El estatus de la ciencia en México para dar sustento a politicas de mitigación en el marco de REDD+

Bernardus de Jong, El Colegio de la Frontera Sur
Fernando Paz, Colegio de Postgraduados
Marcela Olguin, El Colegio de la Frontera Sur
Jorge D. Etchevers, Colegio de Postgraduado
Carlos Omar Cruz, Instituto Nacional de Estadística y Geografía

Seminario «Hacia REDD++: Integración de Políticas Forestales y Agropecuarias»
Facultad de Planeación Urbana y Regional, UAEM, Toluca, Edo de México
1 de abril de 2011

REDD+ is accepted at COP16:

- as an independent mitigation action from the forest sector, with its own specific rules and modalities, encompassing the following activities:

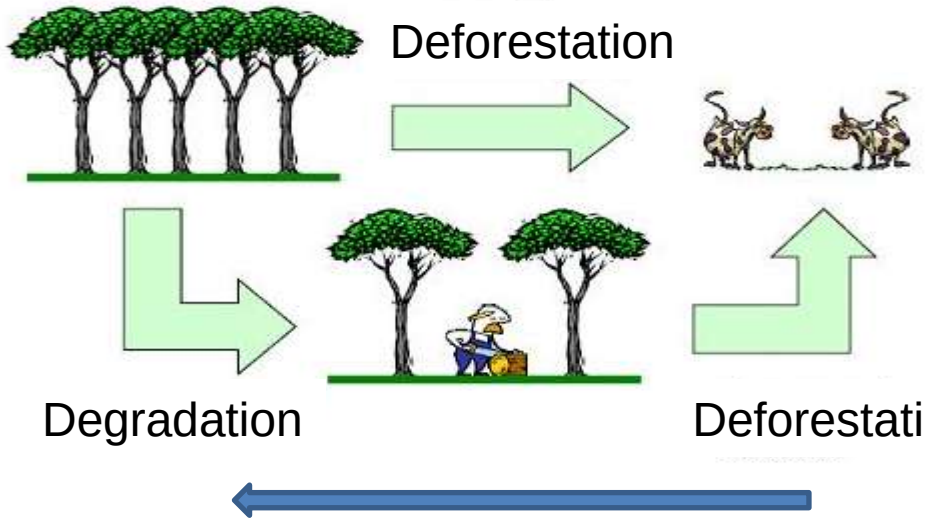
1. – Reducing emissions from deforestation
1. – Reducing emissions from forest degradation
1. – Conservation of carbon stocks
2. – Sustainable management of forests
2. – Enhancement of carbon stocks

Emission reductions

Stock conservation and enhancement (removals)

1. Reservorios de C + CUS

2. Cambios en reservorios y CUS



(Herold and Skutch, 2010)

Temas

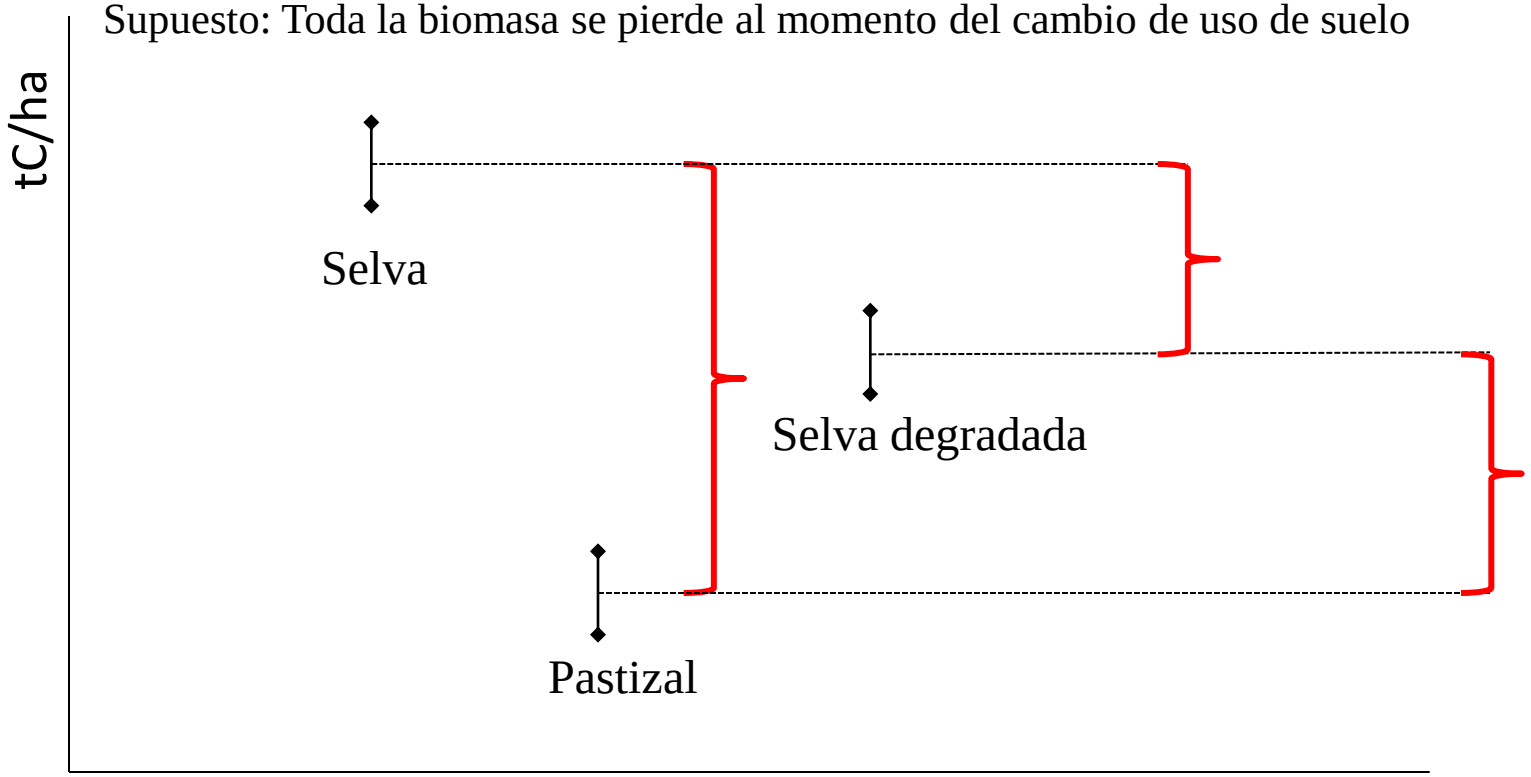
- Establecer una escenario de referencia nacional
  - Cambio de uso de suelo histórico
  - Factores de emisión y remoción
  - Emisión y remoción de C por Deforestación, degradación, restauración y reforestación.
- Siguientes pasos
  - 5 reservorios (IPCC)
  - Escalamiento nacional←→ local

Emisión de CO_2 por cambio de uso de suelo:

1. de un tipo de uso de suelo con alta densidad de biomasa a un uso con baja densidad (Deforestación, degradación)

$(C_{original} - C_{cambio})$ * superficie cambiado * 44/12

Supuesto: Toda la biomasa se pierde al momento del cambio de uso de suelo

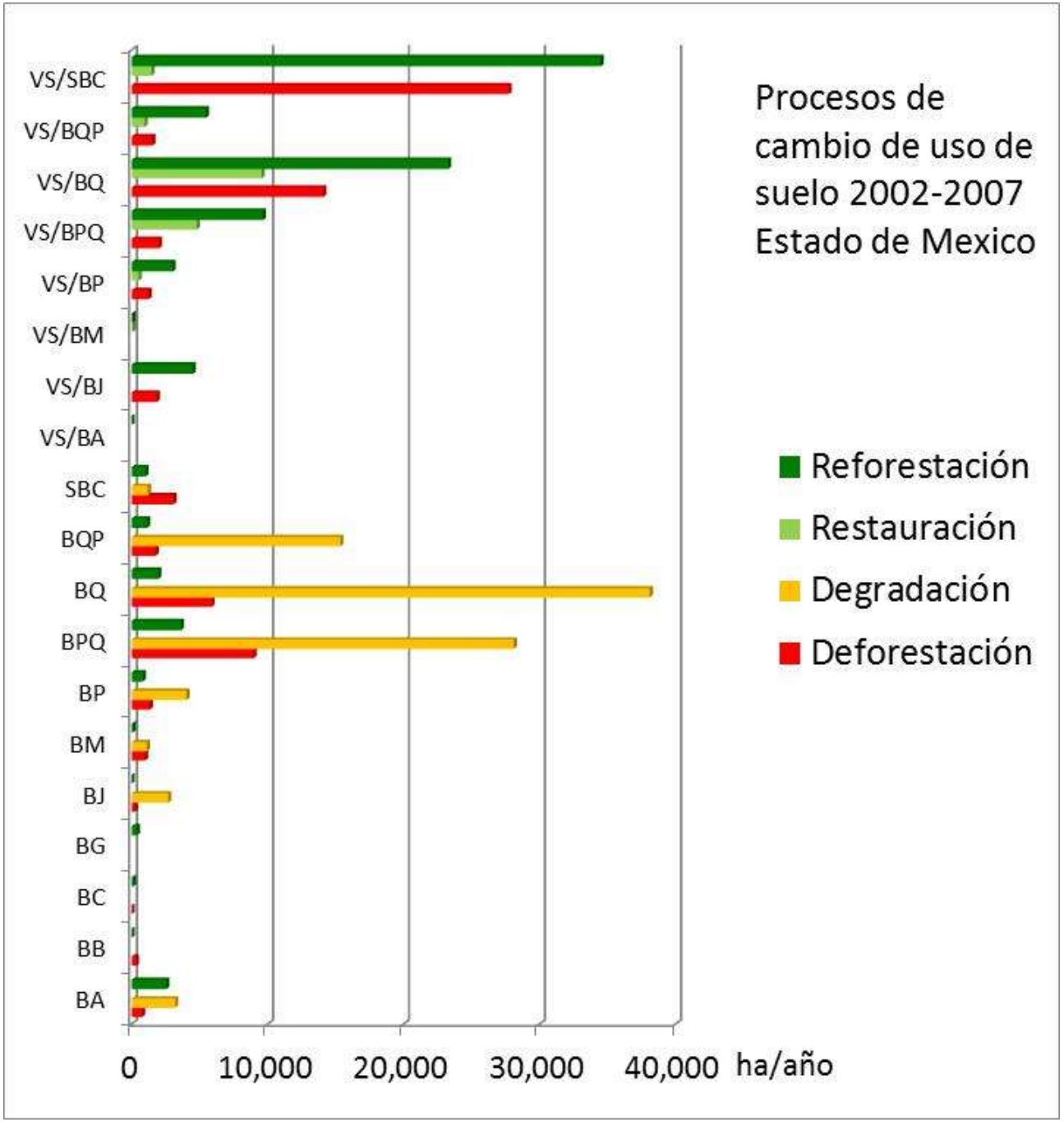


Reference emission scenario

Historical rates of forest conversion

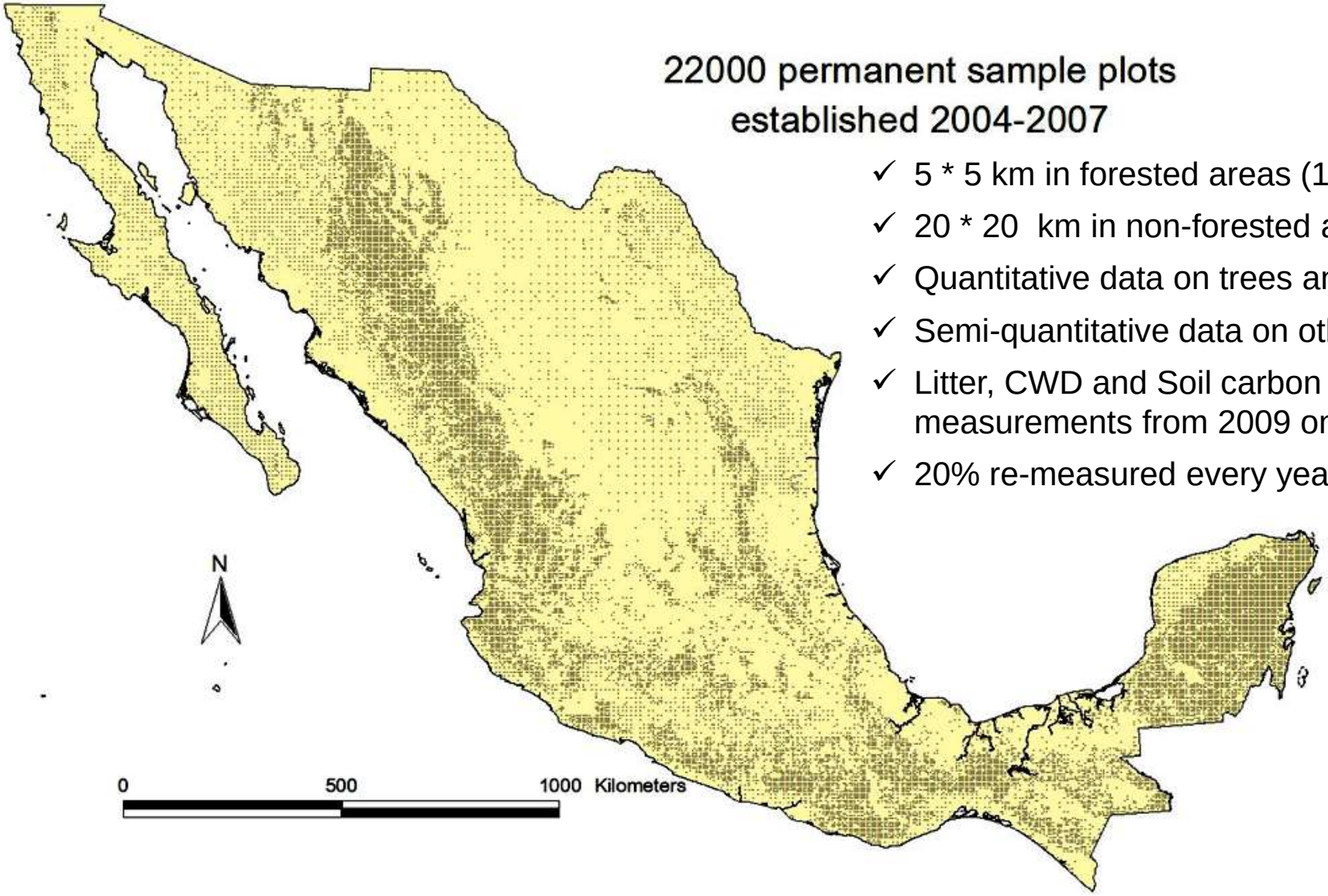
Annual rates of change (ha/yr), based on national LU maps

	1993-2002	2002-2007
Gross Deforestation	595,400	590,400
Reforestation (natural and planted)	264,600	392,700
Net Deforestation	330,800	197,700
Degradation	633,000	415,800
Recovering	176,000	109,400
Net Degradation	457,000	306,400


VS/SBC
VS/BQP
VS/BQ
VS/BPQ
VS/BP
VS/BM
VS/BJ
VS/BA
SBC
BQP
BQ
BPQ
BP
BM
BJ
BG
BC
BB
BA
0
10,000
20,000
30,000
40,000
ha/año
Procesos de cambio de uso de suelo 2002-2007 Estado de Mexico
Reforestación 93,172
Restauración 17,373
Degradación 93,841
Deforestación 71,883

Develop biomass density maps to estimate level of emissions from LU-change.

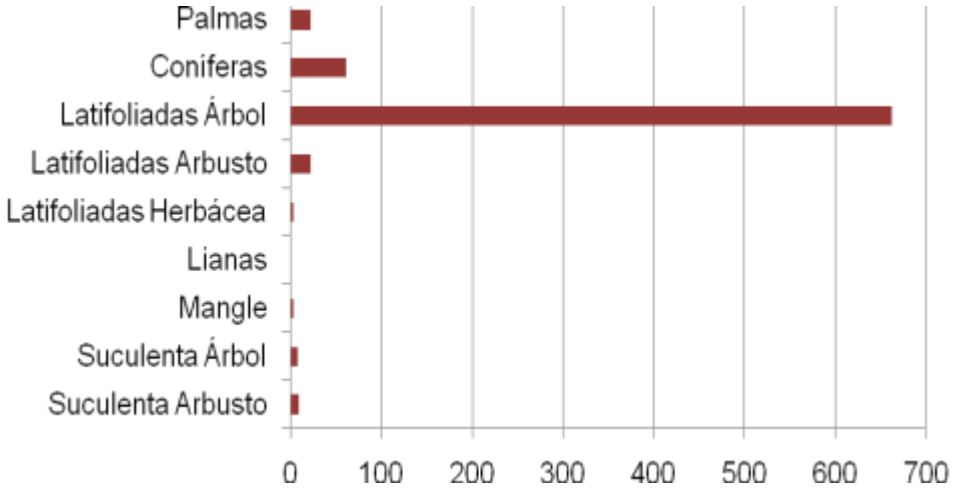
National inventory data and national database of biomass equations



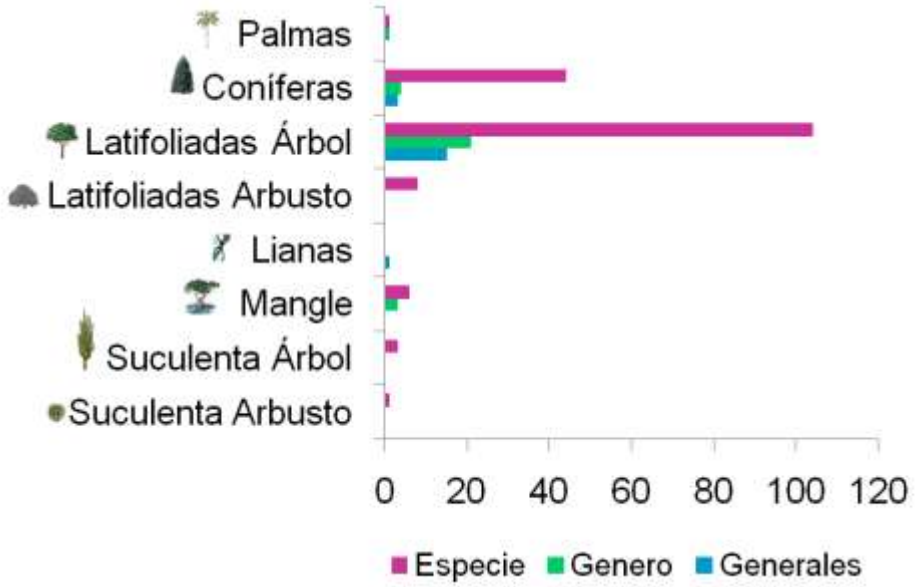
- ✓ 5 * 5 km in forested areas (1600 m2)
- ✓ 20 * 20 km in non-forested areas
- ✓ Quantitative data on trees and shrubs
- ✓ Semi-quantitative data on other pools
- ✓ Litter, CWD and Soil carbon measurements from 2009 onward
- ✓ 20% re-measured every year

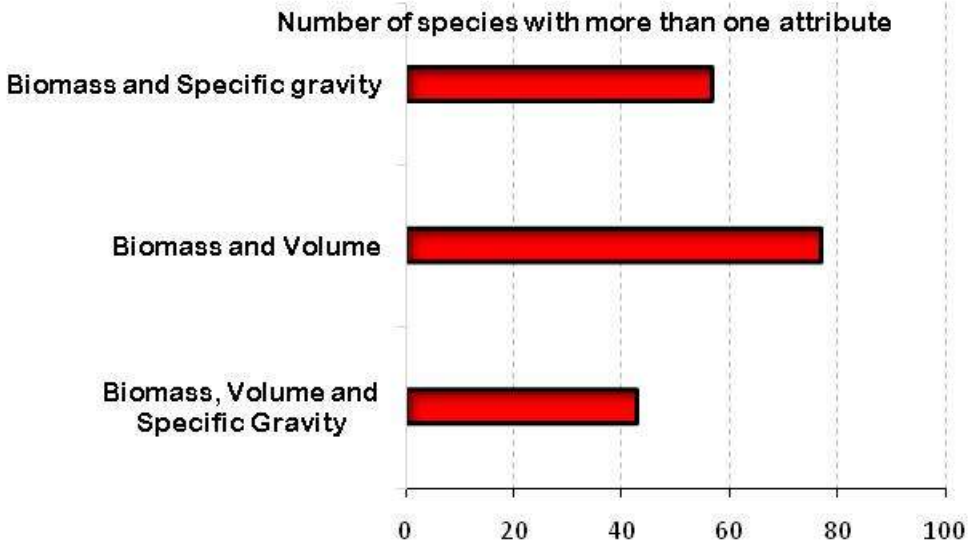
Allometric equations to convert inventory and other data to volume or biomass

Volume



Biomass

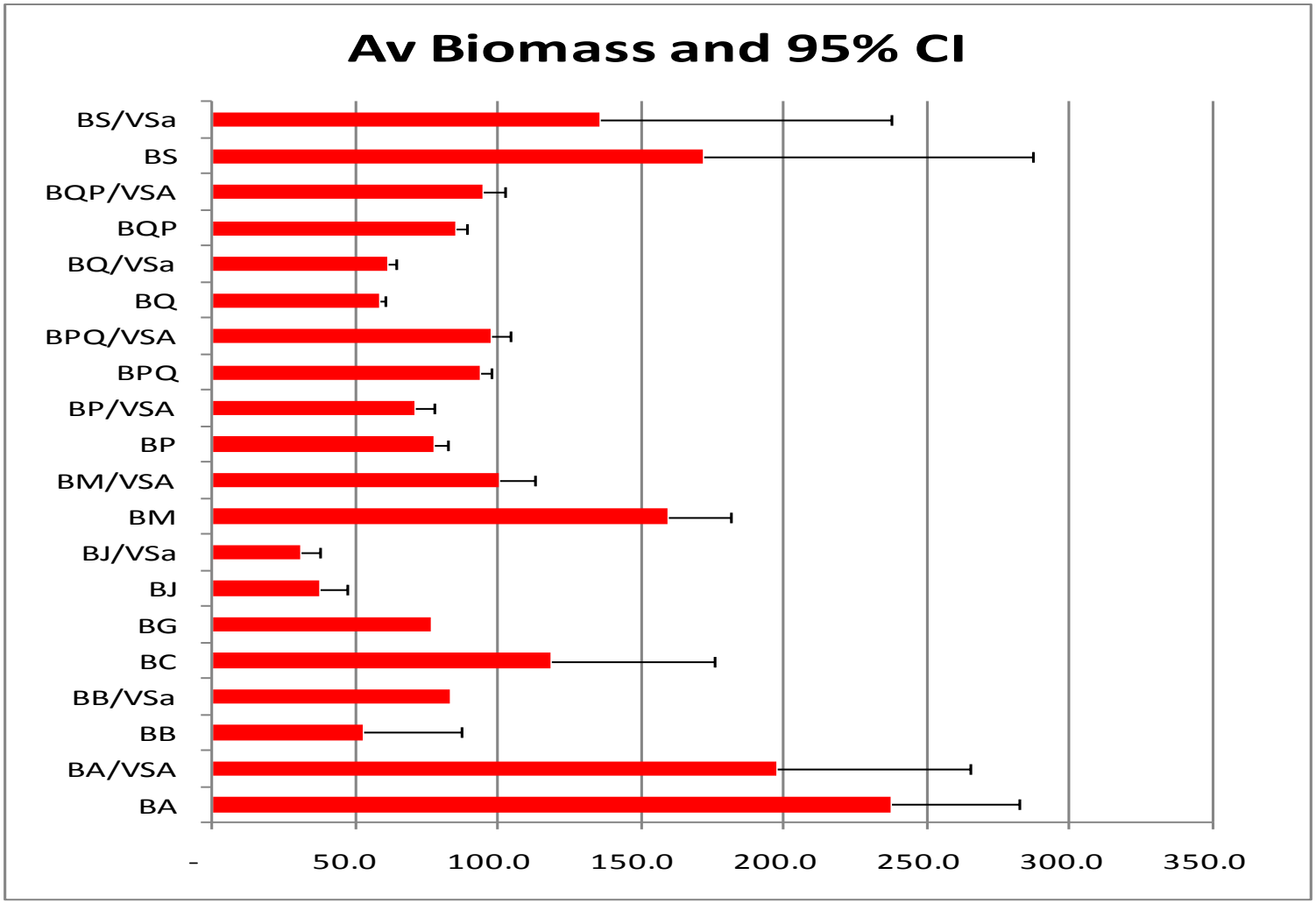


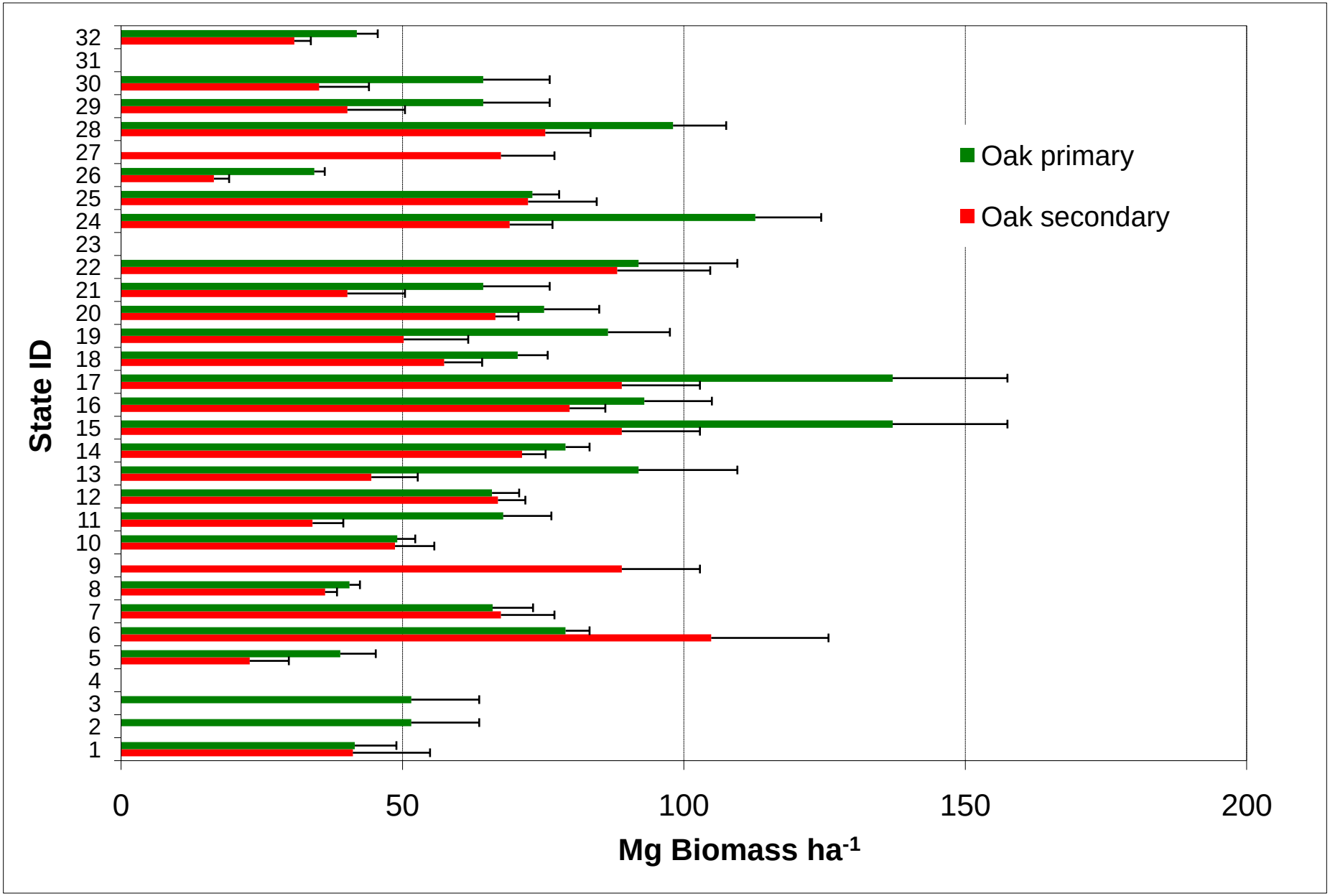


Addionally:

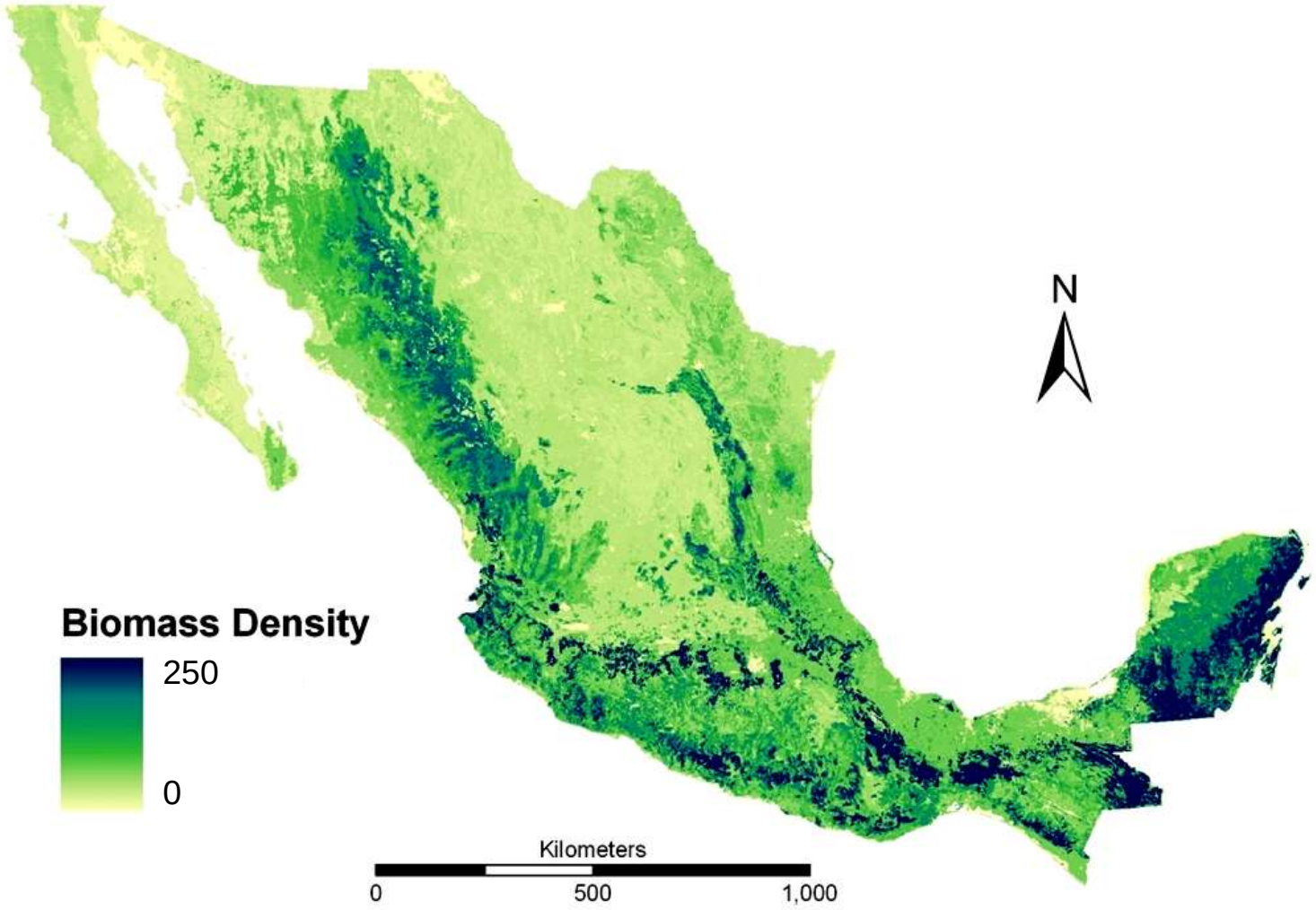
4 Generic equations for trees according to ecosystem (Tropical humid, tropical dry, cloud forest, scrub desert)

Estimate biomass density in each forest type



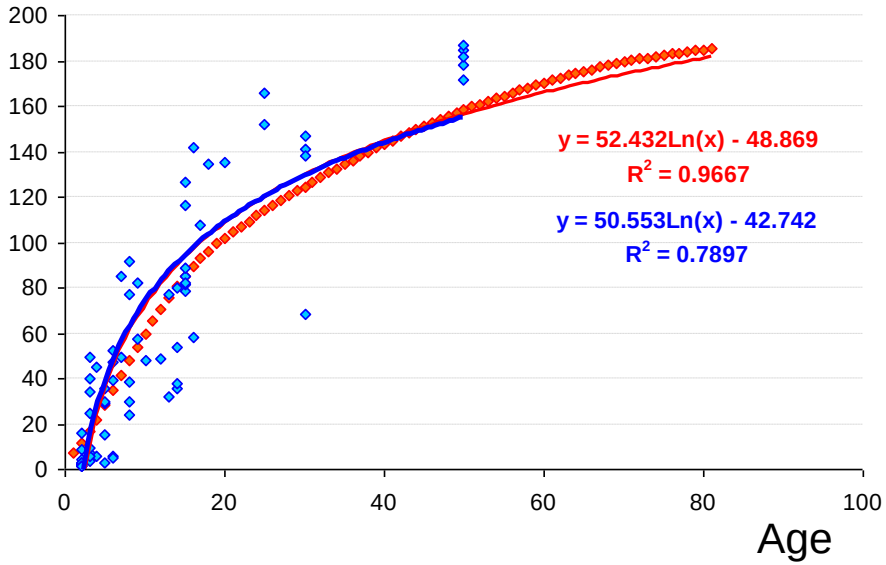

State ID
32
31
30
29
28
27
26
25
24
23
22
21
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
50
100
150
200
Mg Biomass ha-1
Oak primary
Oak secondary

Assign biomass densities to each polygon of the LU maps



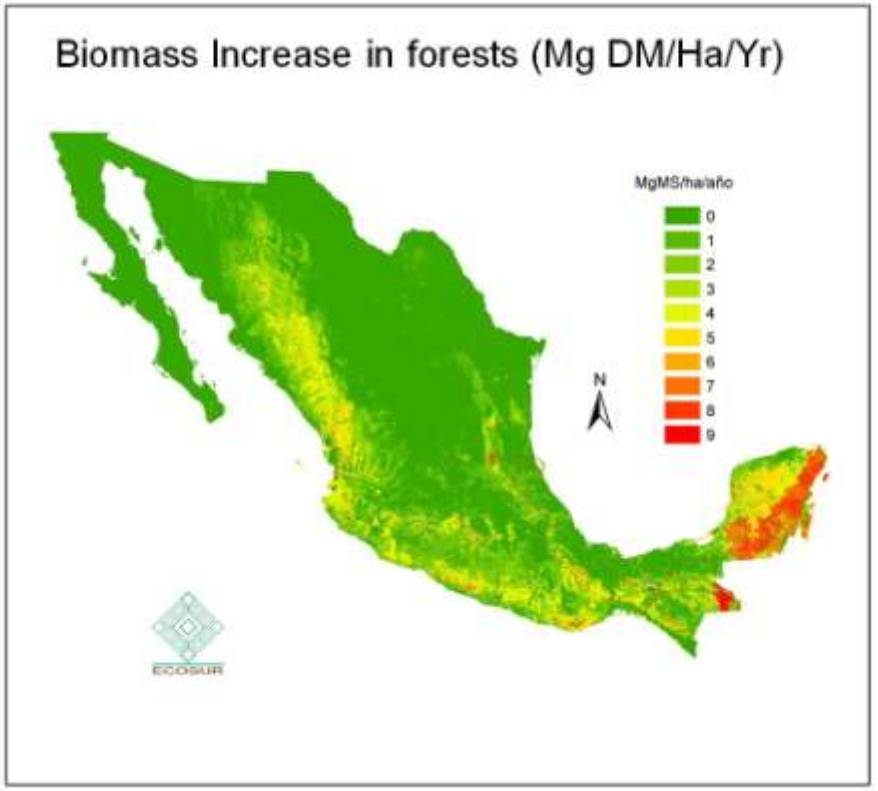
Stock change:

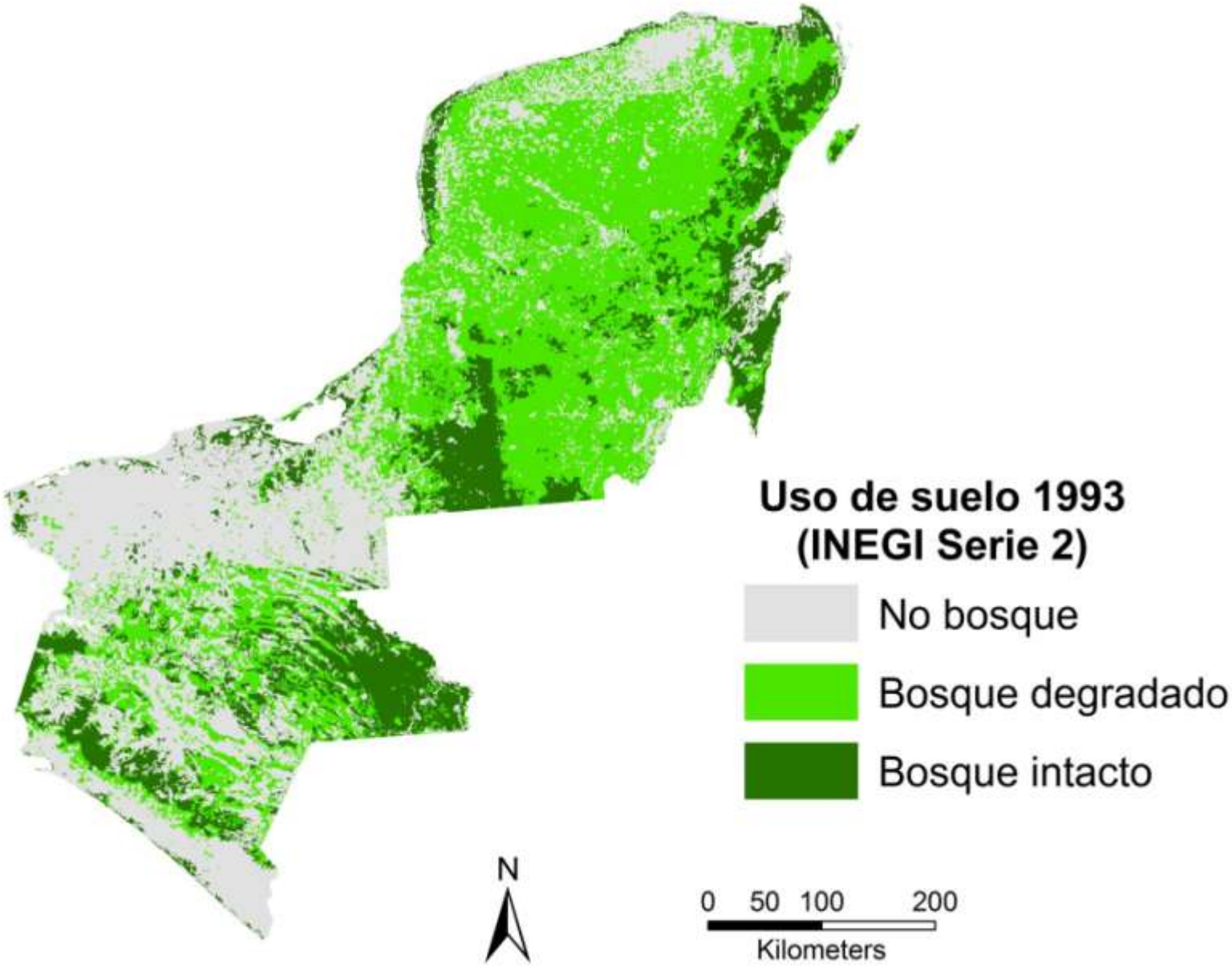
Biomass (Mg/ha)

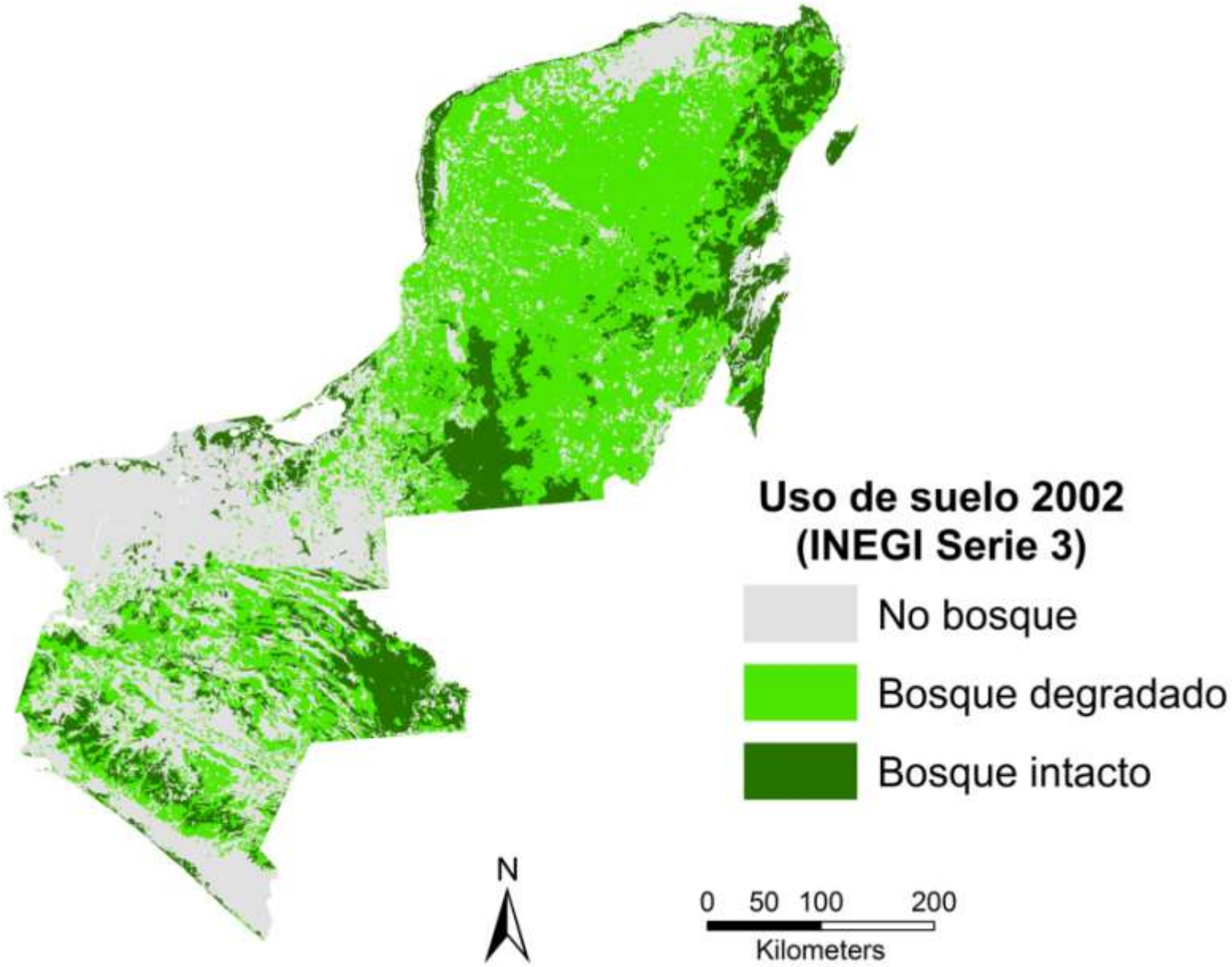


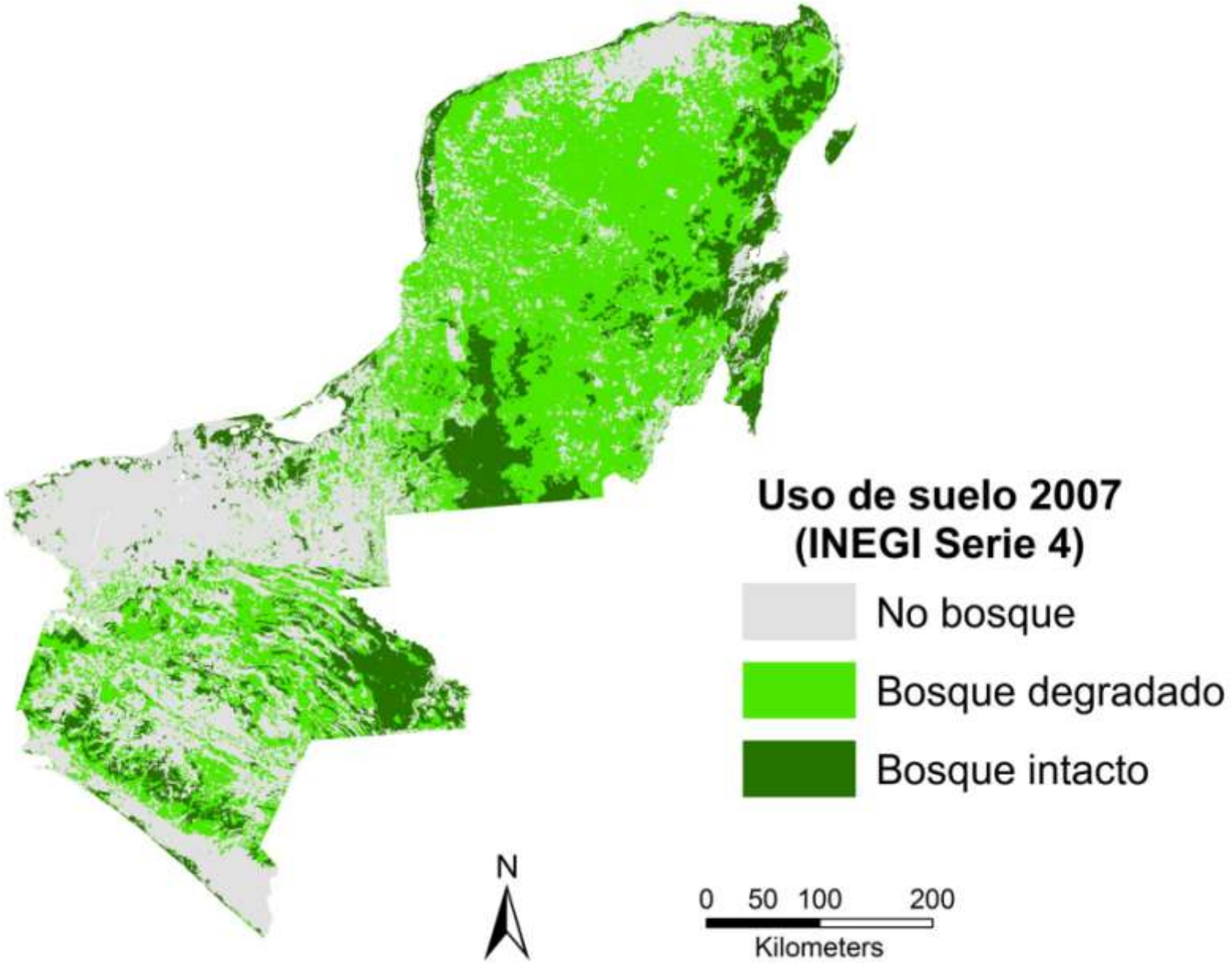
Methodologies to estimate growth

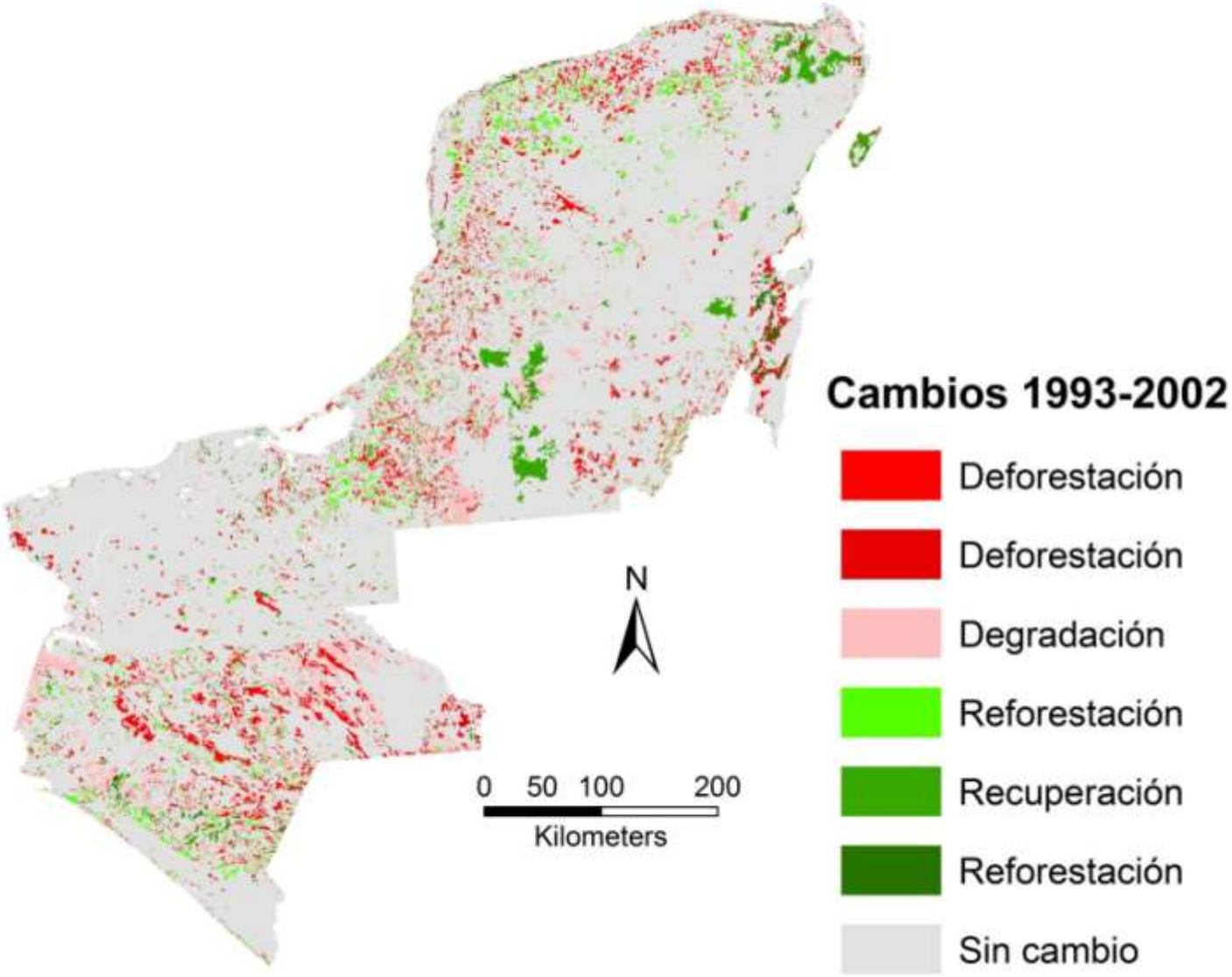
- Chronosequence
- Growth ring analysis
- Permanent monitoring plots

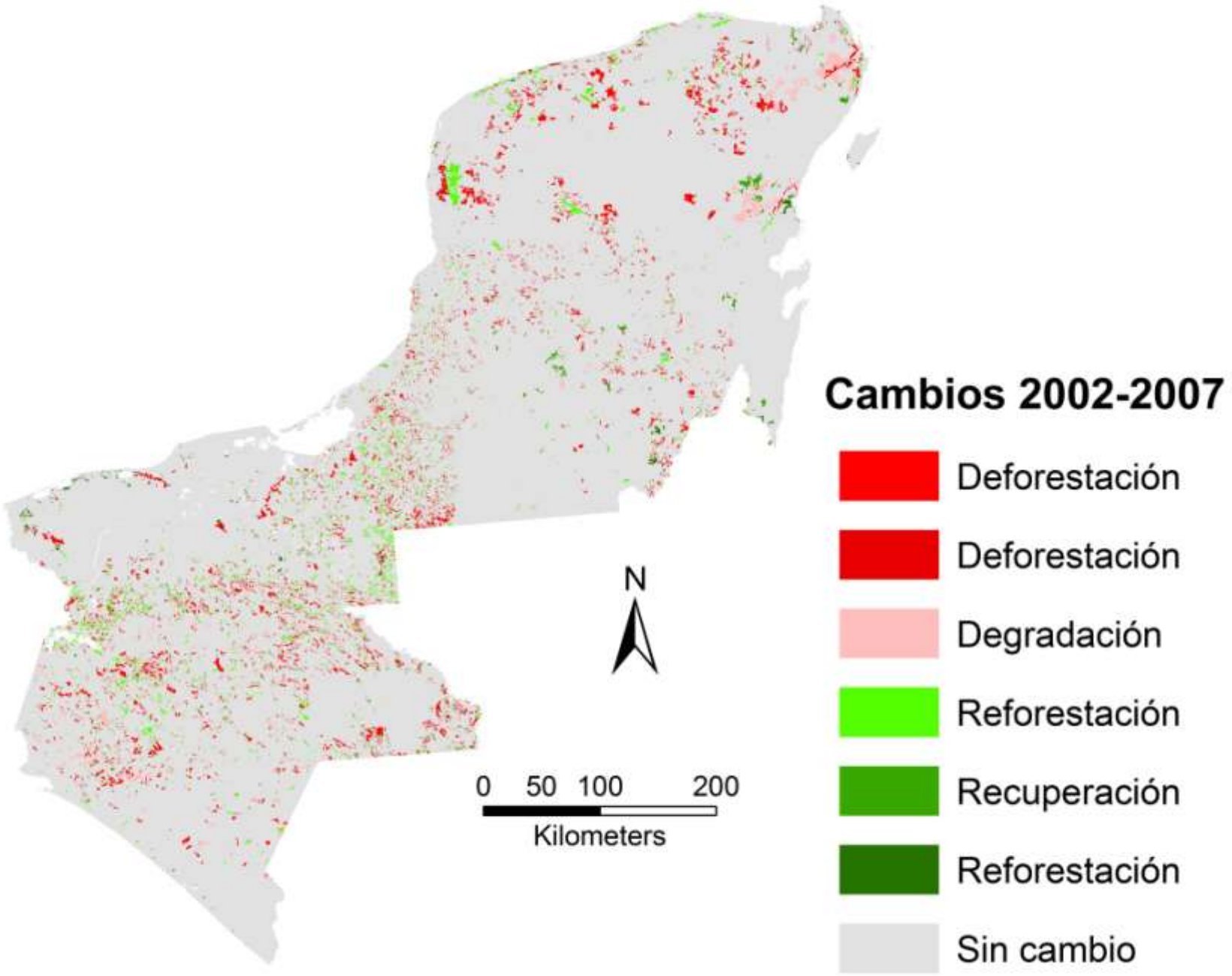



Uso de suelo 1993
(INEGI Serie 2)
No bosque
Bosque degradado
Bosque intacto
N
0 50 100 200
Kilometers

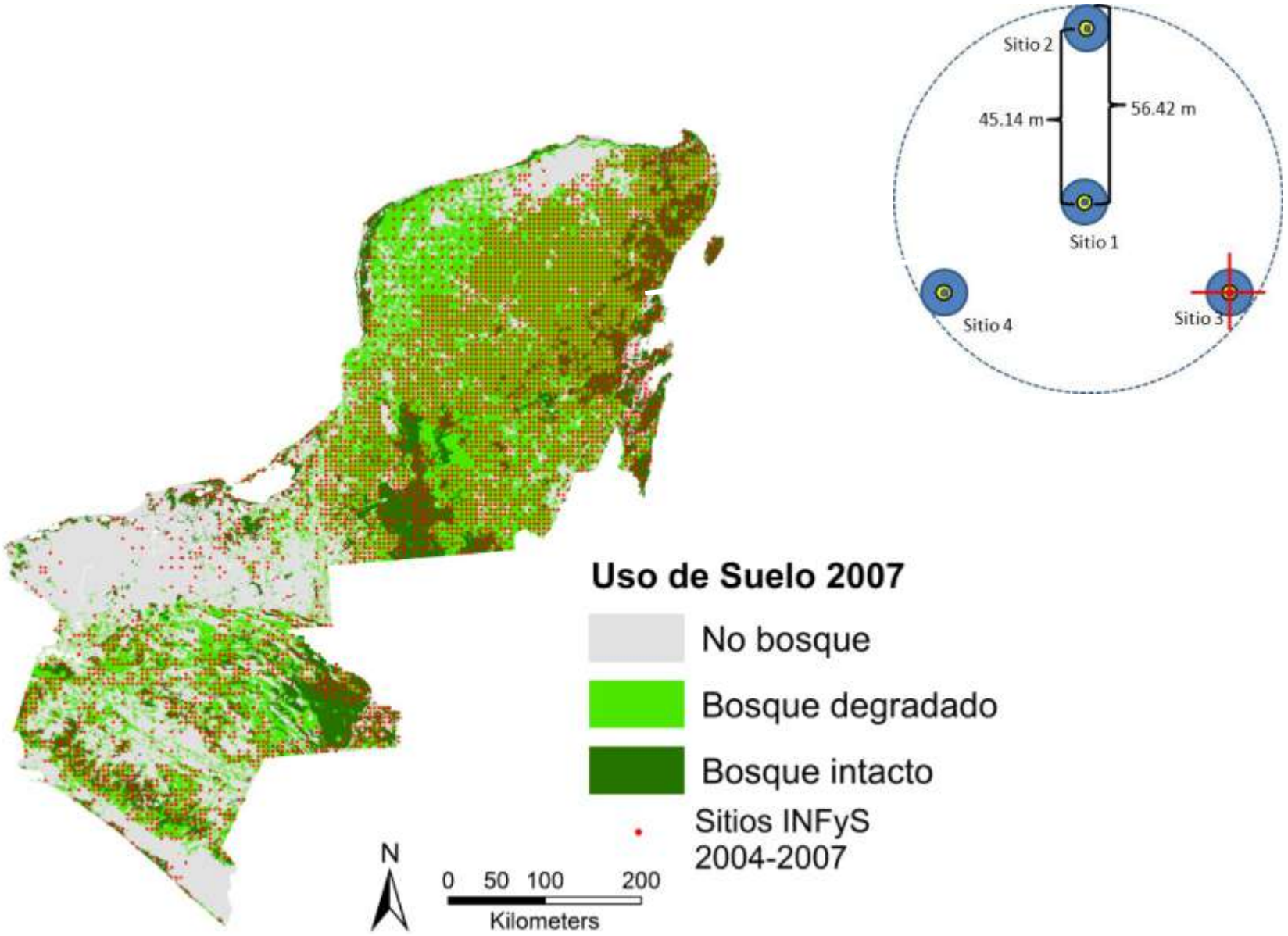

Uso de suelo 2002
(INEGI Serie 3)
No bosque
Bosque degradado
Bosque intacto
N
0 50 100 200
Kilometers

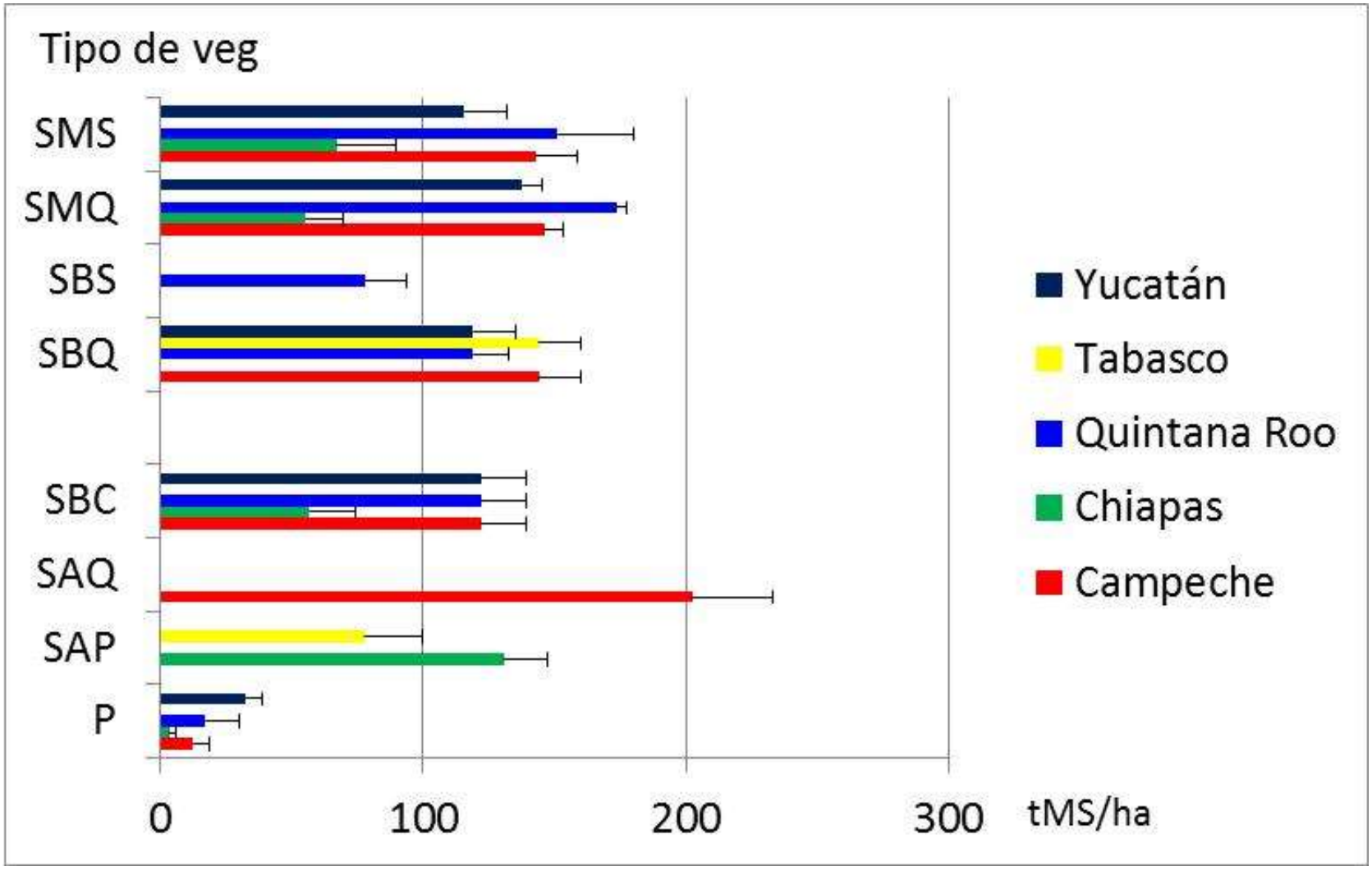

Uso de suelo 2007
(INEGI Serie 4)
No bosque
Bosque degradado
Bosque intacto
N
0 50 100 200
Kilometers


Cambios 1993-2002
Deforestación
Deforestación
Degradación
Reforestación
Recuperación
Reforestación
Sin cambio
N
0 50 100 200
Kilometers

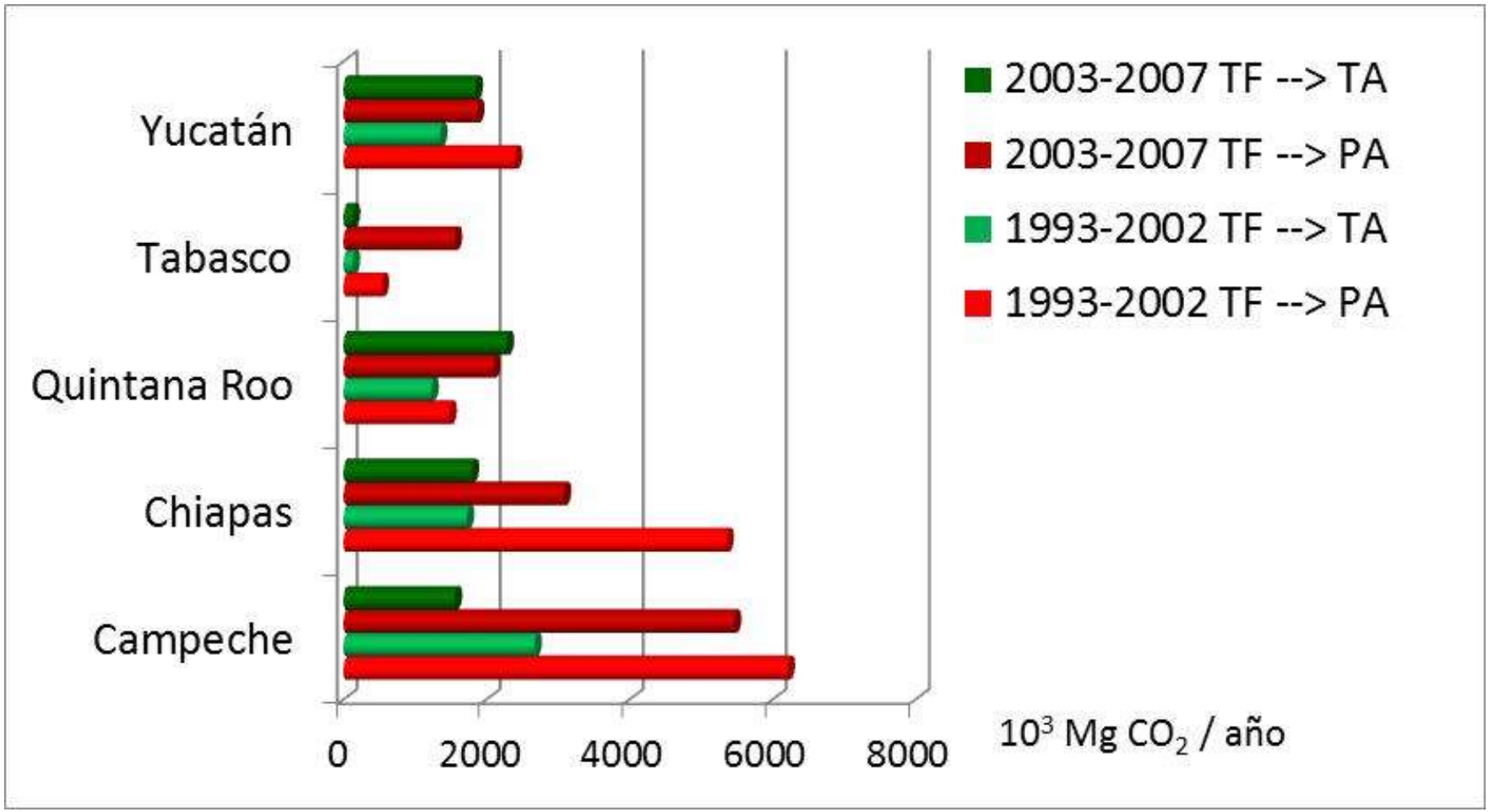

Cambios 2002-2007
Deforestación
Deforestación
Degradación
Reforestación
Recuperación
Reforestación
Sin cambio
N
0 50 100 200
Kilometers

Procesos de cambio de uso de suelo

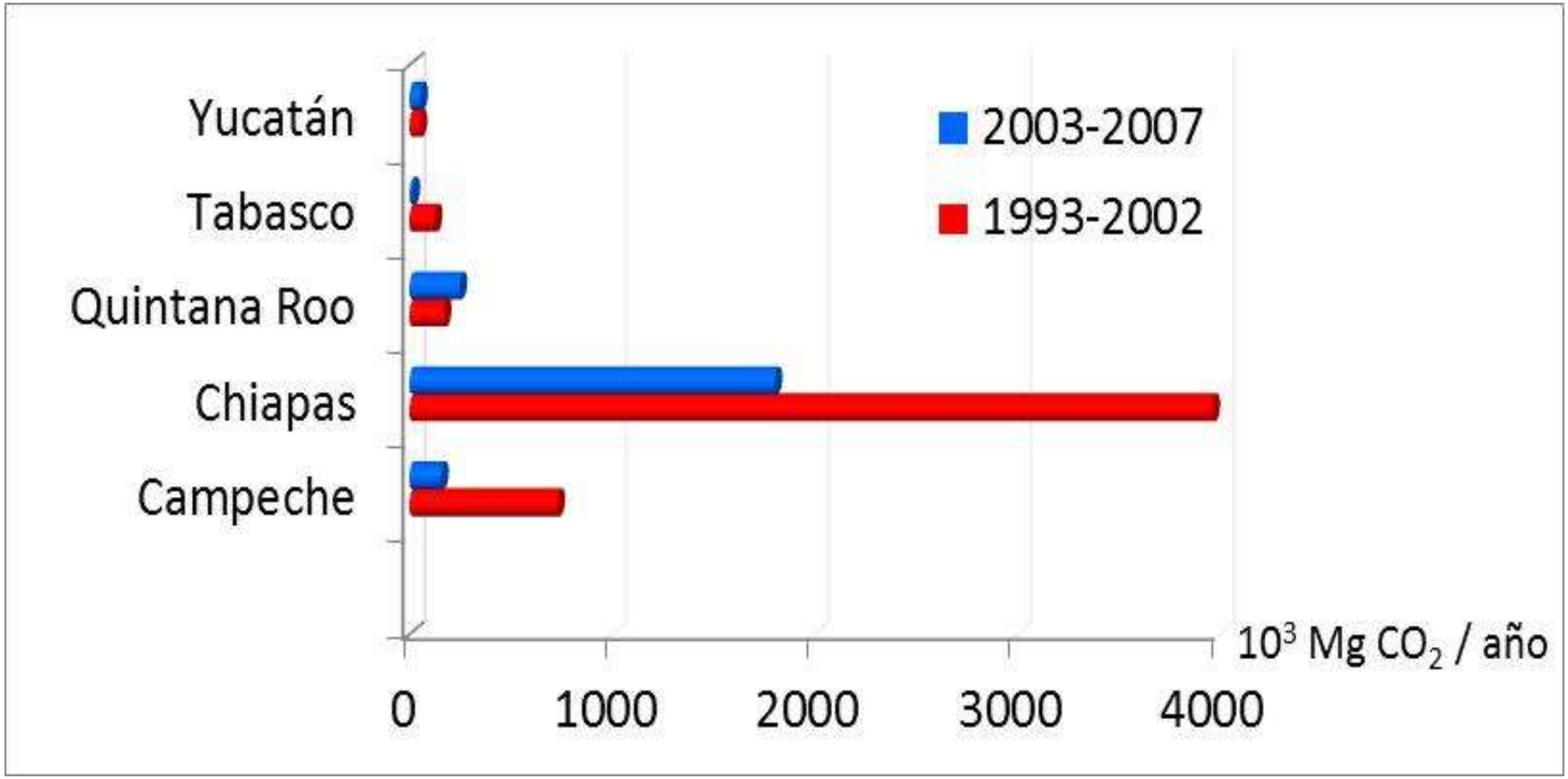

Sitio 2
45.14 m
56.42 m
Sitio 1
Sitio 4
Sitio 3
Uso de Suelo 2007
No bosque
Bosque degradado
Bosque intacto
Sitios INFyS
2004-2007
N
0 50 100 200
Kilometers


Tipo de veg
SMS
SMQ
SBS
SBQ
SBC
SAQ
SAP
P
0
100
200
300
tMS/ha
Yucatán
Tabasco
Quintana Roo
Chiapas
Campeche

Emisiones anuales de CO_2 por cambio de Bosques a Pastizal (TF→ PA) y Bosques a Agricultura (TF → TA) entre 1993-2002 y 2003-2007

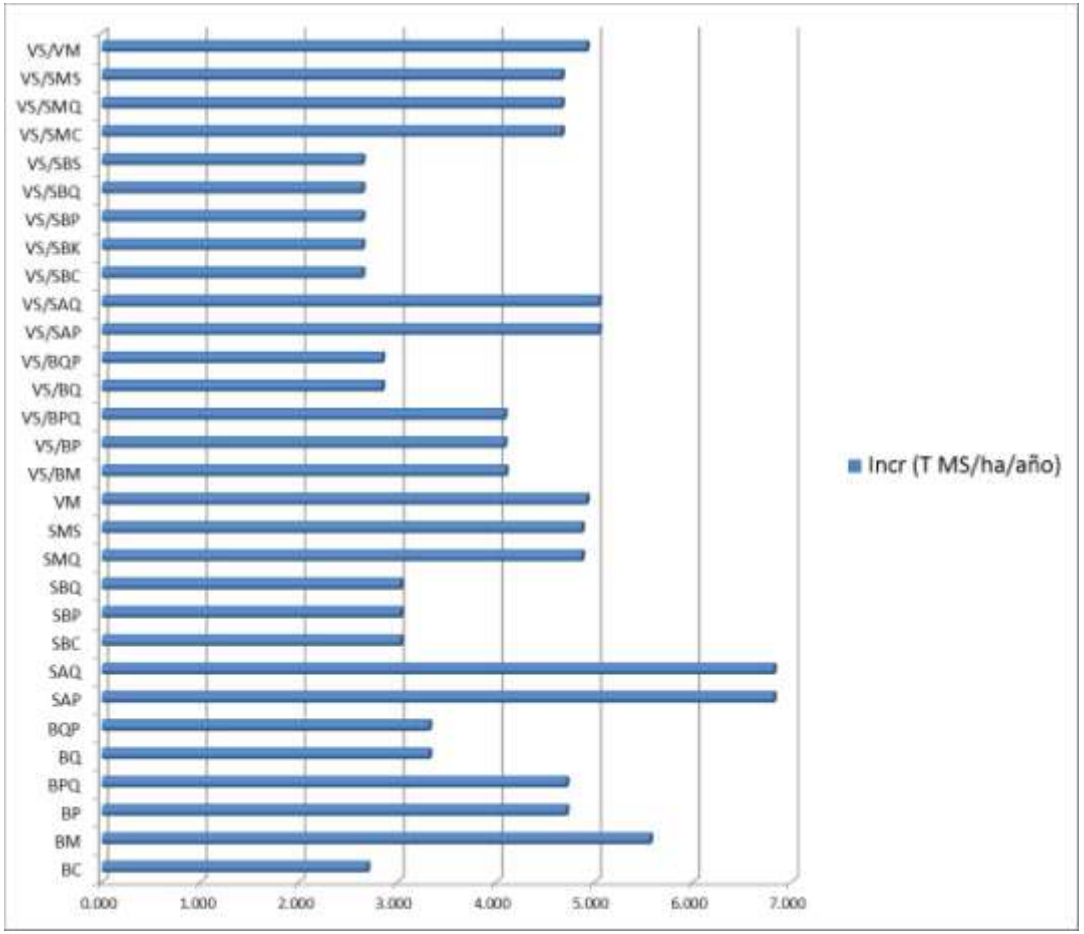


Emisiones anuales de CO_2 por degradación de Bosques entre 1993-2002 y 2003-2007

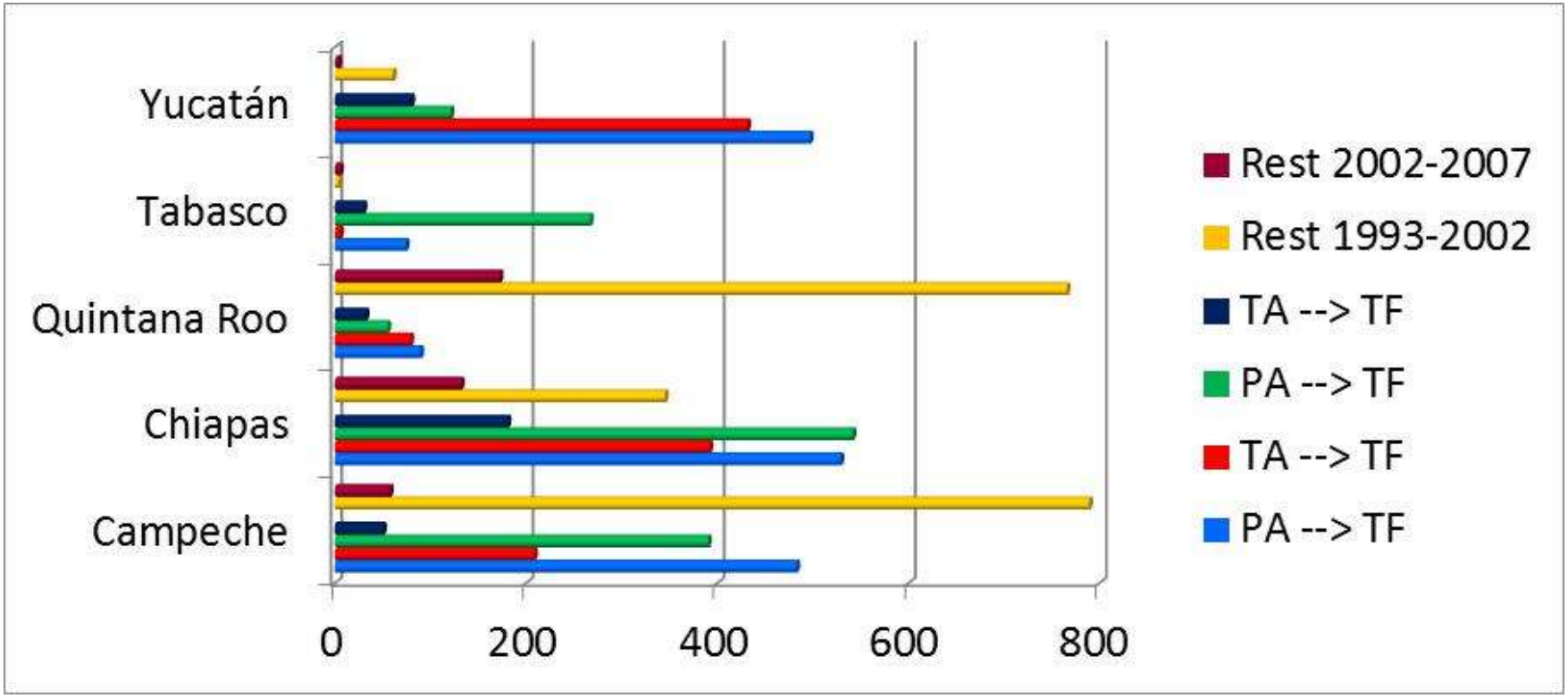


Remoción de CO_2 por cambio de uso de suelo:
2. de un tipo de uso de suelo con baja densidad de biomasa a un uso con alta densidad (Restauración, reforestación)

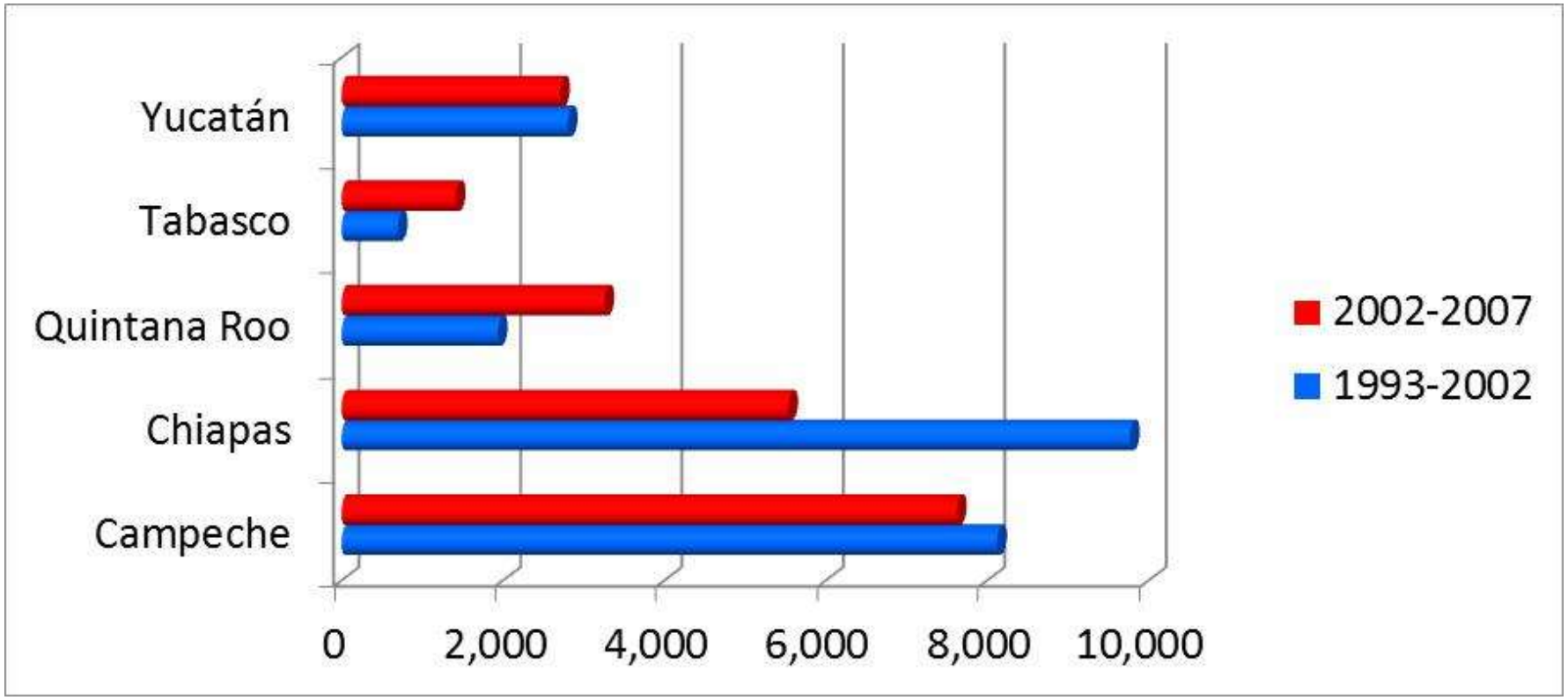
(Tasa de incremento anual en tC/ha/año) * superficie cambiado * 44/12



Remociones anuales de CO_2 (en 10^3 t CO_2 /año) por reforestación y restauración



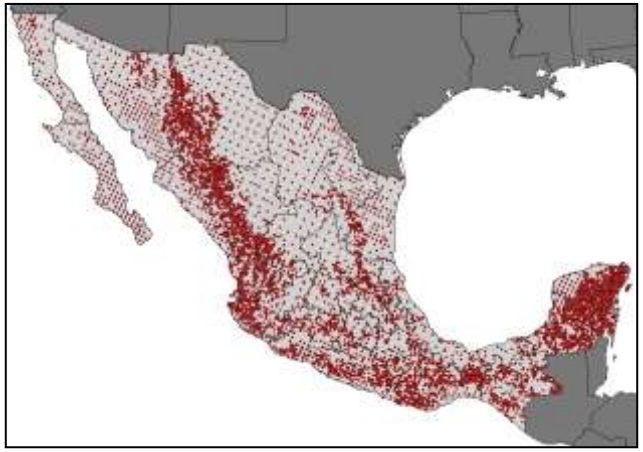
Flujos netos de CO_2 (en 10^3 t CO_2 /año) por cambio de uso de suelo

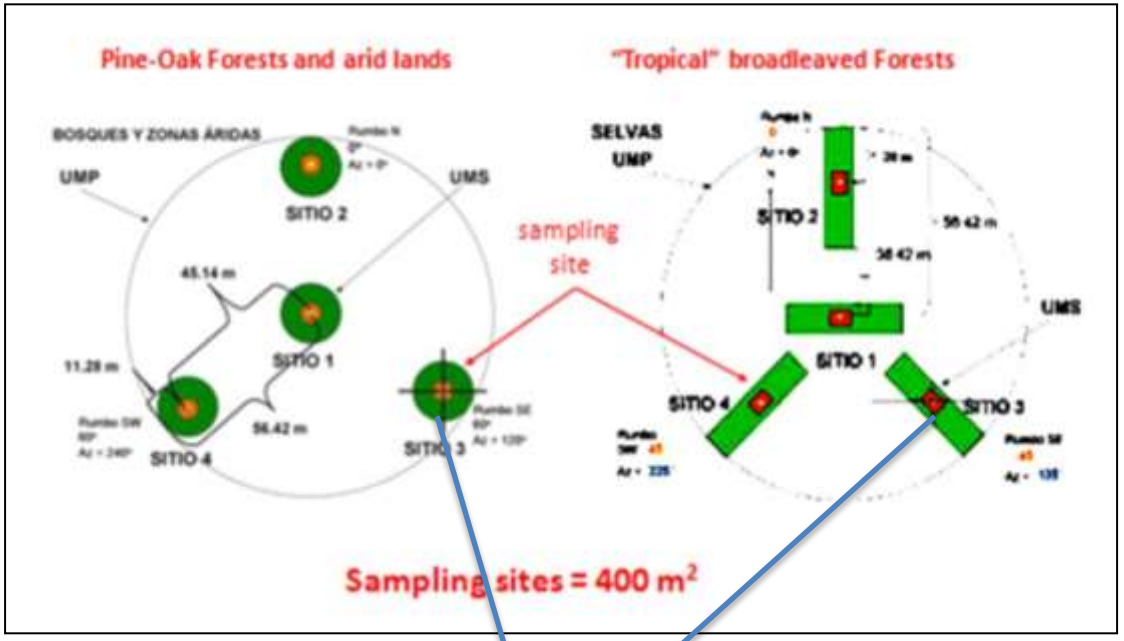


1. Reservorios de carbono terrestre

$$C = C_{SS} + C_{BS} + C_{MM} + C_{HOJ} + C_{COS}$$

Coalition for Rainforest Nations



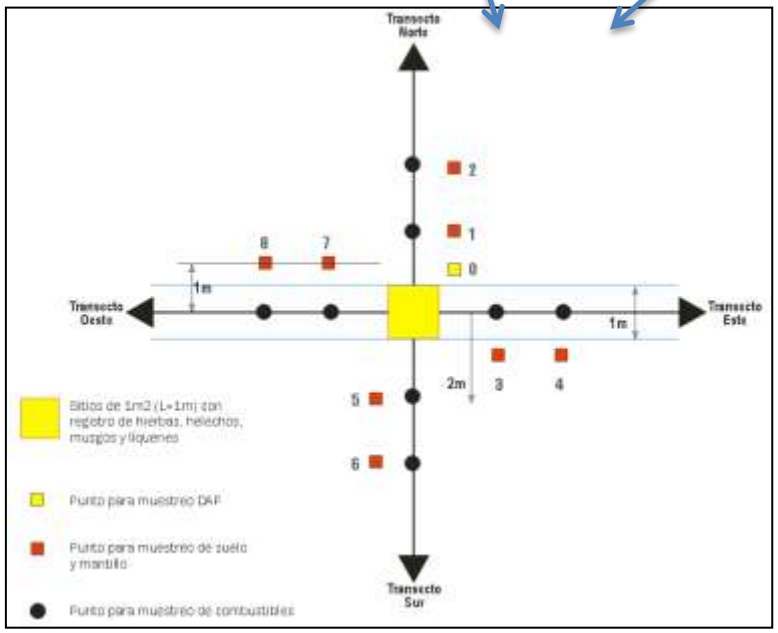


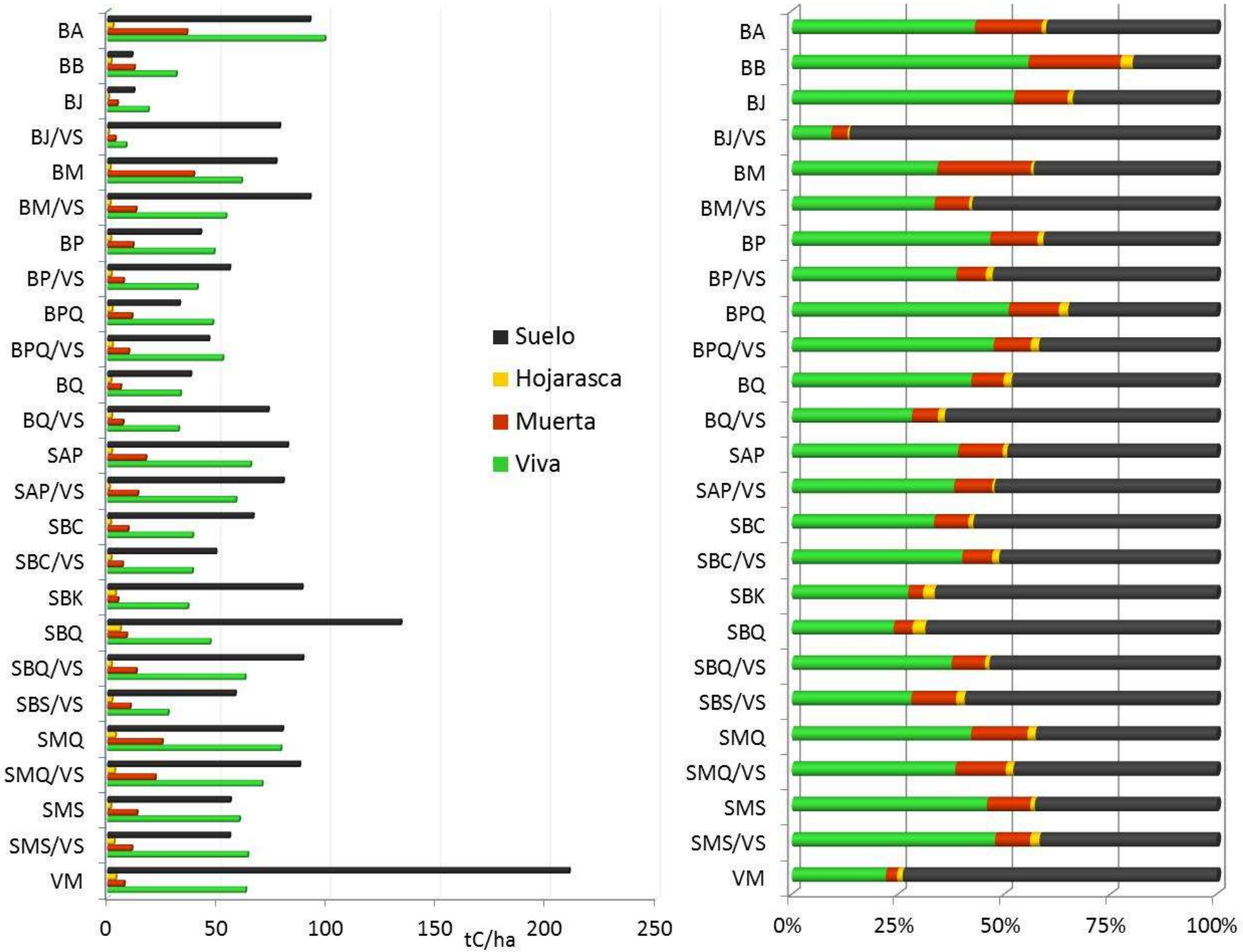
1m² sites
Register of herbs, mosses, lichens

Sampling point for BD
Sampling point for TOC analysis

Sampling point for litter, fermentation horizon and soil

Sampling point for fuels

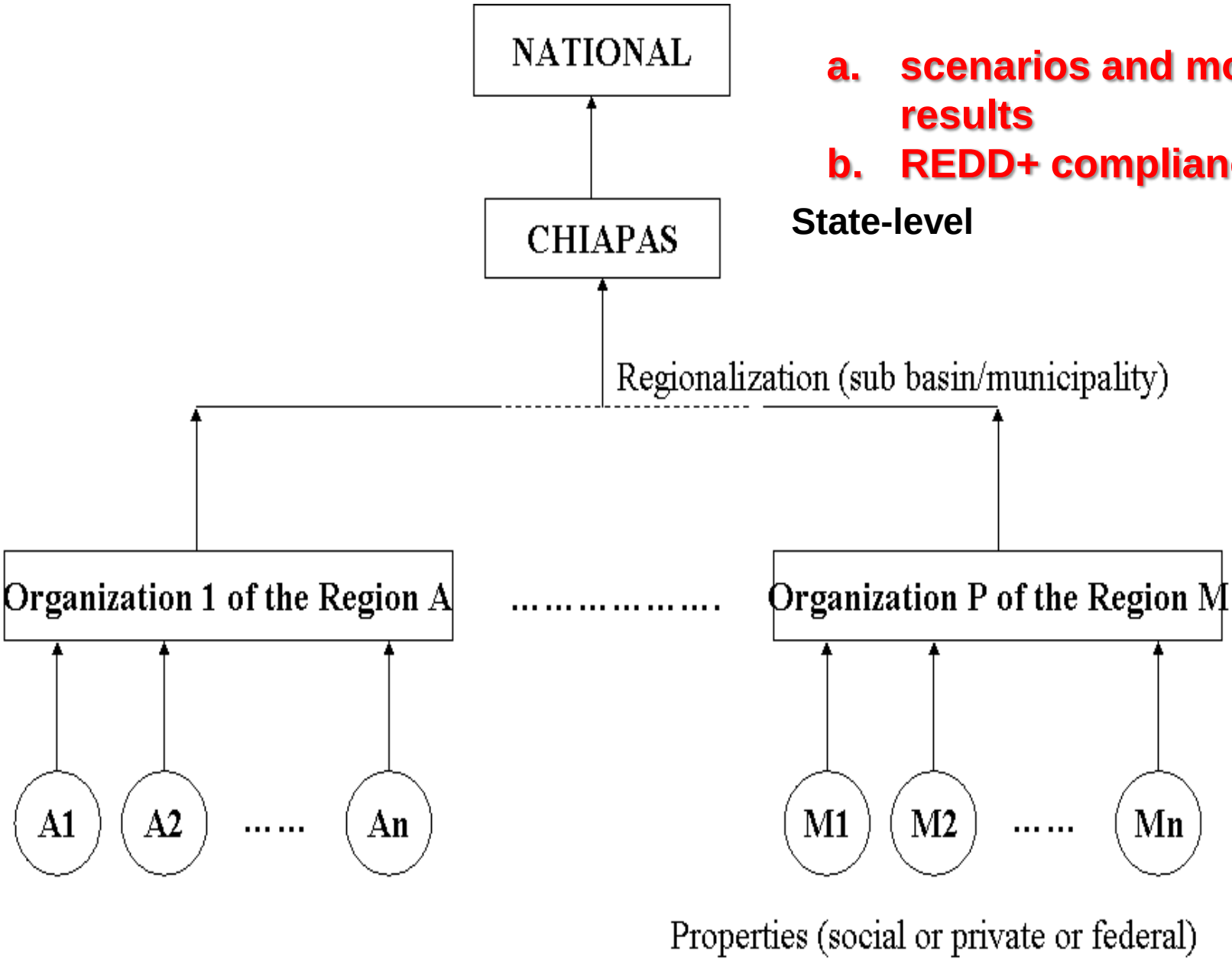



BA
BB
BJ
BJ/VS
BM
BM/VS
BP
BP/VS
BPQ
BPQ/VS
BQ
BQ/VS
SAP
SAP/VS
SBC
SBC/VS
SBK
SBQ
SBQ/VS
SBS/VS
SMQ
SMQ/VS
SMS
SMS/VS
VM
Suelo
Hojarasca
Muerta
Viva
0
50
100
150
200
250
tC/ha
0%
25%
50%
75%
100%

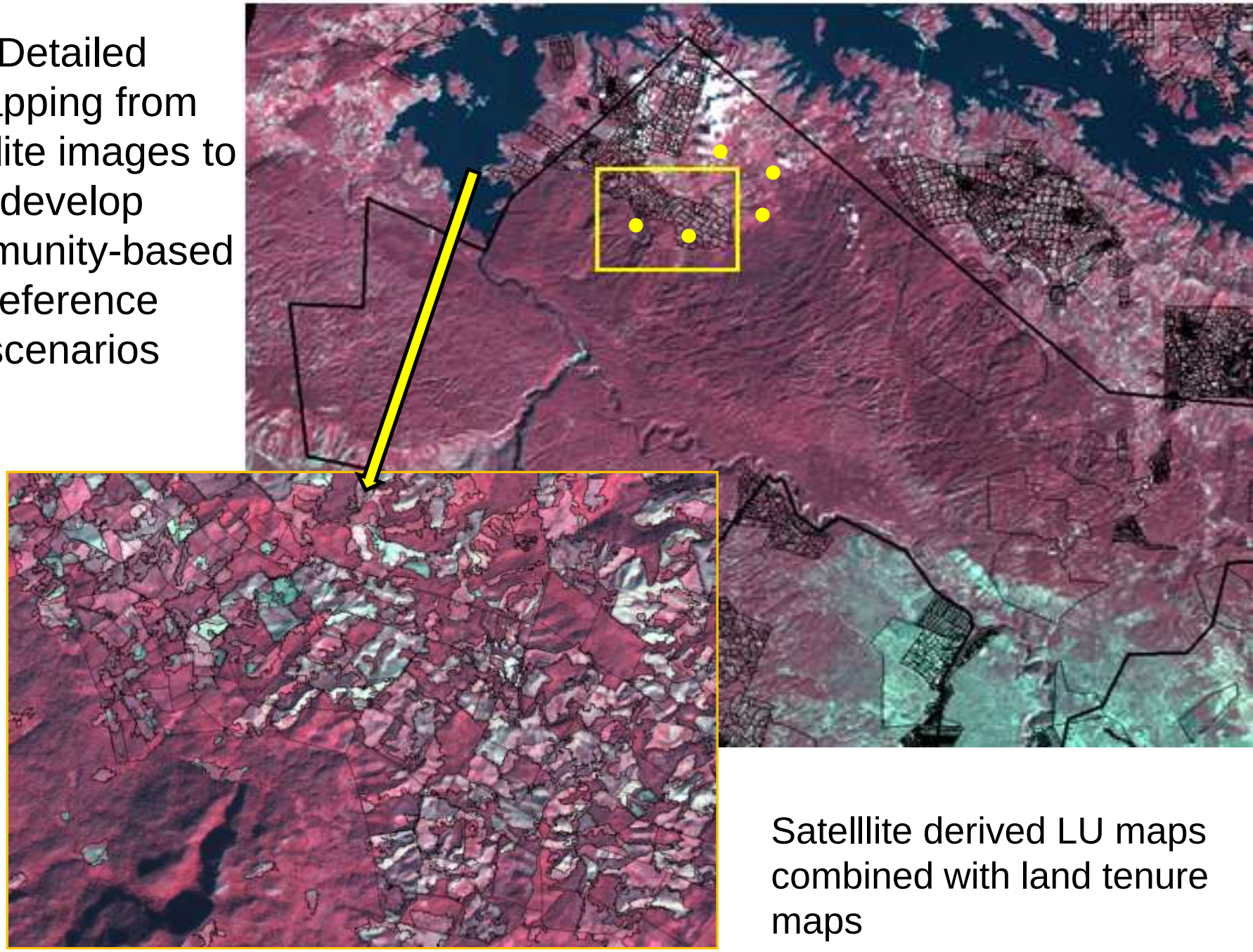
Up and downscaling of

a. **scenarios and monitoring results**
b. **REDD+ compliance**

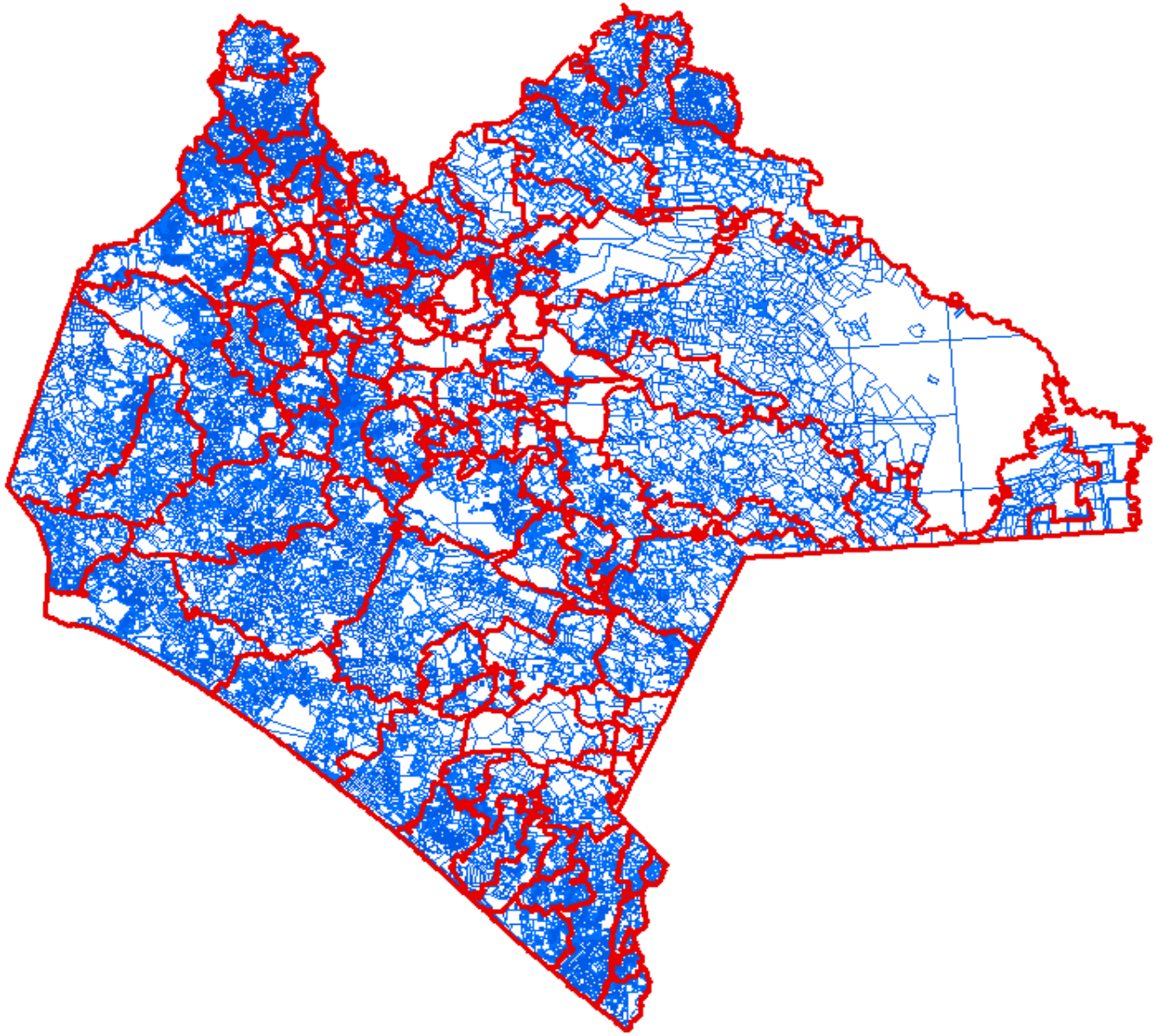
State-level

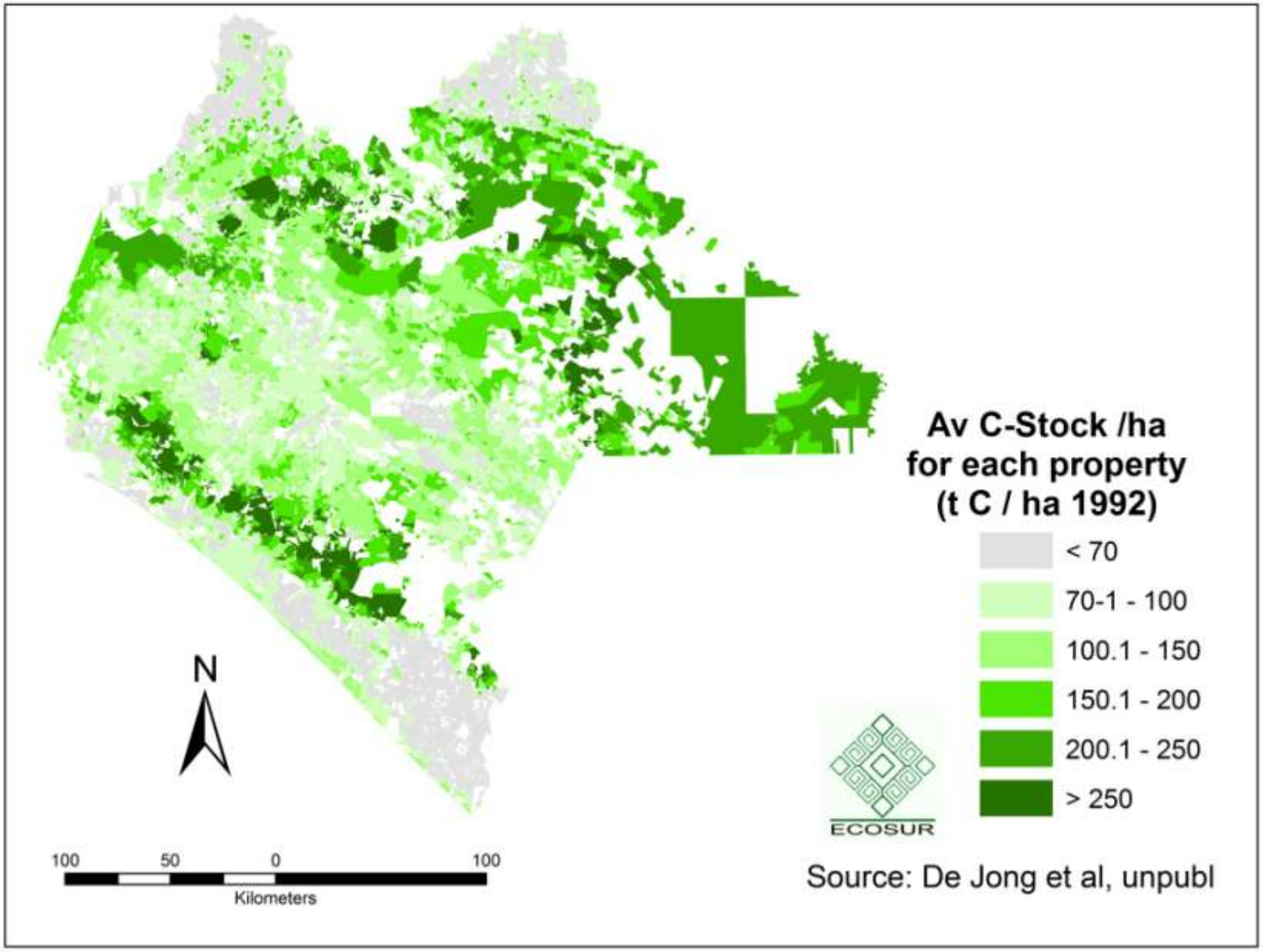


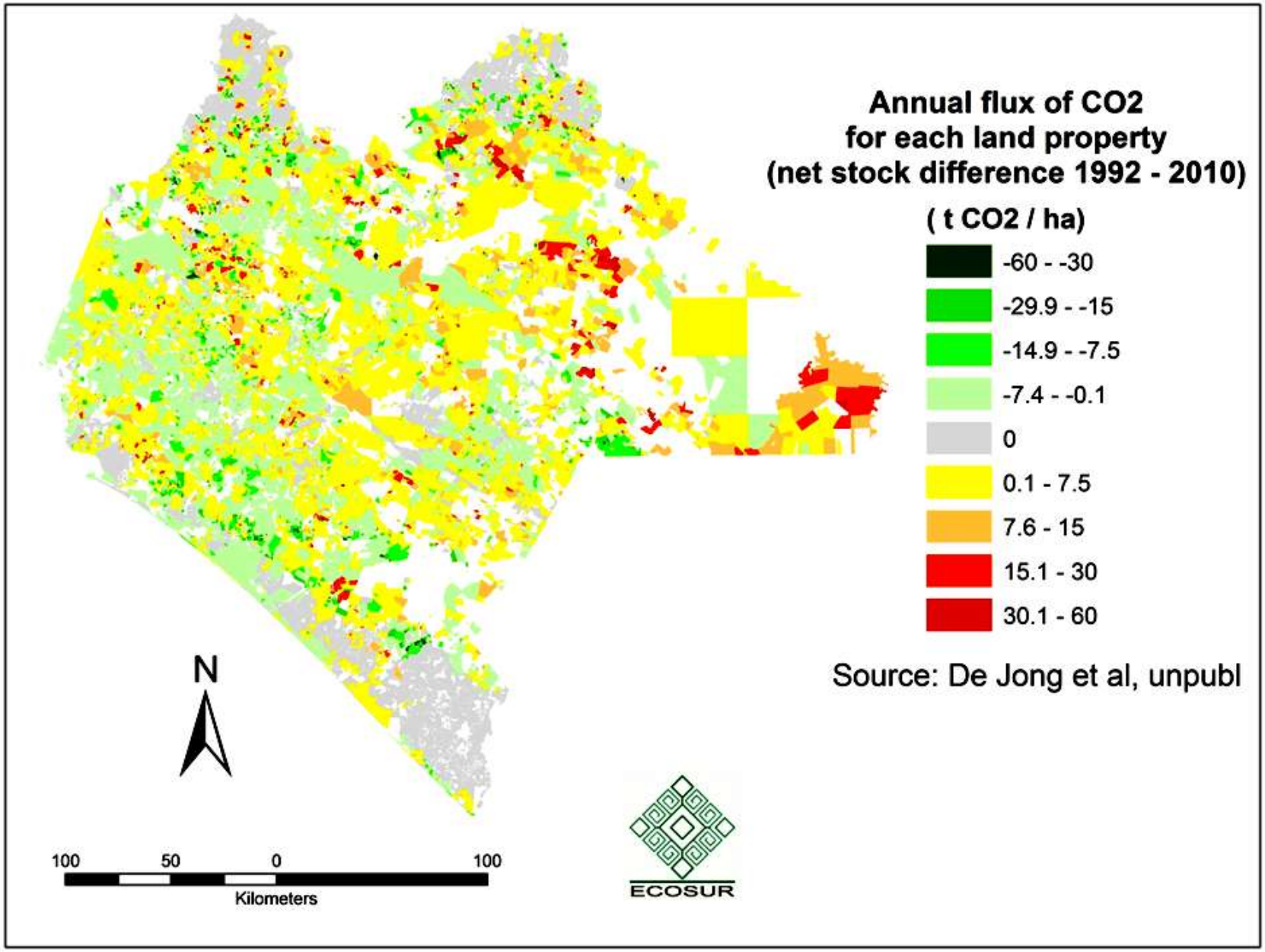
Detailed mapping from satellite images to develop community-based reference scenarios



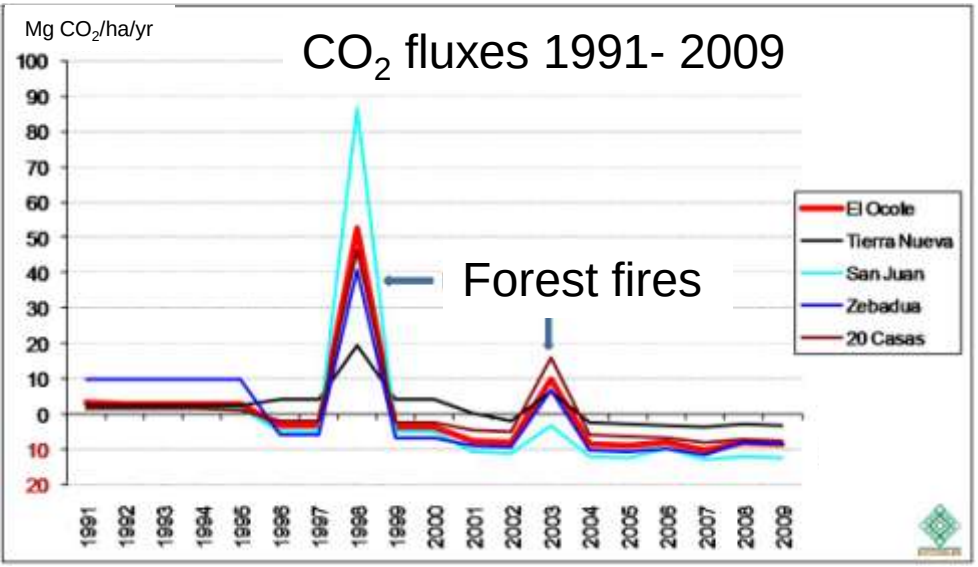
Satelllite derived LU maps combined with land tenure maps




Av C-Stock /ha
for each property
(t C / ha 1992)
< 70
70-1 - 100
100.1 - 150
150.1 - 200
200.1 - 250
> 250
N
100
50
0
100
Kilometers
ECOSUR
Source: De Jong et al, unpubl


Annual flux of CO2
for each land property
(net stock difference 1992 - 2010)
(t CO2 / ha)
-60 - -30
-29.9 - -15
-14.9 - -7.5
-7.4 - -0.1
0
0.1 - 7.5
7.6 - 15
15.1 - 30
30.1 - 60
Source: De Jong et al, unpubl
N
100
50
0
100
Kilometers
ECOSUR

Reference Emission Scenario



Community 5-year LU Plan

	Uso actual					
Uso futuro	Acahual	Agrícola	Cafetal	Enriquecido con árboles	Potrero	Selva
Acahual	30.75				2	
Acahual mejorado	1					
Agrícola	43.25	54		0.25		
Agrícola (café abono)	3.5	3.5				0.5
Cafetal	5	1.5	30.31		1	
Enriq. con árboles	0.7			3	1	
Enriq. con chapaya	0.25				3	8
Potrero	1	0.5		1	63.5	
Selva						197.8
Total genera	85.45	59.5	30.31	4.25	70.5	206.3

REDD+ compared to Emission scenario

Community	Comm. Reference scenario (ERC)	Regional Reference Scenario (ERR)	Plan Vivo (PV)	ERC-PV	ERR-PV
Tierra Nueva	1.850	-0.273	-0.391	+++	+
San Juan	-1.146	-0.273	-0.715	--	++
Chamula Armando Zebadua	-0.306	-0.273	-0.200	-	-
Veinte Casas	0.430	-0.273	-0.997	+++	++

GRACIAS

bjong@ecosur.mx