



Methodology and Demonstration of Collect Earth

*3rd National Workshop on the “Development for the first multipurpose
National Forest Inventory in Papua New Guinea”*

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Background on National Forest Inventory

- **Project Title:** Technical support to the PNG Forest Authority to implement a multi-purpose **National Forest Inventory**
- **Funding:** EU and UNREDD Programme
- **Project Period:** October 2013 – September 2016
- **Project Objective:** To contribute to the implementation of PNG's policies and measures for climate change mitigation.
- **Partners:** European Commission, PNG Forest Authority and PNG University of Technology
- **Support and Implementation:** FAO

National Forest Inventory Status

- Inventory Approach
- PNG has taken a double sampling approach

Phase 1

- Based on RS data analysis and Collect Earth/Open foris & Google earth tool

Phase 2

- Based on field plot clusters on a random restricted sampling design

Pre-Inventory Assessment

1. Sampling Design

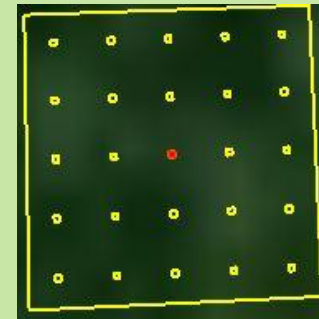
- **Systematic grid 4.44x4.44 km and 2.22x2.22 km** (Grid – 0.04 x 0.04 degree)
- 25,279 tracts covering PNG

2. Sampling Unit

- 1 hectare (100m x 100m) & 25 check points

3. Classification:

- IPCC land use categories and sub-categories
- PNG Forest type and Vegetation classifications as sub-divisions



Sampling plot

Pre-Inventory Assessment

❖ Classification

- 6 Land use Categories



Forest



Grassland



Cropland



Wetland



Settlement (Village, large settlement, Infrastructure)



Other (river, barren soil, sand soils, landslides, rock, lake)

Methodology

- There were a number of steps that were taken in the assessment.



Methodology-Step 1: Training

❖ 2 Trainings were conducted in 2013:

1. September; OCCD, DAL, UPNG, PNGFA
2. October: PNGFA (HQ, Provincial and FRI), UNREDD/OCCD, UNITECH/Forestry

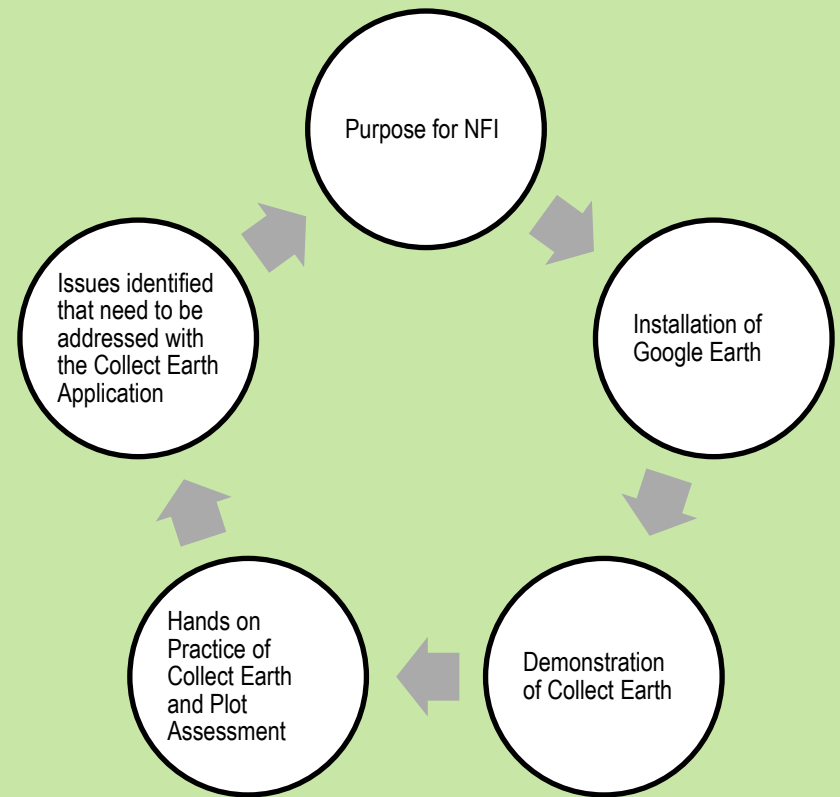
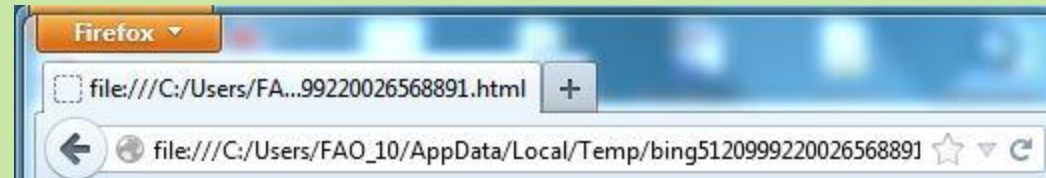


Diagram illustrating activities conducted in the first training.

Methodology- Step 2: Plot Assessment

- There were numerous tools or materials used in the plot assessment.



Note: The same materials/software were used for Steps 3-7

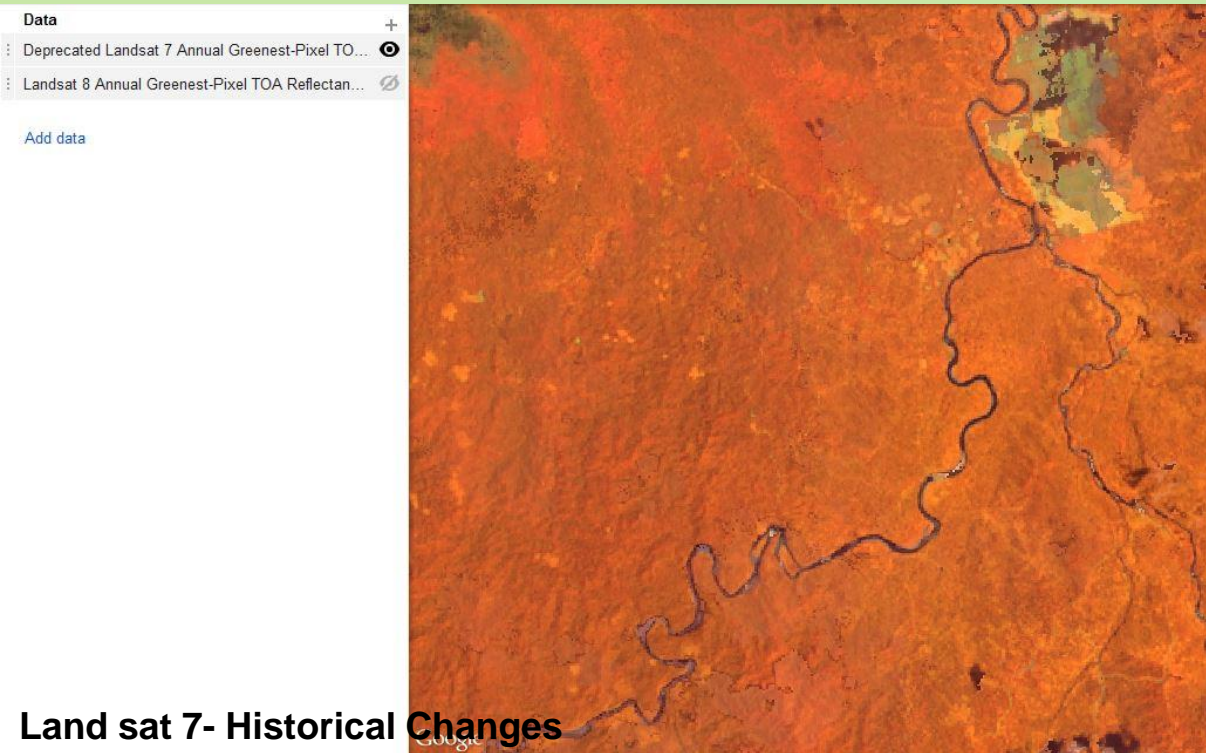
1. Google Earth and Collect Earth

The screenshot shows the Google Earth desktop application. On the left, the 'Places' panel lists 19 locations with IDs ranging from 73890 to 73908. The 'Layers' panel on the bottom left shows various map layers like 'Primary Database', 'Borders and Labels', 'Photos', 'Roads', '3D Buildings', 'Ocean', 'Weather', 'Gallery', 'Global Awareness', and 'More'. The main map area shows a satellite view of a forested area with a yellow rectangular selection box containing several small colored dots. On the right, the 'Collect Earth' data panel is open, displaying the following information:

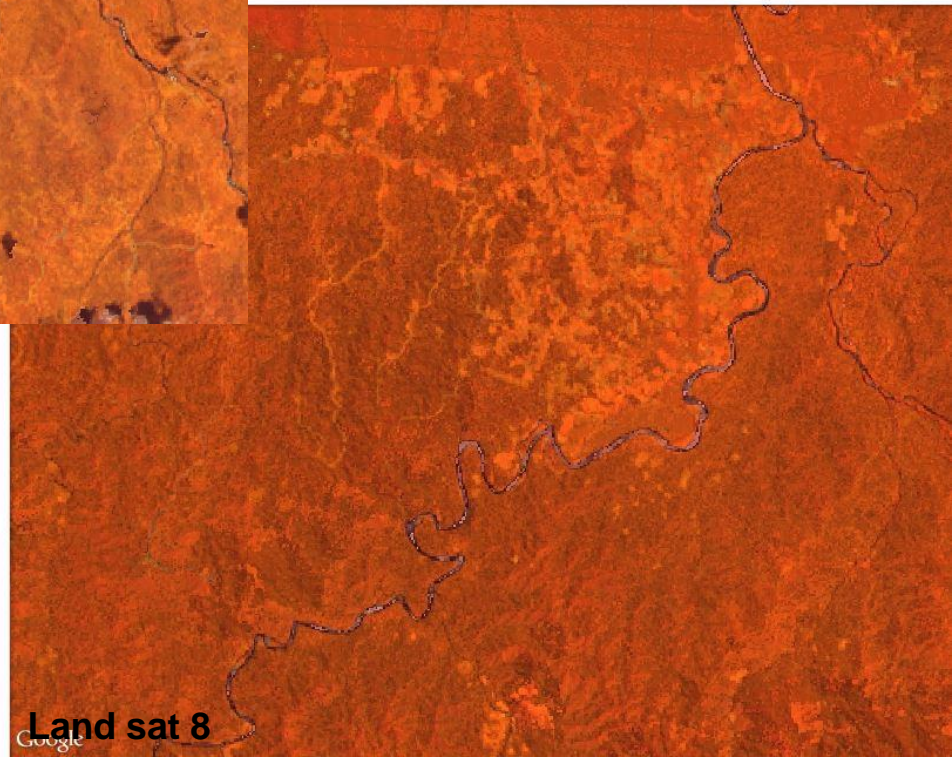
- Collect Earth** (with OPENFORIS logo)
- ID: 73907** - Elevation: 198m, Aspect: South-West, Slope: 12°
- Land use category:** Forest, Grassland, Cropland, Wetland, Settlement, Other, No Data, Accuracy YES NO
- Land use sub-category:** F > F, C > F, G > F, W > F, S > F, O > F, Accuracy YES NO, Year N/A
- Land use sub-division:**
 - Natural Forest:** Low alt. plains&M, Lower montane, Montane conifer, Littoral, Swamp, Woodland, Mangrove
 - Forest Plantation:** Low alt. uplands, Montane, Dry seasonal, Seral, Savanna, Scrub, Not Sure, Teak, Eucalyptus, Balsa, Klinki, Hoop, Pine, Acacia, Terminalia, Rubber, Others, Undetermined
- Accuracy:** YES NO
- Canopy:** (partially visible)

At the bottom of the screen, the Google Earth logo is on the right, and the text 'Google Earth and Collect Earth' is centered. The status bar at the very bottom shows 'Imagery Date: 10/4/2008', coordinates '59°52'46.11" S 150°24'01.91" E', elevation '208 m', and eye alt '1.04 km'. A 'Tour Guide' button and the year '2008' are also visible in the bottom left corner.

2. Google Engine: Land sat 7 & 8

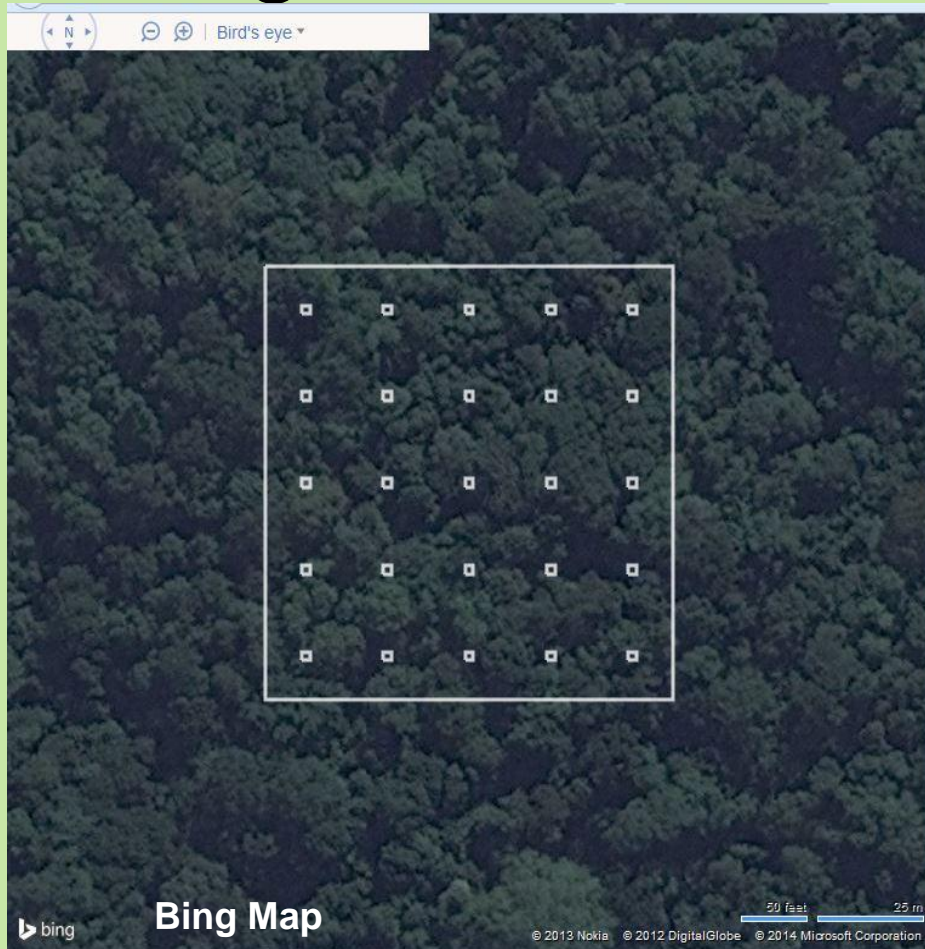


Zoom in 3 levels to view asset



2. Google Engine- Bing Map

3. Digital Globe Image



4. Rapid Eye image



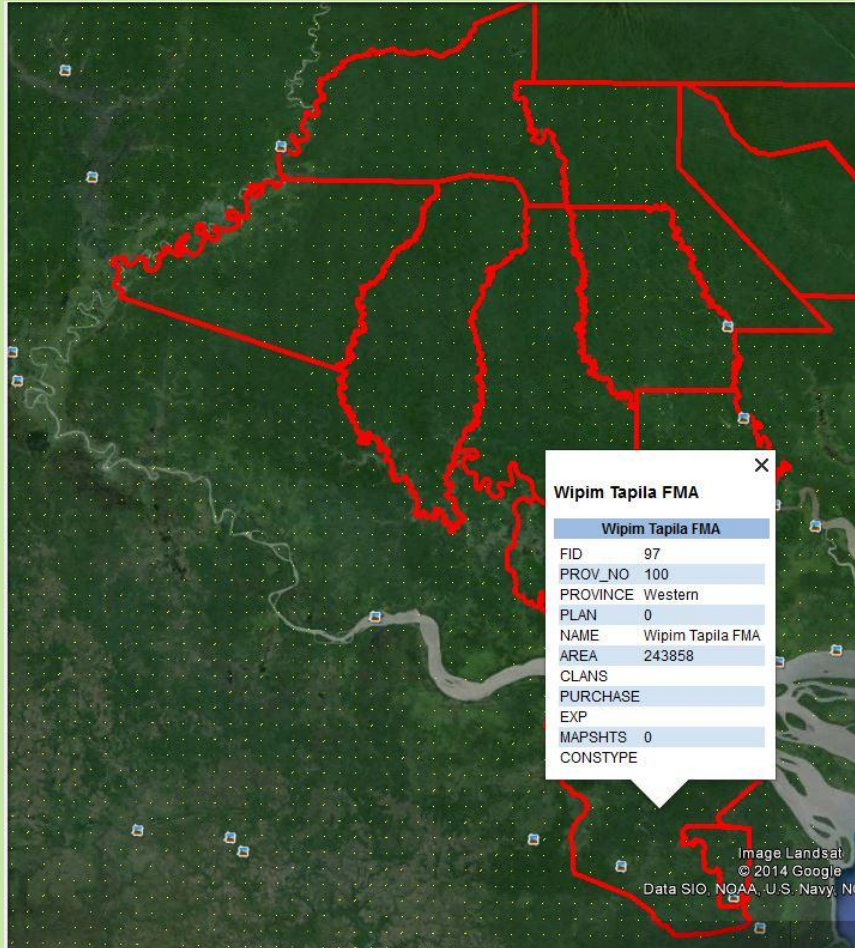
Land sat image



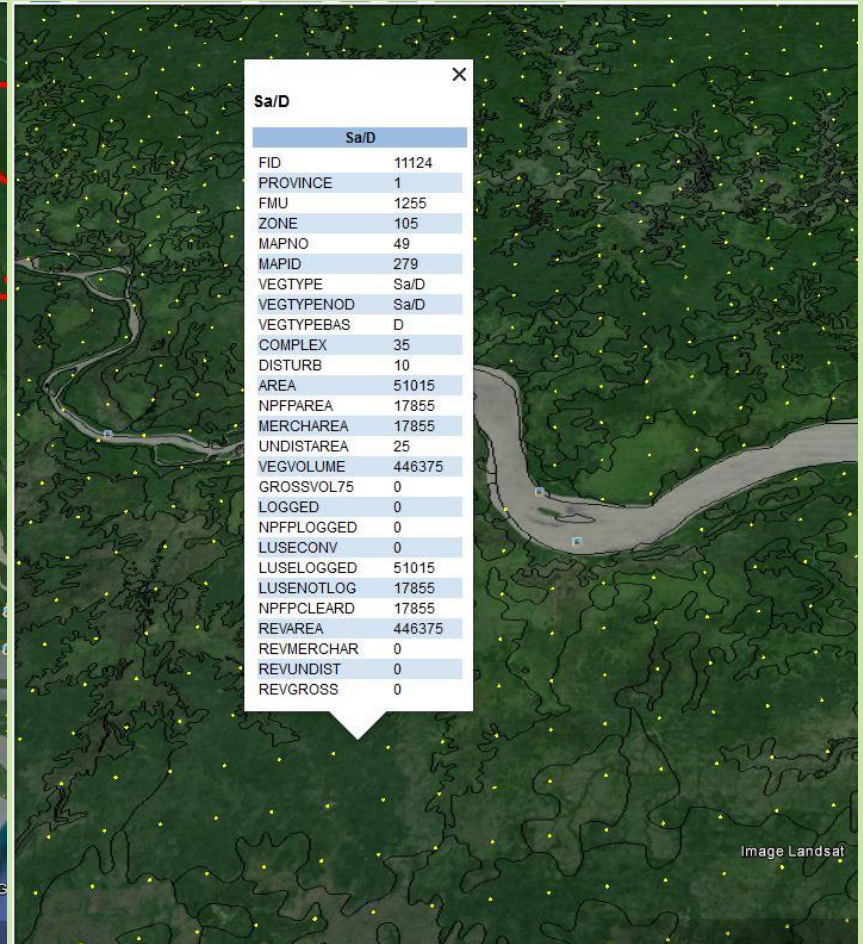
Rapid Eye

5. FIMS Logging Concessions

6. FIMS Forest/Vegetation classification



Logging Concession



FIMS Forest/vegetation classification

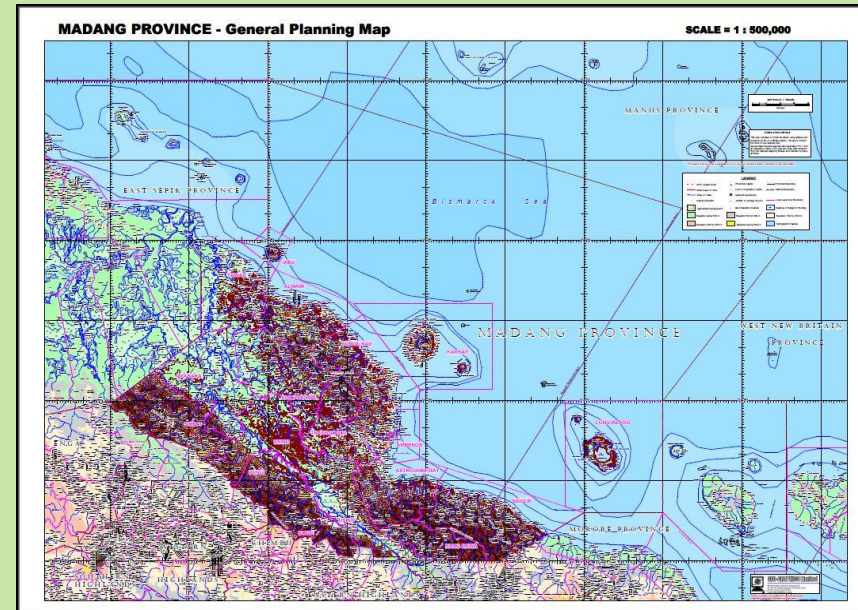
7.Land use Hierarchical Rules

8.General Planning Maps

Land use hierarchical rules

1. Settlement – 10%
2. Cropland- 20% (Subsistence agriculture-30%)
3. Forest land- 30%
4. Grassland- 30%
5. Wetland- 30%
6. Other land

Land use Hierarchical Rules



General Planning Map

9. Vegetation Type and Forest Definition

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Forest Definition
 A 1st land spanning more than 1 hectare, with trees higher than 3 metres and the canopy cover of more than 10 percent (N%). This does not include land that is predominantly under agricultural or urban land use.

Vegetation Type Grouping Table

IPCC 2006 GLADLU	FAD FRA2020 PNG CR	Forest and Non-Forest in Forest Base Map 2010	Vegetation type in Forest Base Map 2010	Condition	Code	Class in PNGRS Publication No. 4	
Forest land	Forest	Forest	1	Low Altitude Forest on Plains and Pans	below 1,000m	Fl Fp Fs Hl Hm HmAr HmC HmE HmF HmG HmH HmI HmJ HmK HmL HmM HmN HmO HmP HmQ HmR HmS HmT HmU HmV HmW HmX HmY HmZ	Large to medium crowned forest Open forest Small crowned forest Large crowned forest Medium crowned forest Medium crowned forest with Araucaria common Medium crowned forest with an even canopy Small crowned forest Small crowned forest with an even canopy Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina
			2	Low Altitude Forest on Uplands	below 1,000m	Hl Hm HmAr HmC HmE HmF HmG HmH HmI HmJ HmK HmL HmM HmN HmO HmP HmQ HmR HmS HmT HmU HmV HmW HmX HmY HmZ	Large crowned forest Medium crowned forest Medium crowned forest with Araucaria common Medium crowned forest with an even canopy Small crowned forest Small crowned forest with an even canopy Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina Small crowned forest with Casuarina
			3	Lowland Montane Forest	above 1,000m	L LAr LArC LArE LArF LArG LArH LArI LArJ LArK LArL LArM LArN LArO LArP LArQ LArR LArS LArT LArU LArV LArW LArX LArY LArZ	Small crowned forest Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common Small crowned forest with Araucaria common
			4	Montane Forest	above 3,000m	Mb	Very small crowned forest
			5	Dry Seasonal Forest in Western Provs		D	Dry evergreen forest
			6	Upland Forest		B BCe Bm Bw	Mixed forest Forest with Casuarina equisetifolia Forest with Melaleuca leucadendron Swamp forest
			7	Forest		W WAr WArC WArE WArF WArG WArH WArI WArJ WArK WArL WArM WArN WArO WArP WArQ WArR WArS WArT WArU WArV WArW WArX WArY WArZ	Riverine mixed successions Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina Riverine successions with Casuarina
			8	Swamp Forest		Sw SwAr SwArC SwArE SwArF SwArG SwArH SwArI SwArJ SwArK SwArL SwArM SwArN SwArO SwArP SwArQ SwArR SwArS SwArT SwArU SwArV SwArW SwArX SwArY SwArZ	Volcanic successions Mixed swamp forest Swamp forest with Casuarina Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron Swamp forest with Melaleuca leucadendron
			9	Woodland		W WAr WArC WArE WArF WArG WArH WArI WArJ WArK WArL WArM WArN WArO WArP WArQ WArR WArS WArT WArU WArV WArW WArX WArY WArZ	Woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland Riverine successions dominated by woodland
			10	Shrub		Sh ShAr ShArC ShArE ShArF ShArG ShArH ShArI ShArJ ShArK ShArL ShArM ShArN ShArO ShArP ShArQ ShArR ShArS ShArT ShArU ShArV ShArW ShArX ShArY ShArZ	Shrub Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron Shrub with Melaleuca leucadendron
			11	Scrub		Sc ScAr ScArC ScArE ScArF ScArG ScArH ScArI ScArJ ScArK ScArL ScArM ScArN ScArO ScArP ScArQ ScArR ScArS ScArT ScArU ScArV ScArW ScArX ScArY ScArZ	Scrub Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron Scrub with Melaleuca leucadendron
			12	Grassland and Herbland	Non-forest	G GAr GArC GArE GArF GArG GArH GArI GArJ GArK GArL GArM GArN GArO GArP GArQ GArR GArS GArT GArU GArV GArW GArX GArY GArZ	Grassland Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest Grassland with some forest
			13	Alpine grassland		A	Alpine grassland
			14	Subalpine grassland		S	Subalpine grassland
			15	Mangrove		M	Mangrove
			16	Agricultural Land Use	Non-forest	Ag	Agricultural Land Use
			17	Lakes and larger rivers		L	Lakes and larger rivers
			18	Bare areas		B	Bare areas
			19	Settlements and larger urban centres		U	Settlements and larger urban centres
			20	Forest Plantation	Forest	P	Forest Plantation
			21	Plantation other than forest plantation	Non-forest		Plantation other than forest plantation

Methodology-Step 8:Data Analysis

The screenshot displays the Saiku web interface in a Firefox browser window. The address bar shows the URL: localhost:8181/#Elevation/hierarchy/[Elevation.elevation]/[Elevation.elevation],[Elevation]. The interface features a top navigation bar with the Saiku logo and a toolbar with various icons. Below the toolbar, there is a section for 'Cubes' and 'Dimensions'. The 'Dimensions' section is expanded to show a tree view of dimensions, including 'Elevation' and 'Land Use Subdivision'. The 'Elevation' dimension is selected, and the 'Subdivision' filter is applied. The 'Columns' section is set to '(All)' and the 'Rows' section is set to 'Subdivision'. The 'Filter' section is set to 'Rectangular Snip'. The data table below shows the following results:

Subdivision	All Elevation.elevations
Low altitude forest on plains and fans	4,654
Low altitude forest on uplands	6,495
Lower montane forest	4,774
Montane forest	234
Dry seasonal forest	757
Littoral forest	82
Seral forest	193
Swamp forest	1,098
Savanna	402
Woodland	810
Scrub	199
Mangrove	178
Montane coniferous forest	43

Saiku interface

DEMONSTRATION