INVENTORY AND MONITORING FOREST RESOURCES

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BACKGROUND: FOREST INVENTORY IN INDONESIA BASED ON:

Law No 41 Year 1999 Para 13:

Forest Inventory using the terrestrial survey methodology:

Status and physical condition of forest, flora and fauna, included another resources.

Socio economic of community in and around the forest

Forest Inventory Based On: Law NO. 41 TAHUN 1999

- National *
- Sub National
- **Catchment Area**
- **Forest Management Units***

National Forest Inventory

NFI PROJECT (1989 – 1996) FAO - GOI

NFI COMPONENT :

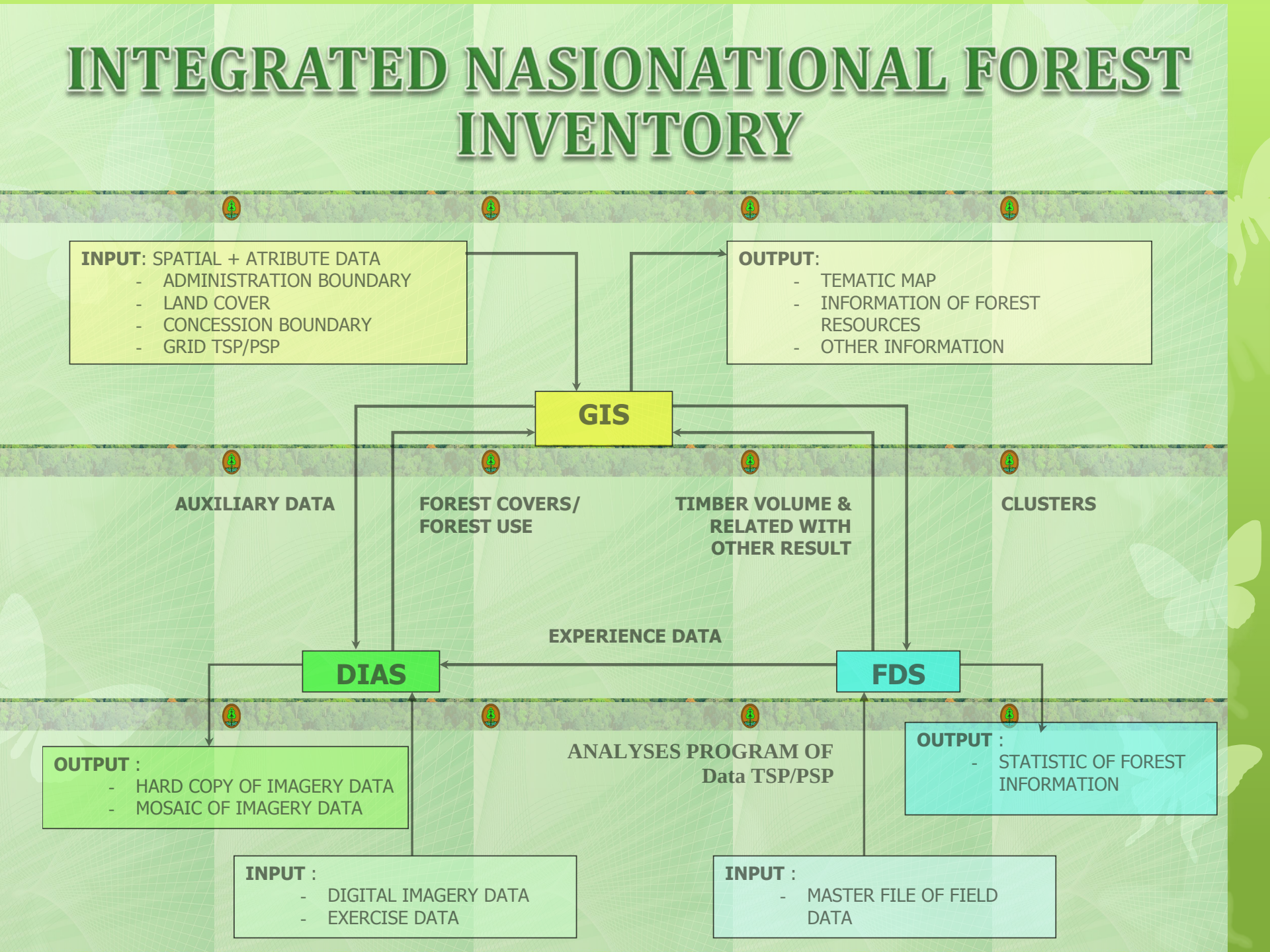
1. FOREST RESOURCES MONITORING (FRA)
2. FOREST RESOURCES MONITORING (FRM)
3. GEOGRAPHIC INFORMATION SYSTEM (GIS)
4. USER SERVICES

GOAL :

1. TO PROVIDE THE INFORMATION OF LOCATION AND FOREST TYPE DISTRIBUTION AND LANDUSE
2. TO BUILT AND DEVELOP NFI SYSTEM FOR FOREST RESOURCES MONITORING
3. TO ESTIMATE TIMBER VOLUME, GROWTH AND YIELD AND FOREST DINAMIC DEPENDS ON FOREST TYPE, SPECIES OR GROUP OF SPECIES

TO PROVIDE THE INFORMATION FOR STAKEHOLDER TO SUPORT PLANNING AND POLICY MAKING AND MONITORING IN FORESTRY SECTOR AT NATIONAL LEVEL AND REGION

INTEGRATED NASIONATIONAL FOREST INVENTORY



Data for the Forest Policy

Information of Community

Information of forest

Information of forest cover

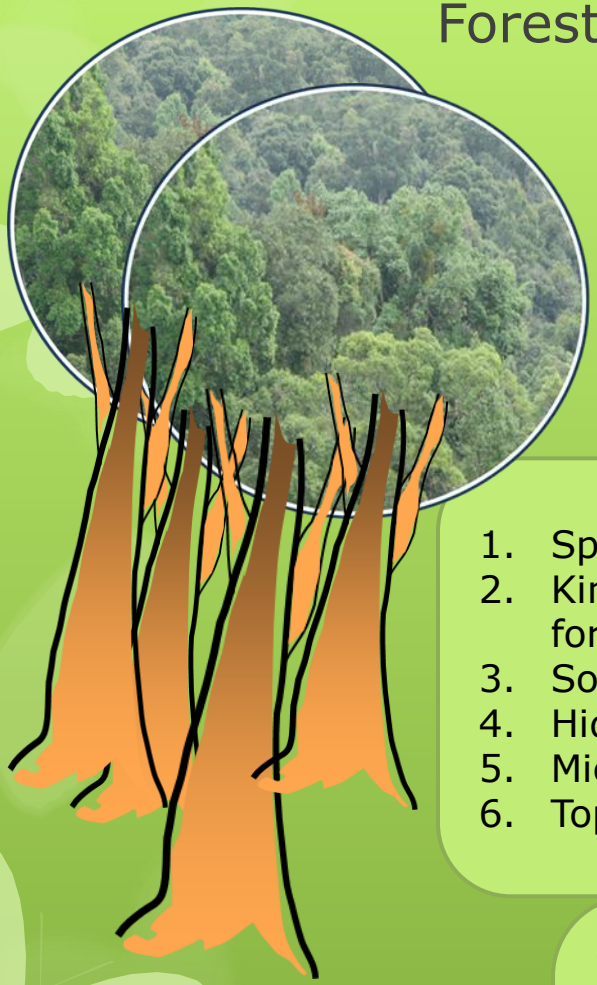
Number of Villages in and around FMU

Number of Cluster (TSP/PSP)

Inventory of Social Economic Conditions

Tools and Human resorces	Field Data System	Geographic Information System	Digital Image Analysis System

Forest Inventory



1. Species and potencial of flora
2. Kinds of forest Land used and forest cover
3. Soil texture
4. Hidrology, water (spring) and site
5. Micro climate
6. Topography

Socio culture inventory

- **Biophysics (soil, topography, micro climate)**
- **Demographyphy (number of people, education level, , livelihoods)**
- **infrastructure**
- **Village history, sttelemen and land use (after and before forest establisment)**
- **System and structure of communities**
- **Calender season**
- **Type of interaction community nearby forest with forest**

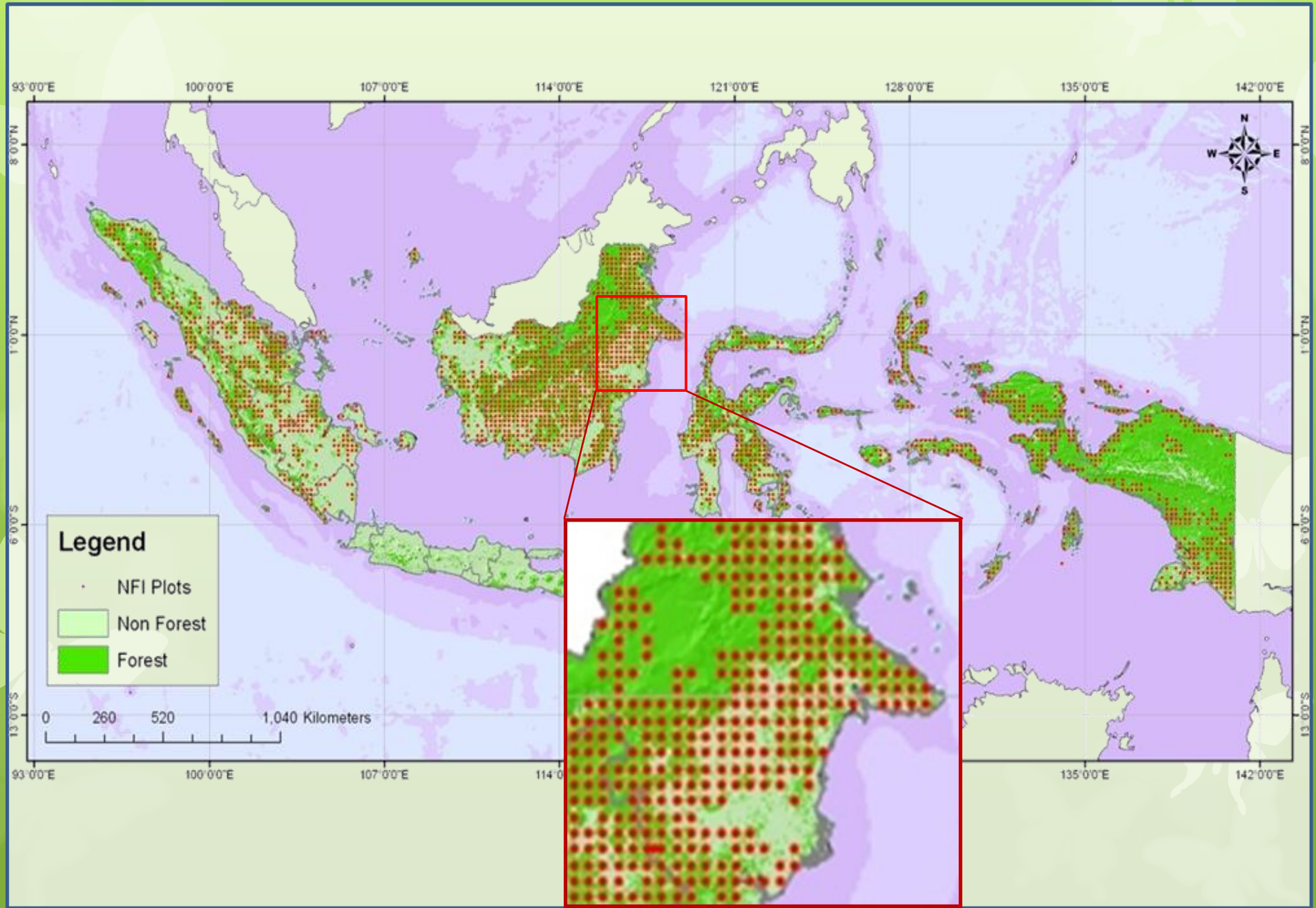
1. FDS : Doing field inventory

Temporary Sample Plots (TSP) in enumeration activity; Permanent Sample Plots(PSP) in Re-enumeration; Processing field data system integrated with GIS

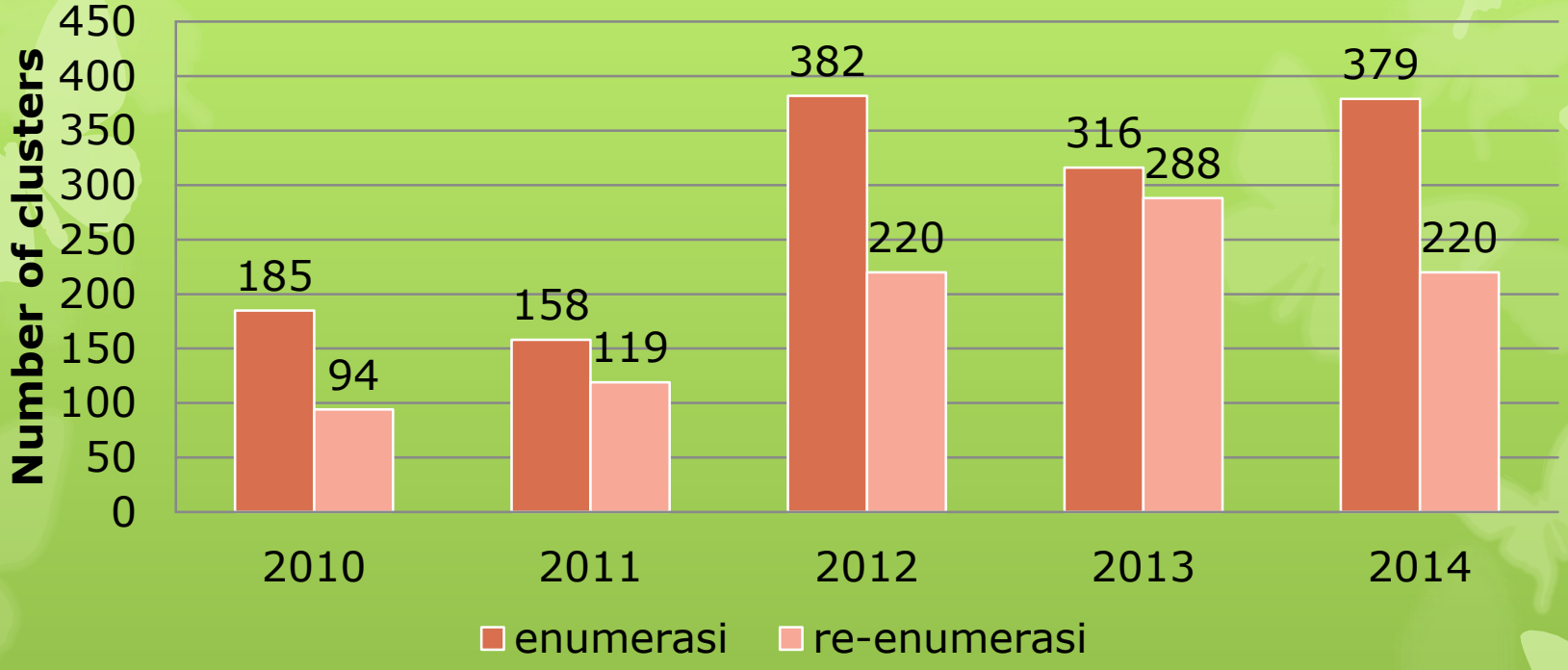
2. FRM : Mapping, data updating, land cover change monitoring use imagery data (in different of time)

3. DIAS : Digital image Interpretation as data input for FRM

4. GIS : Built GIS basic data and change monitoring and integrated with other information


93°0'0"E
100°0'0"E
107°0'0"E
114°0'0"E
121°0'0"E
128°0'0"E
135°0'0"E
142°0'0"E
8°0'0"N
1°0'0"N
6°0'0"S
13°0'0"S
N
W
E
S
Legend
NFI Plots
Non Forest
Forest
0
260
520
1,040 Kilometers

Number of NFI Clusters in Indonesia



1. At the beginning, Design of TSP PSP is 20 km x 20 km
2. Re-design of TSP PSP is 10 km x 10 km
3. The DOERS is technical Unit of DG.Planology, named BPKH. There 22 Technical Unit spread over Indonesia
4. Budget of Enumeration is Rp.79.mio/cluster (7190 $ USA)
5. Budget of Re-enumeration is Rp. 35 mio/cluster (3182 $USA)

Inventarisasi Hutan Nasional Indonesia (two types of Clusters)

Activity		Objectives
Enumeration	Measuring in TSP/PSP	To estimate the timber Volume, Stand Condition, Species Distribution, Species Diversity
Re-enumeration	Measuring PSP	To estimate growth and forest dynamic (increment)

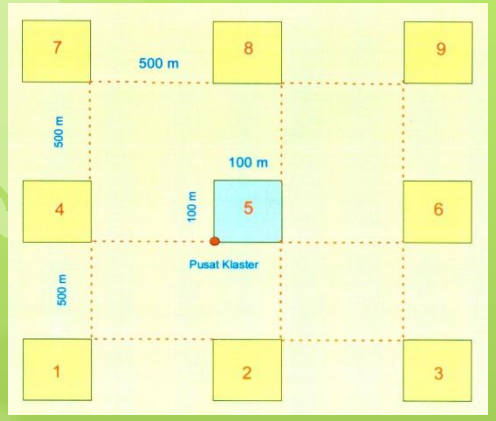
1x

xx

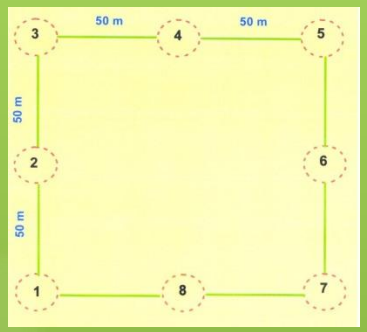
1. Using the systematic sampling
2. Distance between cluster is 20 x 20 km; 10 km x 10 km
3. Spread over forest area
4. Next re-enumeration based on the representative area

Forest Management Unit; Stratification Method

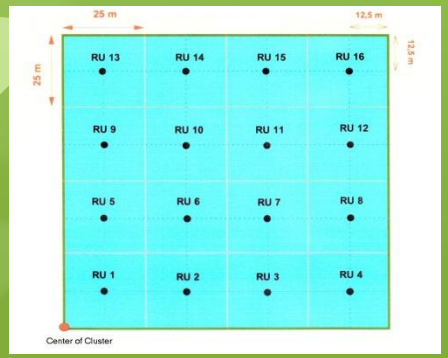
CLUSTER PLOTS LAYOUT



1 cluster: 9 Tract or 72 Sub Plot
TSP : Temporary Sample Plots
PSP : Permanent Sample Plots



1 tract Temporary Sample Plot (TSP): 8 Sub Plot (± 1 Ha)
Included PSP (tract 5th)
Measurement with point sampling technique (BAF 4)



1 tract PSP = 1 Ha
Only at 5th tract, Square plot (100 m x 100 m)
with 16 Record Unit

MEASUREMENT OF TSP AND PSP

100 m

100 m

17 trees in BAF 4 m2/ ha

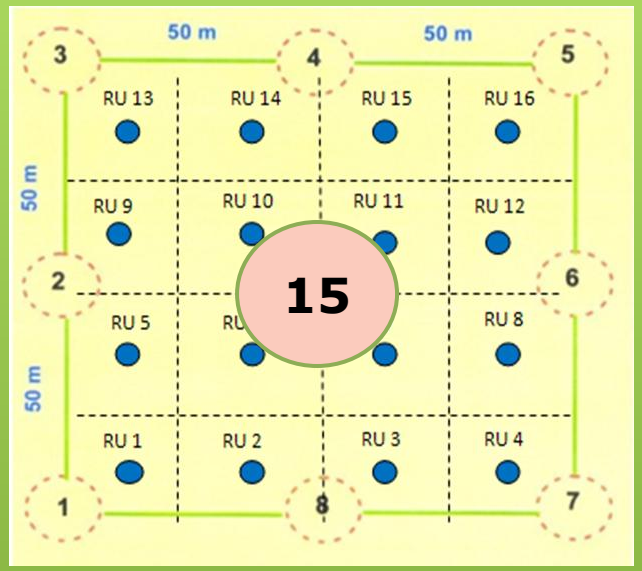
500 m

15 trees / ha in BAF 4 m2/ ha

500 m

12 trees/ ha in BAF 4 m2/ ha

500 m



11 trees/ha in BAF 4 m2/ ha

14 trees/ha in BAF 4 m2/ ha

500 m

17 trees /ha in BAF 4 m2/ ha

500 m

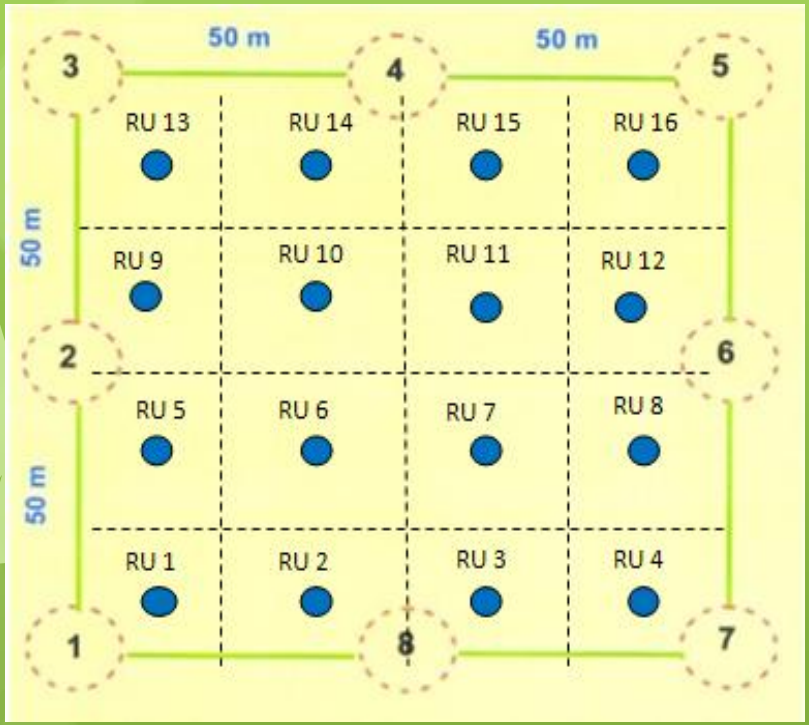
15 trees /ha in BAF 4 m2/ ha

500 m

14 trees/ha in BAF 4 m2/ ha

Verification and validation of Data TSP and PSP

The result of point sampling (TSP) and record unit (PSP) must have tolerancy (sampling error) → ≈ 10 % (in which value of N and V at TSP dan PSP has a difference not more than ≈ 10 %)



Tract 5, Point sampling (sub plot 1 s/d 8) must have difference value of N and V not more than 10 % with value of N and V at record unit (RU) 1 s/d 16

Must include the Tree Map at Track 5 and documentation of center cluster.

Coordinate of T1 dan T2 on tracking must directly record with GPS and verified by "Kepala Seksi ISDH"

Verification and Validation of TSP and PSP at ENUMERATION ACTIVITY

Tract 5

TSP		PSP
Subplot 1	Must has value with the difference ≤ 10 % (Vise versa)	RU 1
Subplot 2	Must has value with the difference ≤ 10 % (Vise versa)	RU 5 dan 9
Subplot 3	Must has value with the difference ≤ 10 % (Vise versa)	RU 13
Subplot 4	Must has value with the difference ≤ 10 % (Vise versa)	RU 14 dan 15
Subplot 5	Must has value with the difference ≤ 10 % (Vise versa)	RU 16
Subplot 6	Must has value with the difference ≤ 10 % (Vise versa)	RU 8 dan 12
Subplot 7	Must has value with the difference ≤ 10 % (Vise versa)	RU 4
Subplot 8	Must has value with the difference ≤ 10 % (Vise versa)	RU 2 dan 3

Method of Forest Resource Assesment

Ground Check

- NFI
- Balance of Natural Resources
- Socio Economy

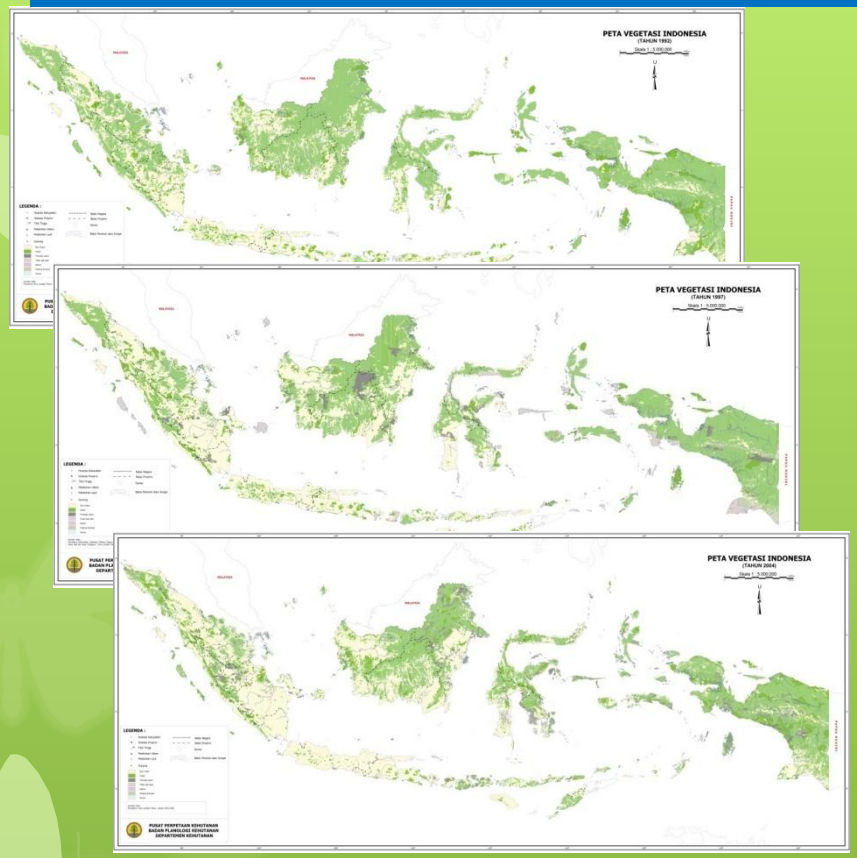
Remote Sensing

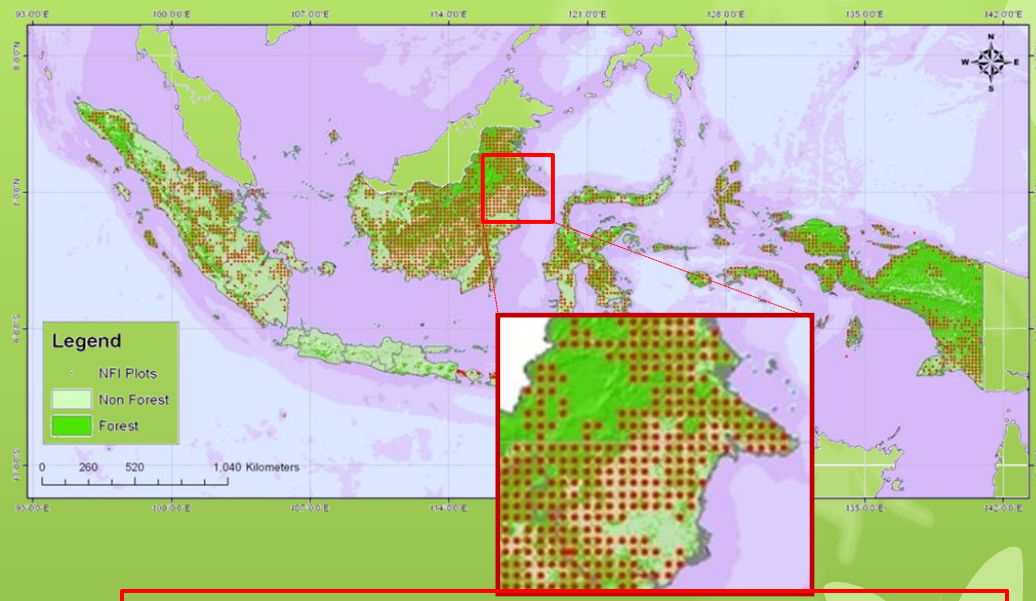
- Forest Cover
- Degradasi & Deforestasi
- Mapping

- Q C (Quality Control)
- Q A (Quality Assurance)

Primary Forest		
No activities of logging , high timber volume	No activities of logging , medium timber volume	No activities of logging , low timber volume
(≥ 7 trees, BAF 4 m2/ha)	(4-6 pohon, BAF 4 m2/ha)	(≤ 4 pohon, BAF 4 m2/ha)
(vol ≥ 250 m3/ha)	(vol 150- 250 m3/ha)	(vol ≤ 150 m3/ha)

PENGGUNAAN DATA NFI UNTUK PENDUGAAN EMISI DAN SERAPAN

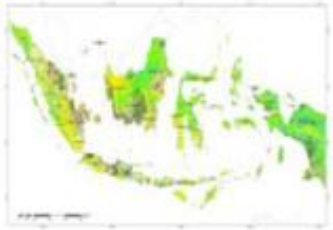


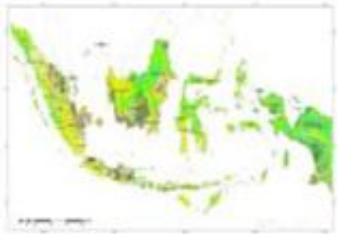


Forest Cover Change:
Landsat 5, Landsat 7 ETM+ , another satelite (1990, 1996, 2000, 2003, 2006, 2009, 2011)

Sample Plot **National Forest Inventory (NFI)**

- 1990-1996 (2.735 cluster plots)
- 1996-2000 (1.145 cluster plots)
- 2000-2006 (485 cluster plots)
- 2006-2014 (>3.000 cluster plots)

Pendugaan Kandungan Karbon =  Kandungan Karbon/ha X  Data Aktivitas

Pendugaan Serapan Karbon =  Serapan Karbon/ha X  Data Aktivitas

Monitoring of Data Activity
1990-1996 ,
1996-2000,
2000-2003,
2003-2006,
2006-2009,
2009-2011,
2011-2012,
2012-2013.

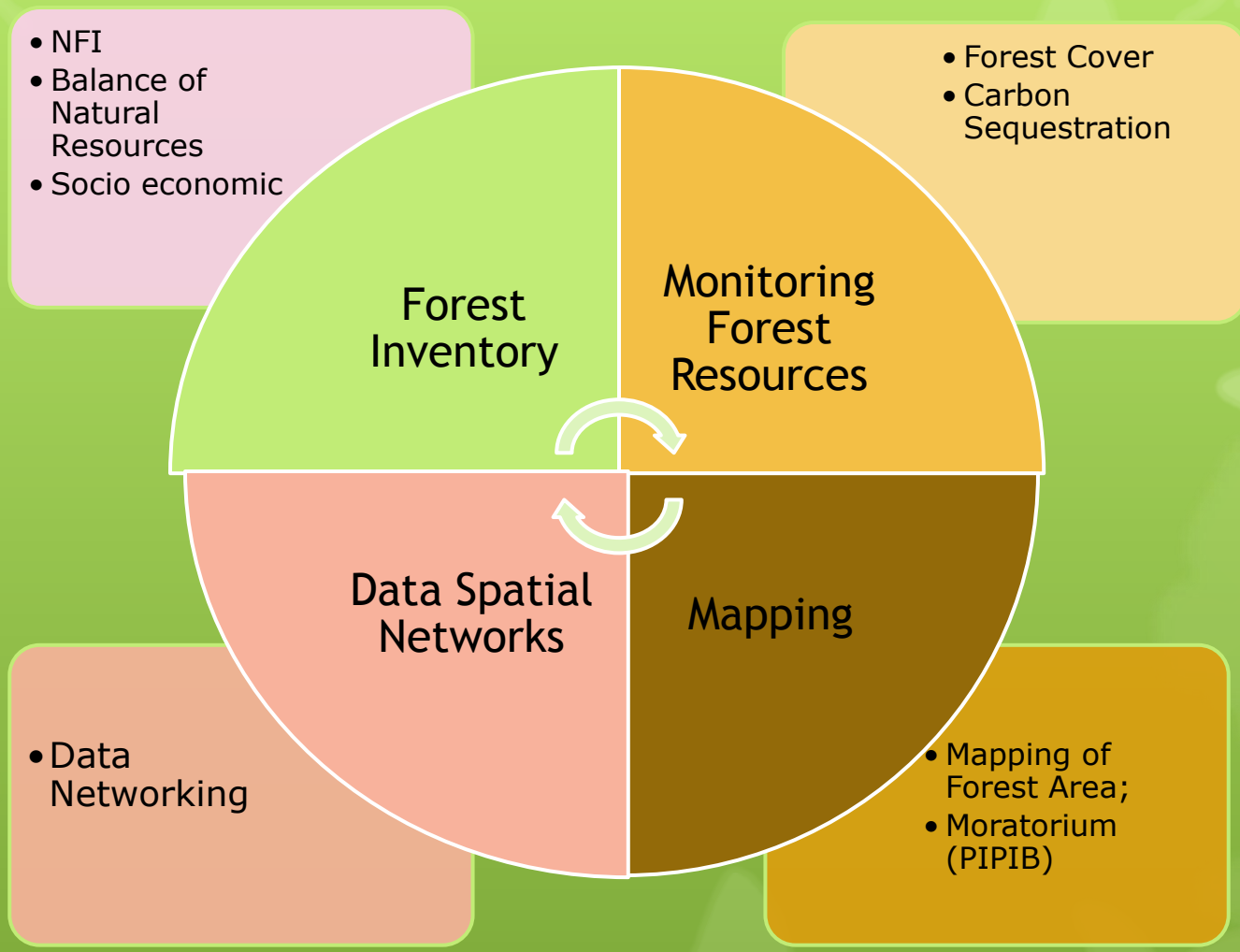
PENUTUPAN LAHAN TAHUN 2012

PENUTUPAN LAHAN TAHUN 2011	Grand Total	HLK Primer	HLK Sekunder	Hutan Mangrove	Hutan Rawa	Hutan Tanaman	Belukar	Pertanian	Sawah	Perkebunan	Tanah Terbuka
HLK Primer	40.345.470	40.321.899	6.736				10.682	2.083	129	982	2.958
HLK Sekunder	37.648.438		37.243.782			1.109	182.553	61.033	1.972	50.959	107.029
Hutan Mangrove	2.867.157			2.852.058			7.759	1.710	174	206	5.250
Hutan Rawa	12.456.516				12.244.001	18.003	84.958	2.323	278	23.151	83.803
Hutan Tanaman	4.806.743					4.707.768	7.879	4.744	1.091	8.292	76.969
Belukar	23.535.600		49			17.229	23.473.799	8.456		26.578	9.490
Pertanian	36.762.532						78	36.762.405			49
Sawah	12.640.019								12.639.875		144
Perkebunan	9.682.136					51	758	3		9.679.476	1.848
Tanah Terbuka	10.947.340					96.976	2.461	374	1	14.319	10.833.209
Grand Total	191.691.951	40.321.899	37.250.567	2.852.058	12.244.001	4.841.135	23.770.928	36.843.130	12.643.521	9.803.963	11.120.748

PERBANDINGAN STOK KARBON PER PENUTUPAN LAHAN TAHUN 2012 & 2013

No.	Class of Forest Cover	Carbon Stock 2013	Carbon Stock 2012
1	Hutan Lahan Kering Primer	3,824,821,638	4,628,559,456.93
2	Hutan Lahan Kering Sekunder	3,414,426,141	4,390,246,727.79
3	Hutan Mangrove Primer	66,361,296	101,743,948.87
4	Hutan Rawa Primer	534,284,569	644,421,662.83
5	Hutan Tanaman	105,882,354	296,455,699.64
6	Semak Belukar	604,940,733	1,231,526,813.01
7	Perkebunan	1,268,737,458	792,091,984.28
8	Pemukiman	5,932,698	14,050,531.37
9	Lahan Terbuka	19,895,903	8,043,334.88
10	Savanna	7,423,961	4,284,802.26
11	Tubuh Air	-	-
12	Hutan Mangrove Sekunder	52,574,412	89,141,843.08
13	Hutan Rawa Sekunder	223,772,222	470,797,364.75
14	Semak Belukar Rawa	79,769,829	253,635,574.28
15	Pertanian Lahan Kering	31,505,545	101,843,304.66
16	Pertanian Lahan Kering Campur	1,511,737,685	797,458,667.09
17	Sawah	8,041,831	14,654,436.90
18	Tambak	-	-
19	Bandara/Pelabuhan	-	-
20	Transmigrasi	25,830,428	3,268,720.22
21	Pertambangan	-	-
22	Rawa	-	-
Total		**11,785,938,702**	**13,842,224,872.86**

Team of Forest Inventory



Terima kasih
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Land Cover Classes

Informasi Penting Dalam Supervisi

- Peta lokasi dan Peta penutupan lahan
- Peta kerja (termasuk mencapai lokasi)
- Cek lokasi klaster di atas peta
- Cek teknik pengambilan sample (sistematik, jalur, stratifikasi)
- Cek jumlah klaster/plot yang diukur bandingkan dengan luasan
- Cek hasil inventarisasi hutan
- Cek Nilai potensi kayu
- Cek Jenis dan diameter kayu yang diukur
- Cek pengukuran di lapangan (sesuai??)
- Cek pembagian petak (sesuai dengan methode klaster?
- Cek pengukuran kayu di bawah diameter 20 cm
- Cek informasi lainnya (tanah, iklim, topografi dll)

Teknik invent arisasi hutan

MITIGASI

1. **Reducing emission from deforestation:**
   - **Suspension on New Licensing in Primary Forest and Peatland (Moratorium Indicative Map, revised every 6 months).**
   - **Combating illegal logging and law enforcement (minimal 75%).**
   - **Preventing and controlling of encroachment (minimal 75%).**
2. **Reducing emission from forest degradation:**
   - **Hotspot reduction for 20% every year**
   - **Control the conversion of natural forests and peat forest rehabilitation (INPRES 6/2011).**
3. **Conservation of forest carbon stocks:**
   - **Ecosystem Restoration in conservation area (4 locations).**
   - **Improved management of protected areas through resort-based management (51 National Park).**
   - **Establishment of protected areas in the concessionaires area (HCVA/ HCVF).**

4. Sustainable management of forest:
   - Forest boundary establishment: 65.000 km.
   - Establishment of Forest Management Unit (FMU): 120 models.
   - Integrated Watershed Management: 108 locations.
   - Certification of Sustainable Forest Management (50 unit).
   - Applying of timber legality certification (Timber Legality Verification System).
   - Applying of Multi-System Intensive Silviculture.
5. Enhancement of forest carbon stocks:
   - One Billion Indonesia's Tree (OBIT) Program for the world.
   - Rehabilitation and development of the forest 500.000 ha/year.
   - Forest plantation in concessionaire and community forest (2,65 million ha).

FRA 2015


FRIMS
Forest Resources Information Management System
FRA
2015
Please sign in
User:
Password:
Username
Password
Select your language:
English
Sign in
CFRQ
Collaborative Forest Resources Questionnaire
Forest Europe growing life
COMIFAC
ITTO
Release 20131209

1. What is the area of forest and other wooded land and how has it changed over time?

Documents for this question:

- Guide for country reporting FRA 2015
- FRA 2015 Terms and Definitions

1.1 Categories and definitions

Category	Definition
Forest	Land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent or trees able to reach these thresholds in situ. It does not include land that is predominantly under agricultural or urban land use.
Other	Land not classified as "Forest" spanning more than 0.5 hectares with trees