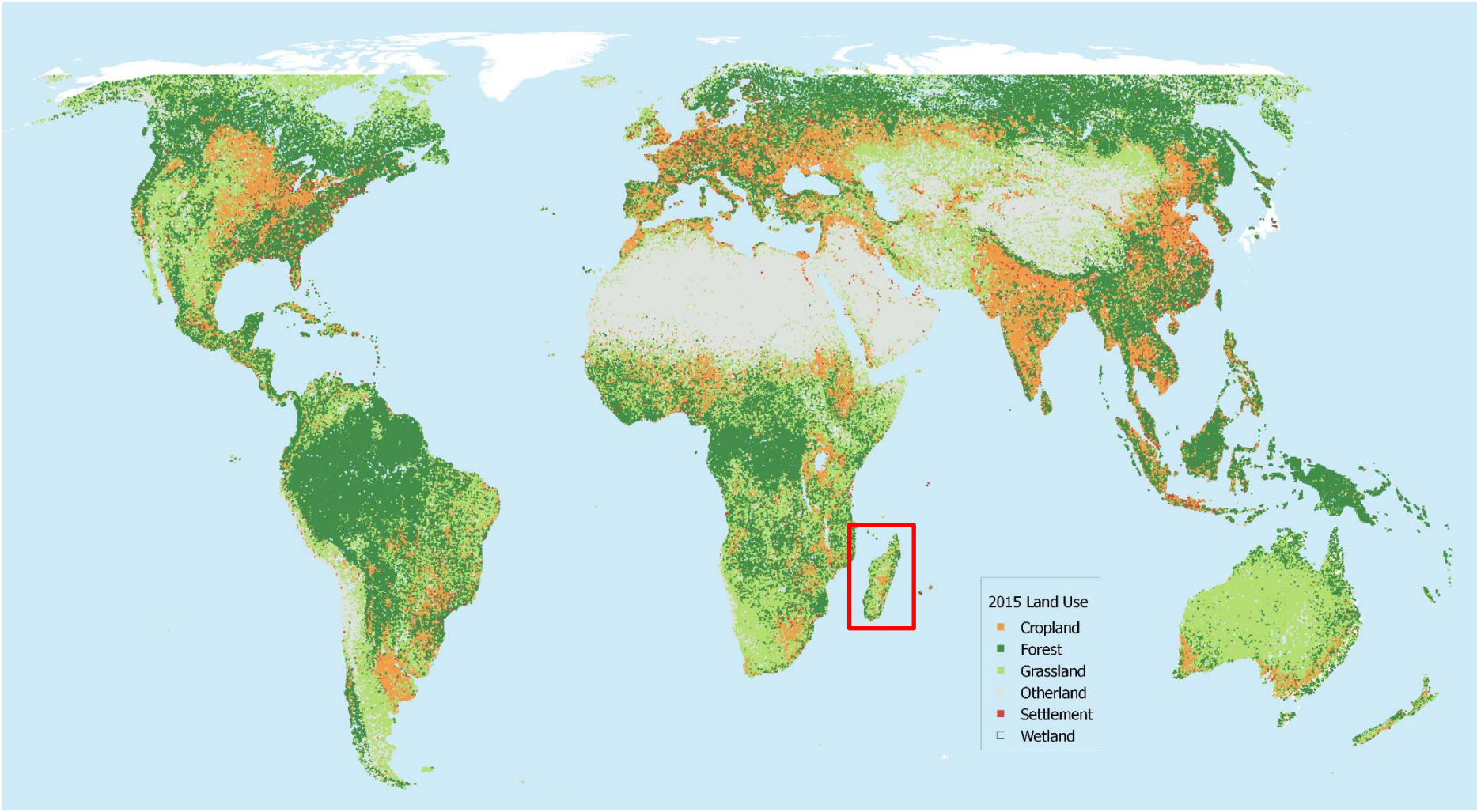
+ 500 000 points / + 34 partners / + 500 operators



COLLECT EARTH

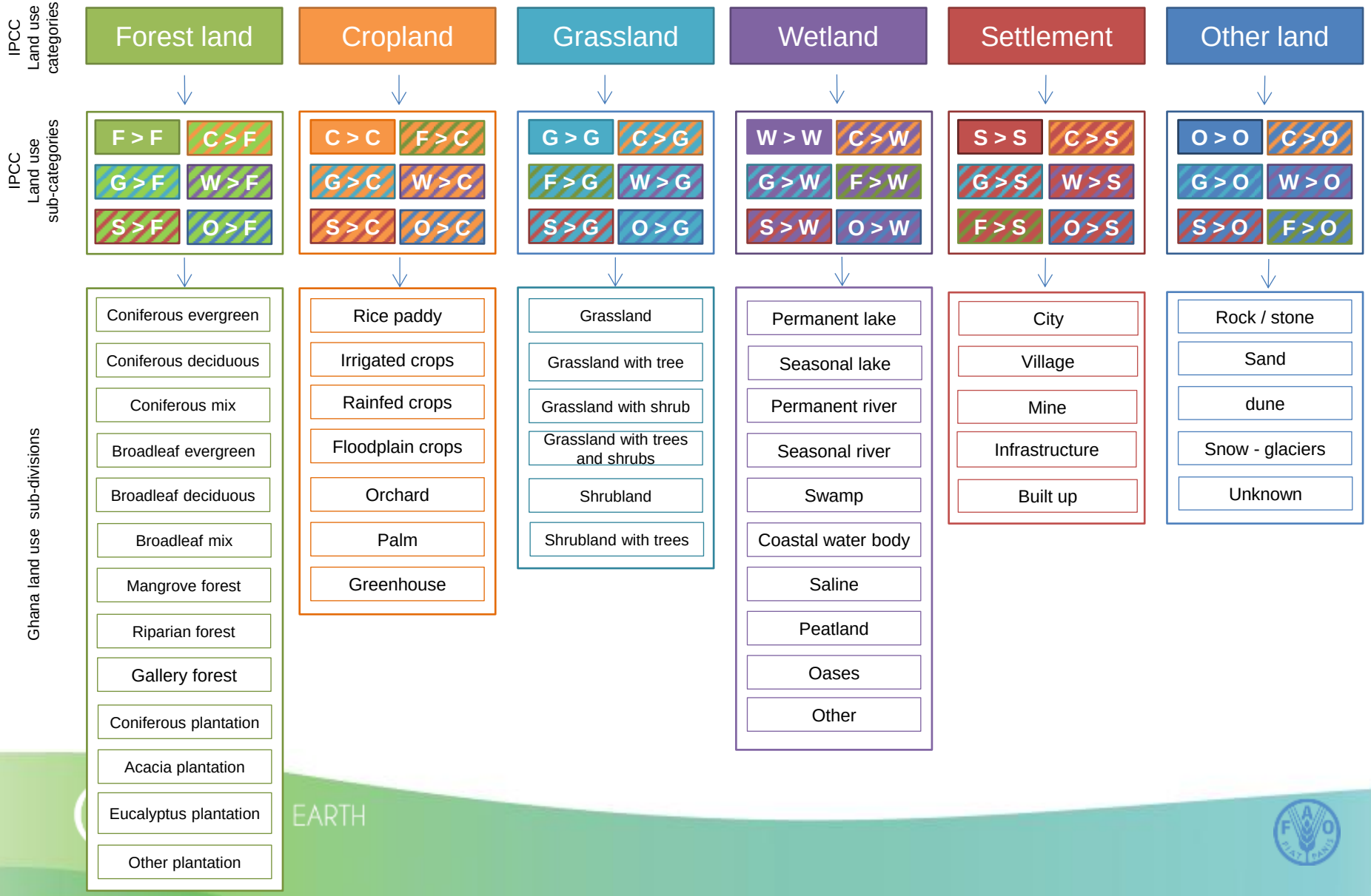
Food and Agriculture Organization of the United Nations

The first **Land Use** global representation



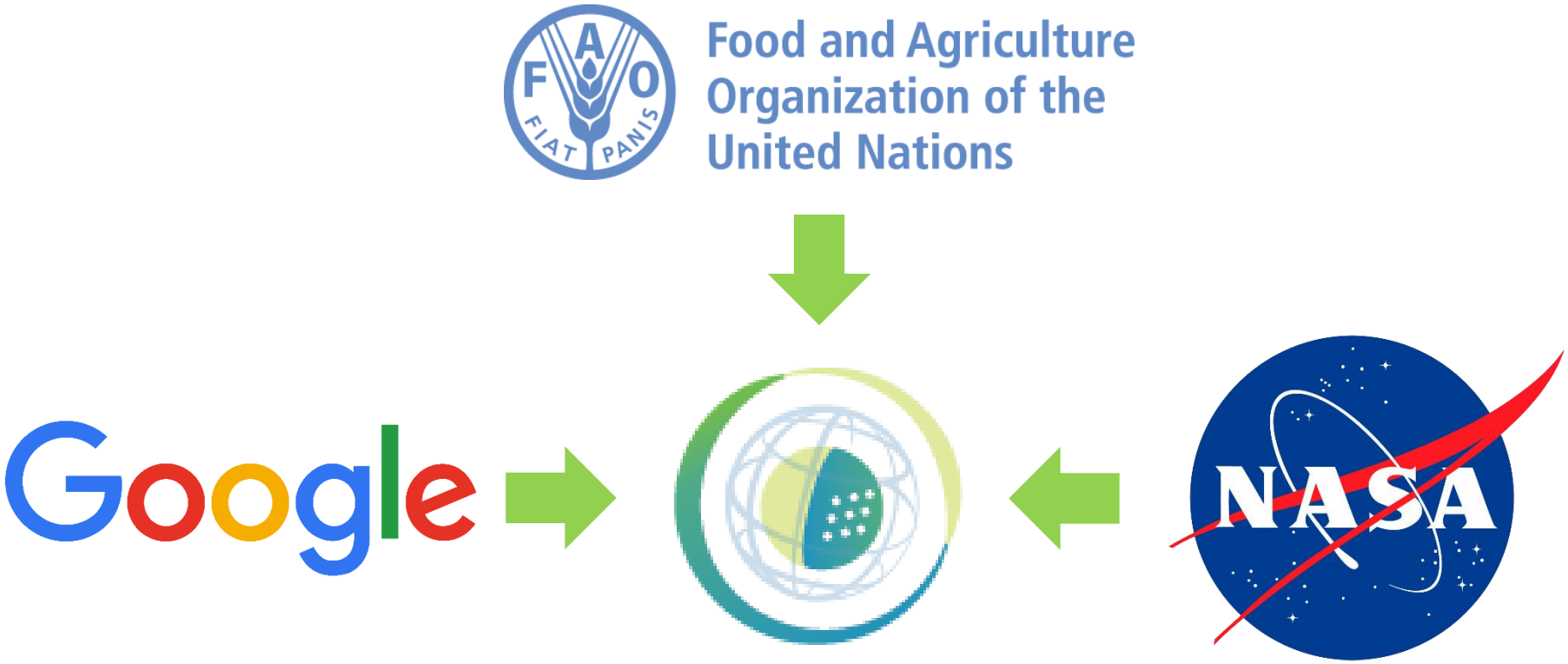
COLLECT EARTH

LOUD classification scheme



openforis
COLLECT EARTH trainings and assessment in 2014-15

Food and Agriculture Organization of the United Nations



In 2017 a new Collect Earth

Food and Agriculture Organization of the United Nations

Thank you