

# Forest Resources Management: Axis, background and illustration of a research project



Gembloux Agro-Bio Tech  
Université de Liège



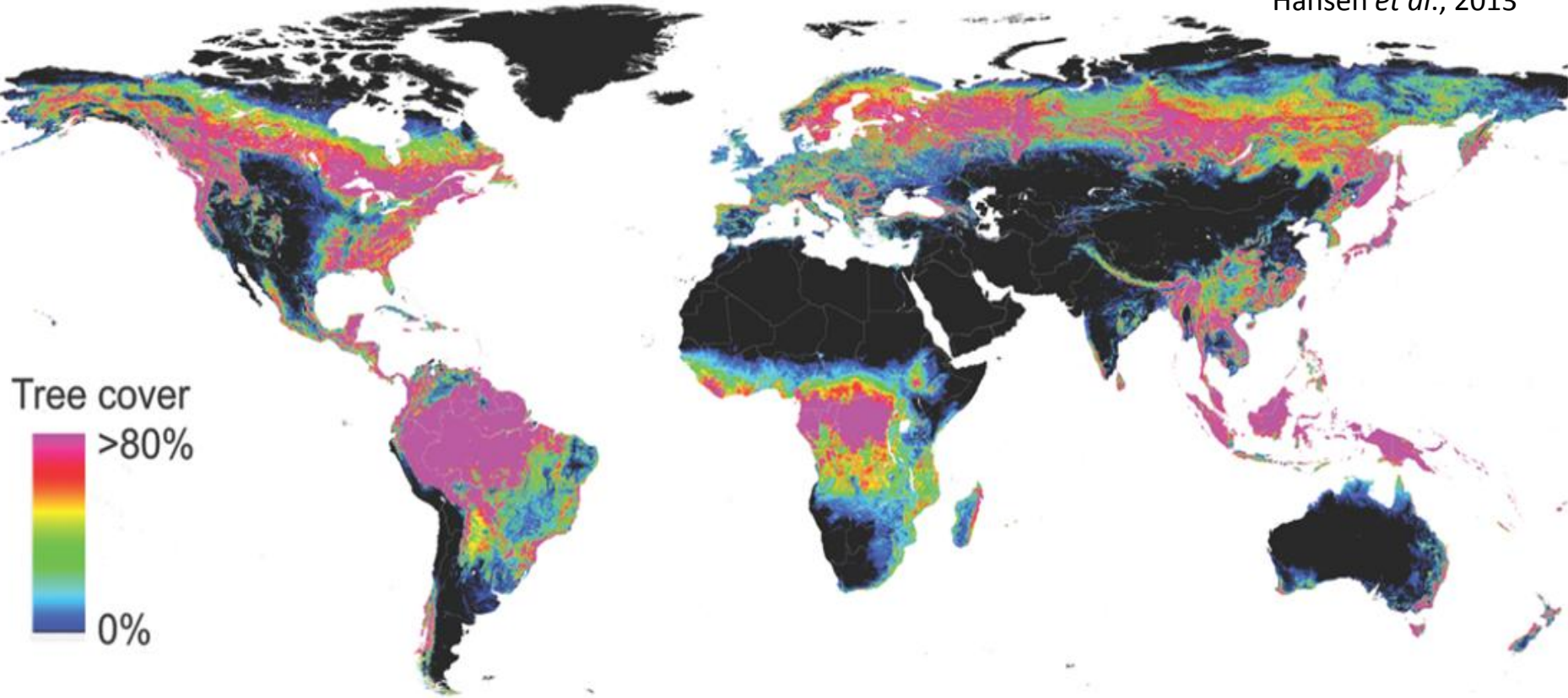
*Communication presented at BIOSE Department Young Researchers Day*

Gembloux, 10th December 2015

Simon Lhoest

# Forests in the world?

Hansen *et al.*, 2013



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Hansen *et al.*, 2013

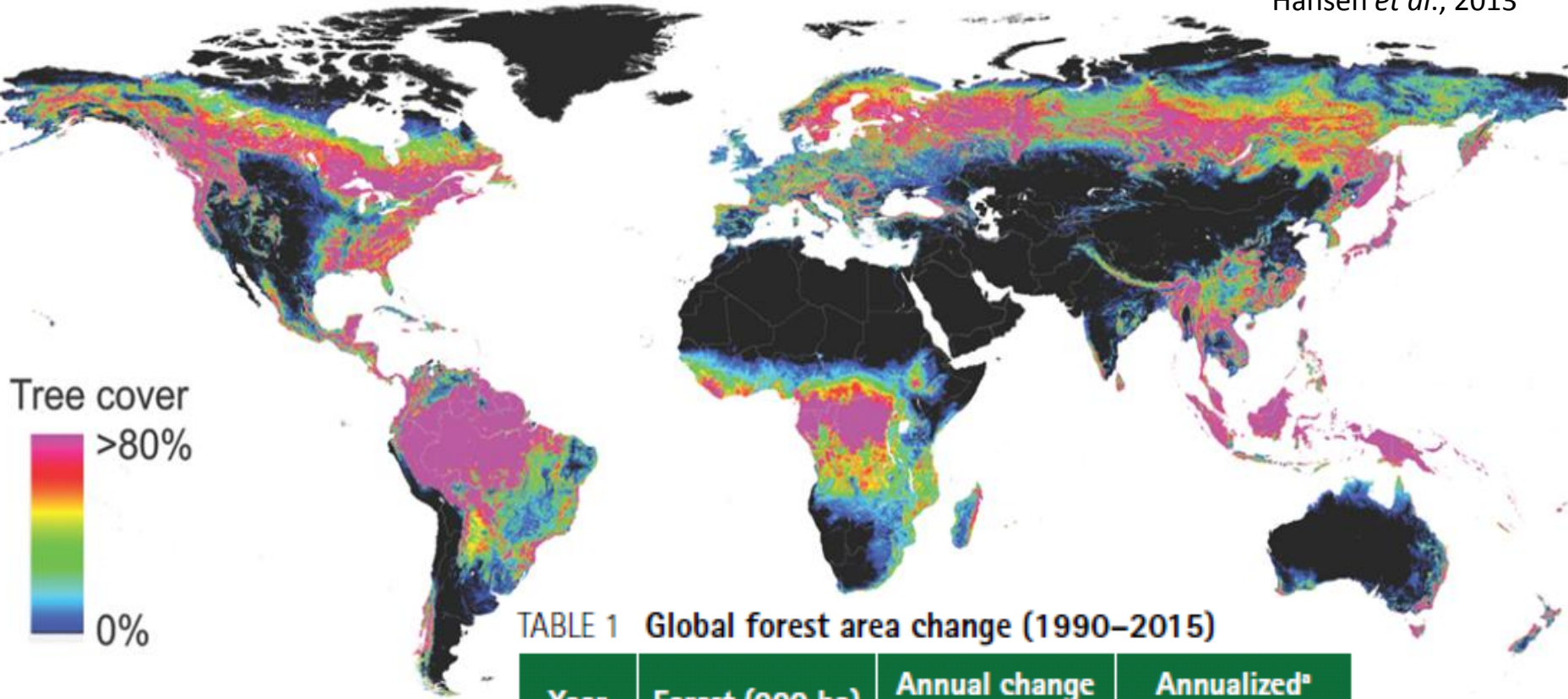
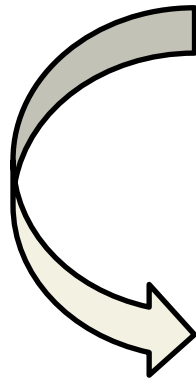


TABLE 1 Global forest area change (1990–2015)

Year	Forest (000 ha)	Annual change (000 ha)	Annualized* Change
1990	4 128 269		
2000	4 055 602	-7 267	-0.18
2005	4 032 743	-4 572	-0.11
2010	4 015 673	-3 414	-0.08
2015	3 999 134	-3 308	-0.08

FAO, 2015

- 129 000 000 ha



# Forests in the world?

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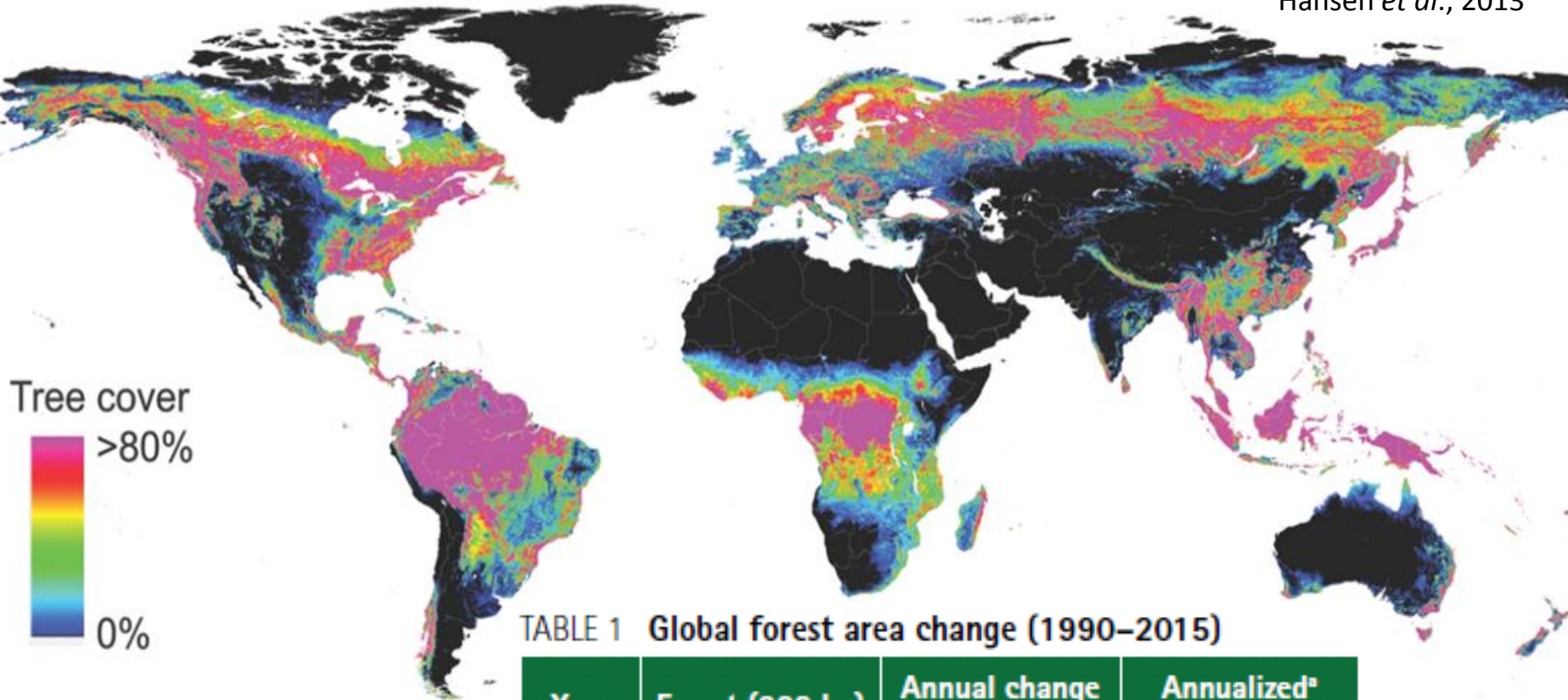
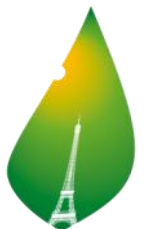


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**BUT** →

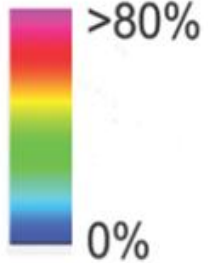
FAO, 2015



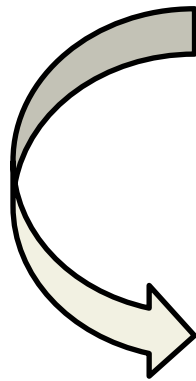
COP21- CMP11  
PARIS 2015  
UN CLIMATE CHANGE CONFERENCE

...

Tree cover



- 129 000 000 ha





# Quantification of forest resources and wildlife monitoring

1

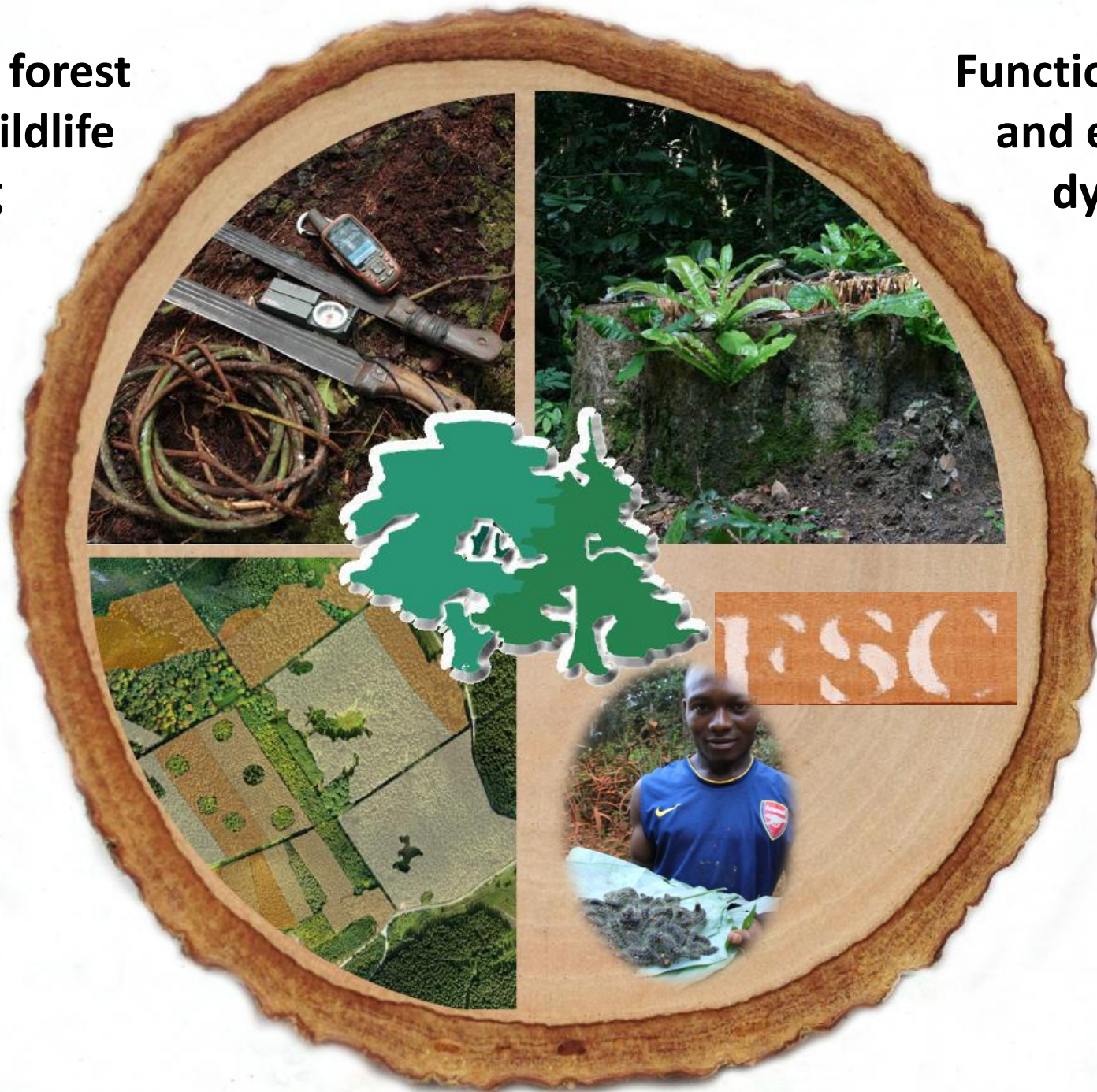


Quantification of forest resources and wildlife monitoring

1

Functional ecology and ecosystem dynamics

2



**Quantification of forest resources and wildlife monitoring**

**1**



**Functional ecology and ecosystem dynamics**

**2**



**Forest management and planning**

**3**



**Quantification of forest resources and wildlife monitoring**

**1**



**Functional ecology and ecosystem dynamics**

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**Forest management and planning**

**3**



**Valorization of ligneous and non ligneous natural resources**

**4**



# ① Quantification of forest resources and wildlife monitoring

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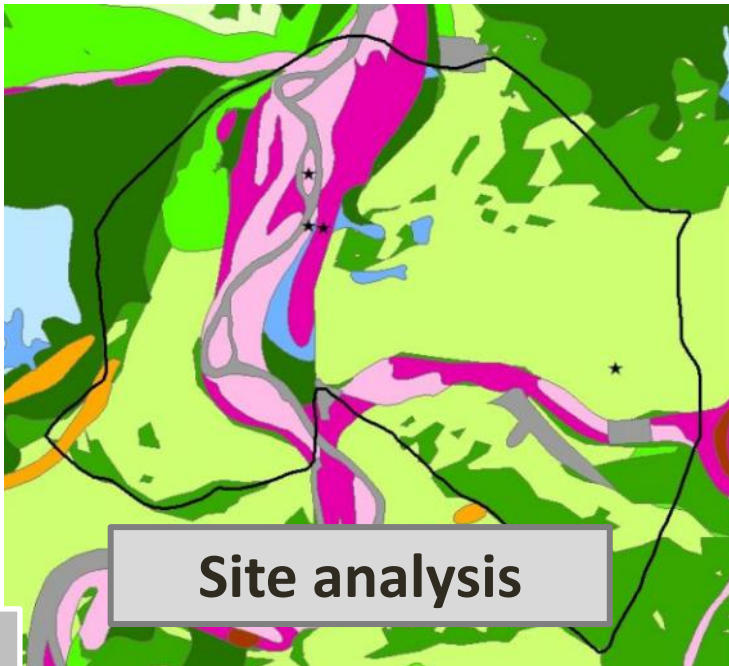


Remote sensing

# ① Quantification of forest resources and wildlife monitoring



Remote sensing



Site analysis

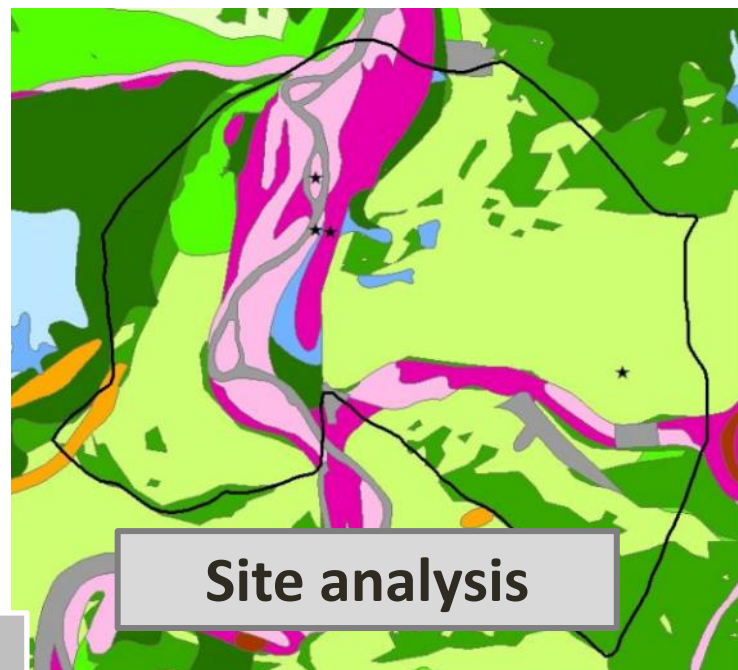
# ① Quantification of forest resources and wildlife monitoring



Remote sensing



Inventories

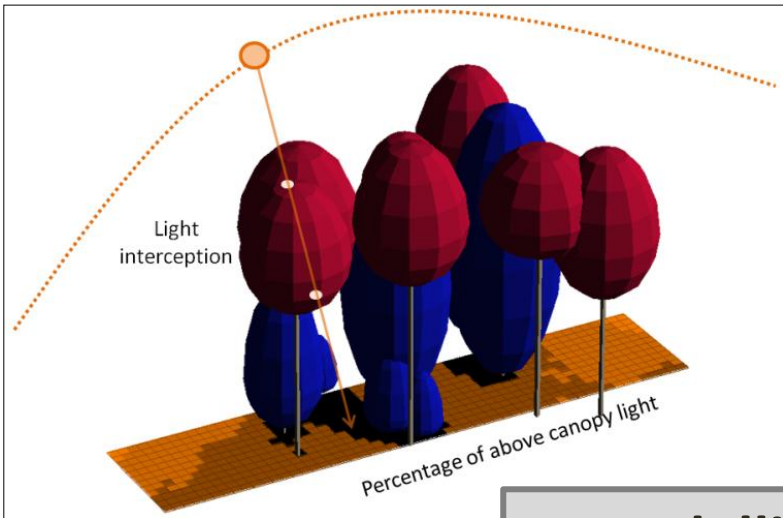


Site analysis



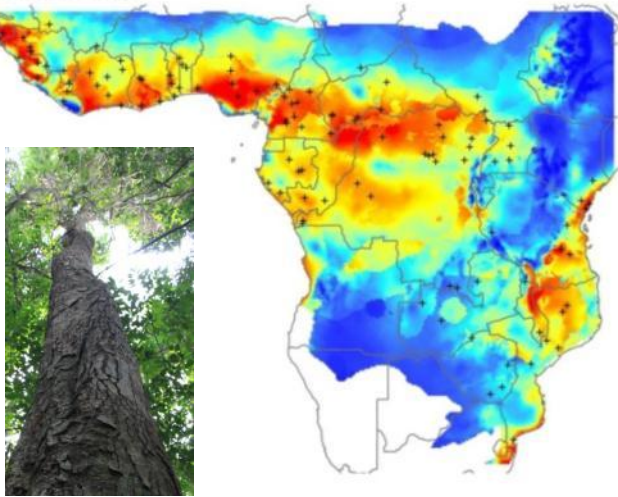
## ② Functional ecology and ecosystem dynamics

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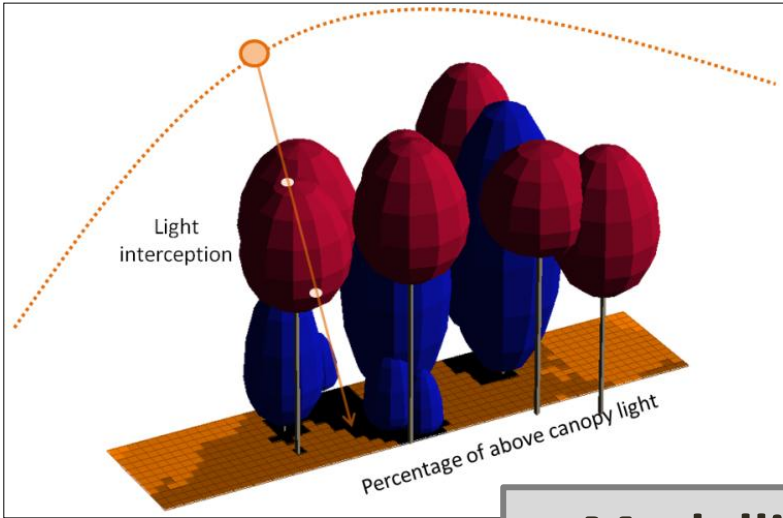


Modelling

*E. suaveolens*

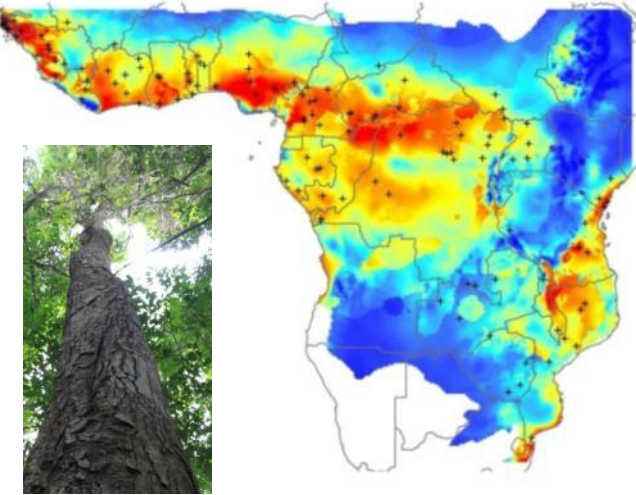


## ② Functional ecology and ecosystem dynamics



Modelling

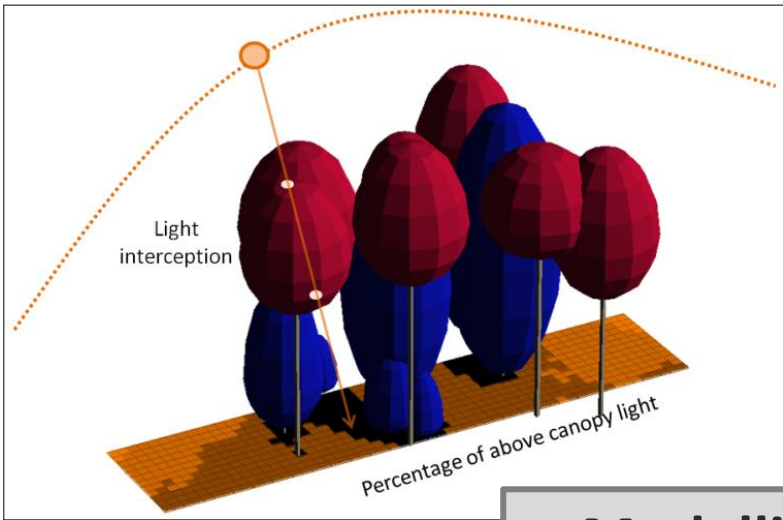
*E. suaveolens*



Ecophysiological experiment



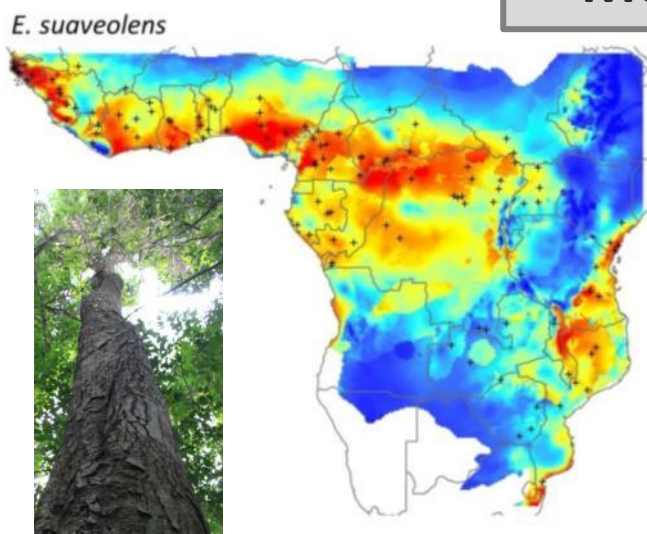
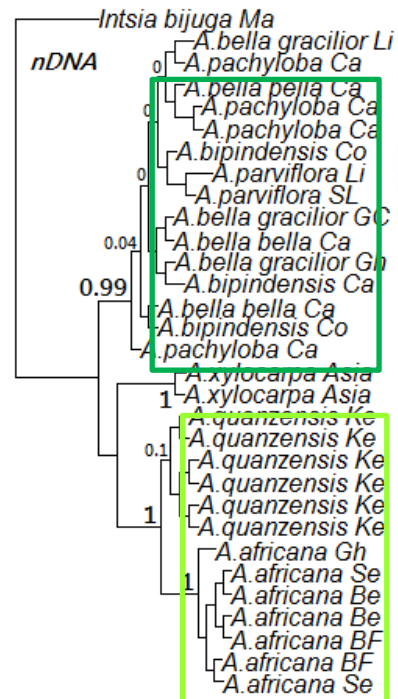
# ② Functional ecology and ecosystem dynamics



Modelling



Genetics



Ecophysiological experiment

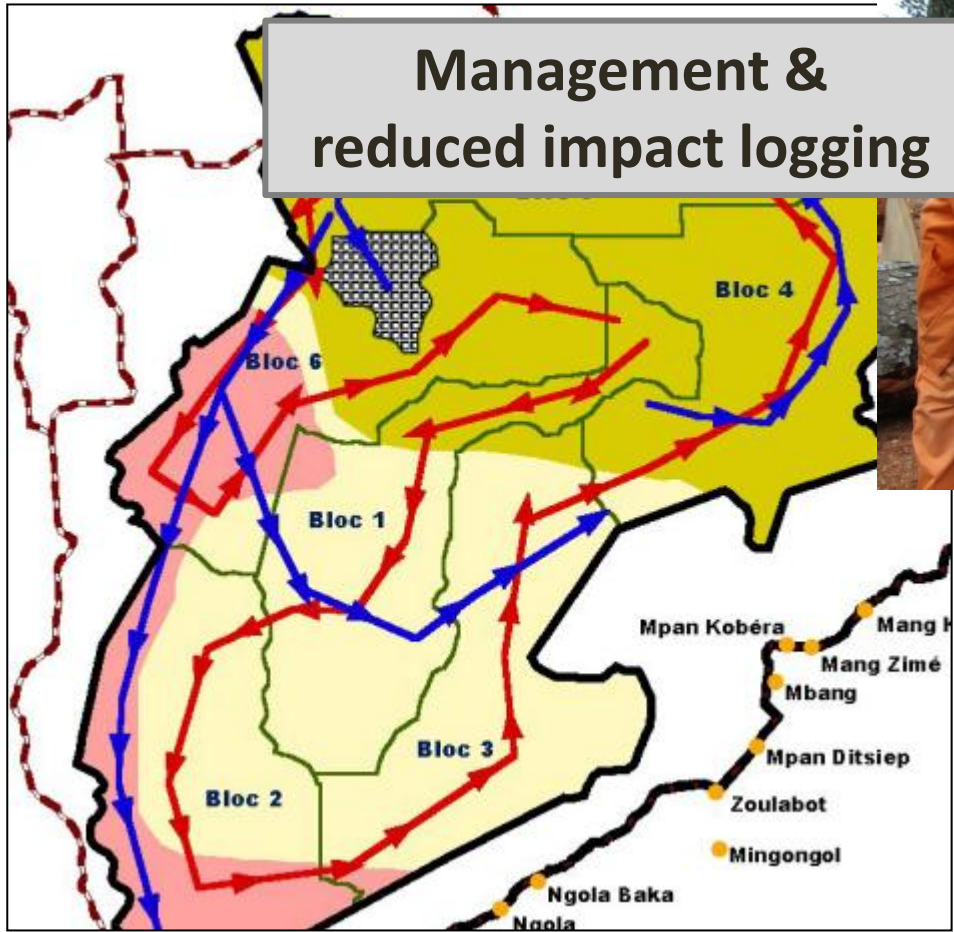


Seeds dispersal

# ③ Forest management and planning

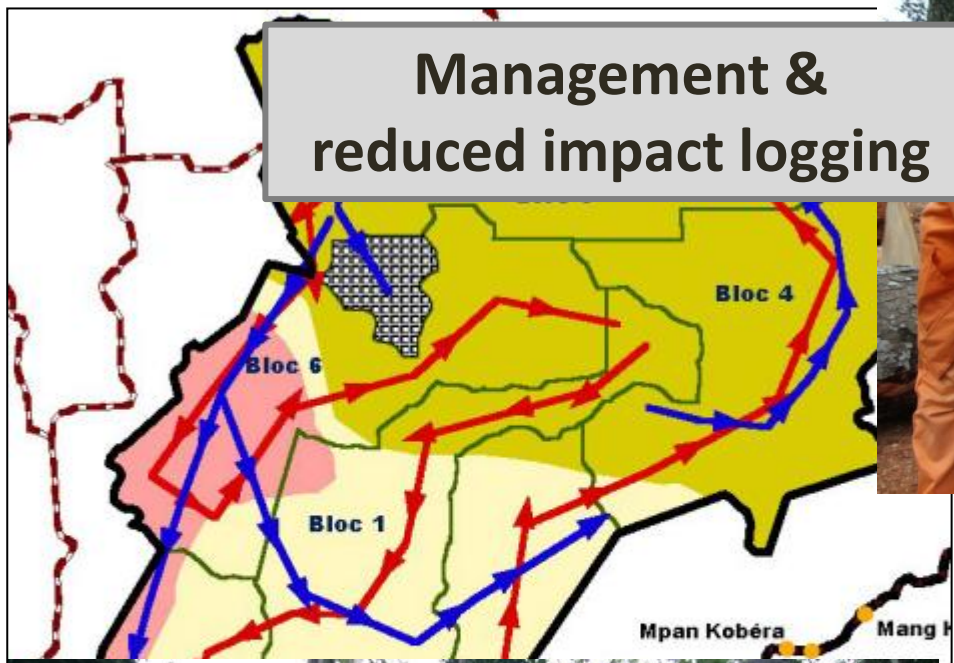
# ③ Forest management and planning

Management & reduced impact logging



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Management & reduced impact logging

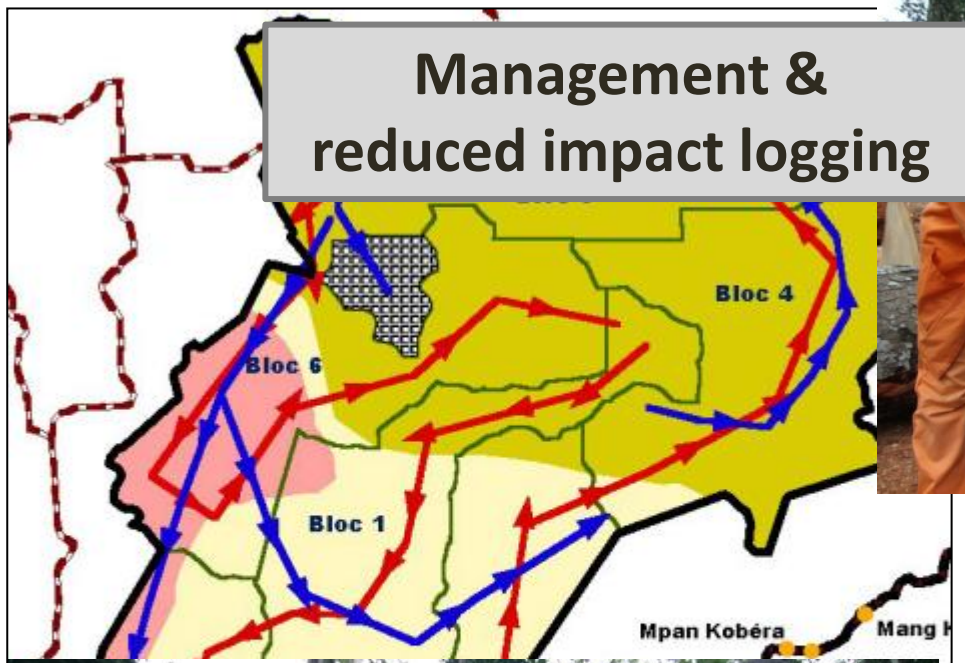


Social forestry

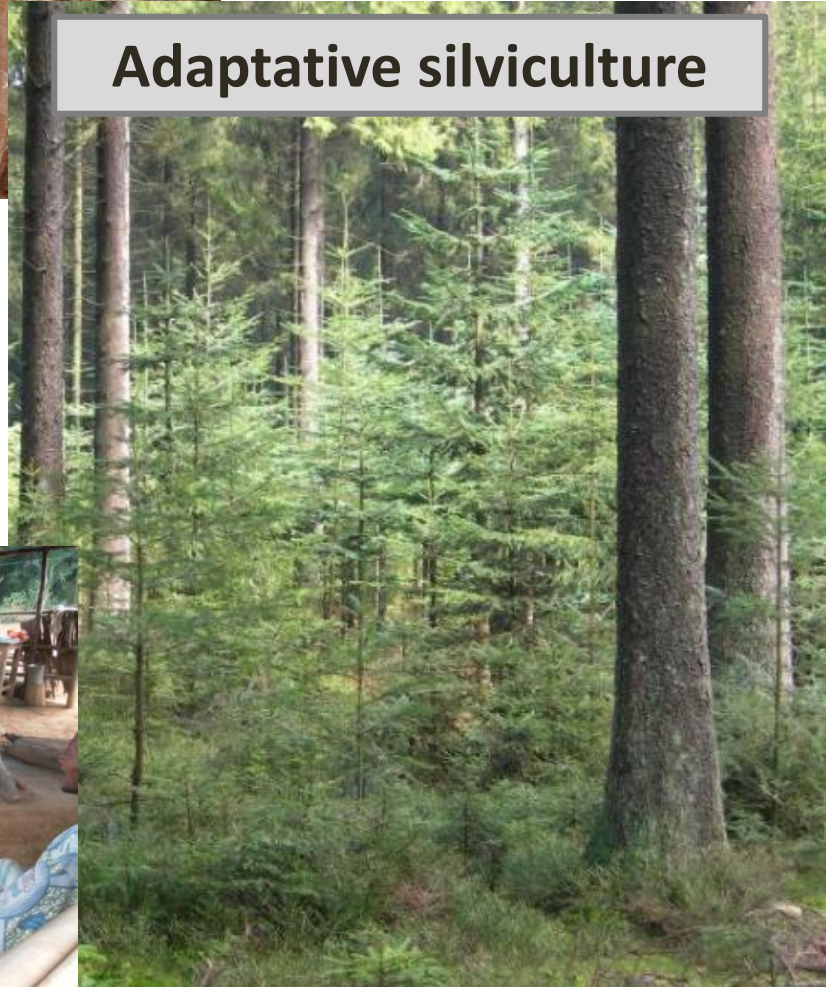


# ③ Forest management and planning

Management & reduced impact logging



Adaptative silviculture

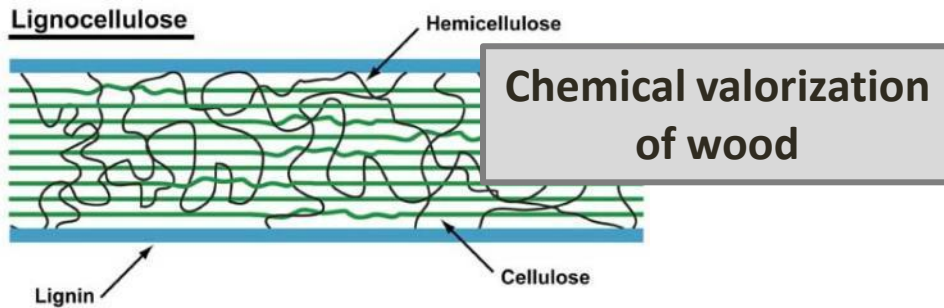


Social forestry

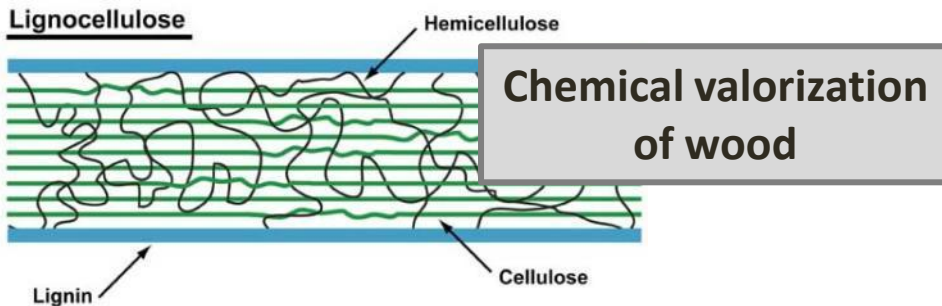


# ④ Valorization of ligneous and non ligneous natural resources

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# 4 Valorization of ligneous and non ligneous natural resources





## Illustration of a research projet:

*What are the interactions between biodiversity and the provision of ecosystem services in central African tropical forests?*

Simon Lhoest (PhD Student)

Supervisors: Adeline Fayolle & Marc Dufrêne

**Ecosystem services in tropical forests: 6.800.000.000.000 \$/year**

Costanza *et al.*, 2014



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But...

Logging  
intensification  
&  
Deforestation



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Land use change  
= main threat for biodiversity in the tropics

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Land use change  
= main threat for biodiversity in the tropics

*Sustainability and « value » of current management practices?*

# Objectives

An aerial photograph of a dense tropical forest. The canopy is mostly a deep green color, with a distinct cluster of trees in the middle-left area that have a yellowish-green hue, possibly indicating a different species or a specific stage of growth. The forest extends to the edges of the frame, showing a high density of trees.

**Objectives**

**Management practices**



**Biodiversity**  
State indicators

# Objectives

Management practices

1 ?

2 ?

**Biodiversity**  
State indicators

**Ecosystem services**  
Impact indicators



# Objectives

Management practices

1 ?

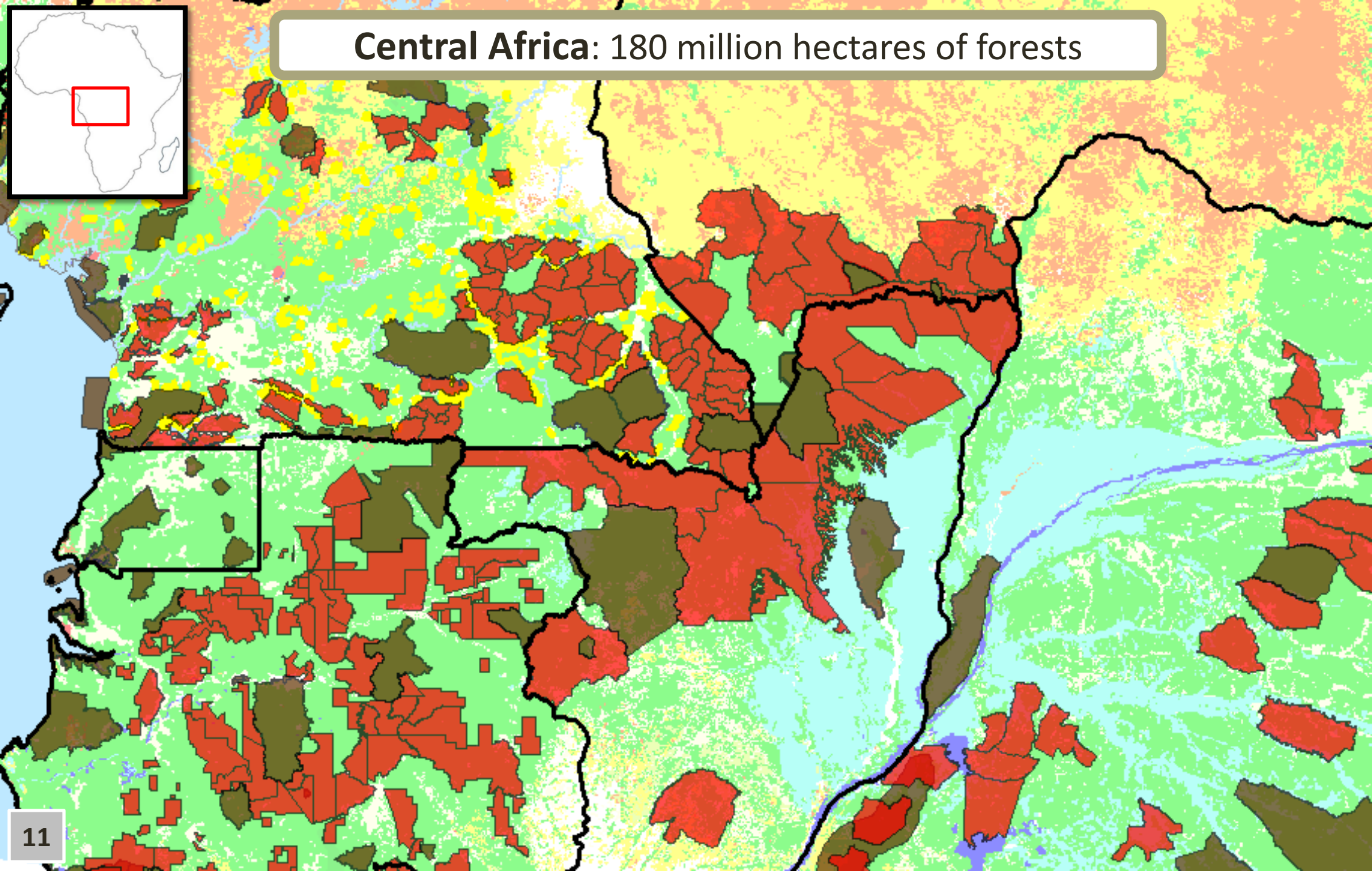
2 ?

**Biodiversity**  
State indicators

3 ?

**Ecosystem services**  
Impact indicators

**Central Africa: 180 million hectares of forests**



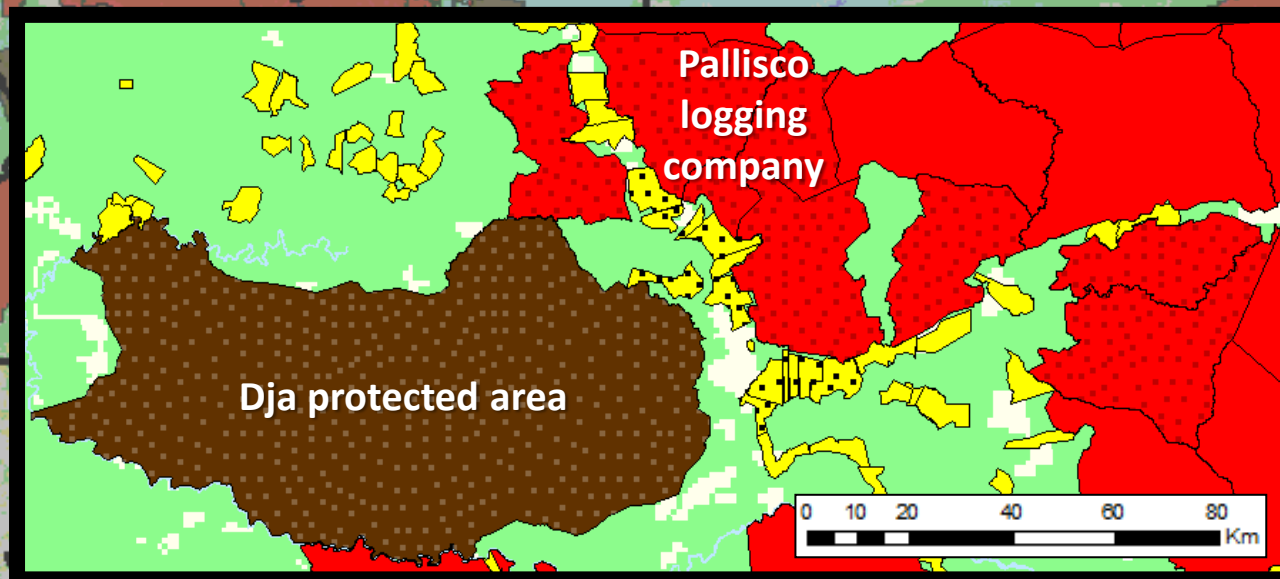
# Central Africa: 180 million hectares of forests

Management practices:

Community forests

Selective logging

Protected area



# Biodiversity analysis

## 3 Management practices

Community forests

Selective logging

Protected area

→ State indicators



# Biodiversity analysis

## 3 Management practices

Community forests

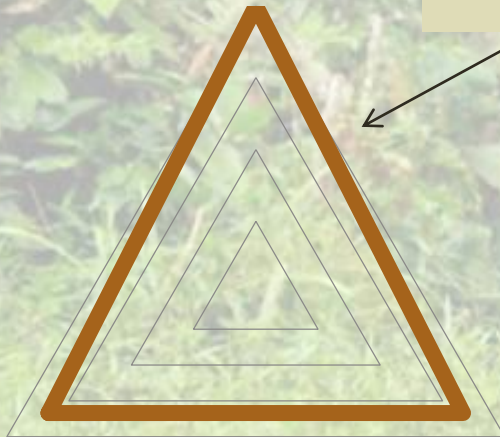
Selective logging

Protected area

State indicators

Synthetic image for each management practice for comparisons

Composition



Functioning

Structure

*Hypotheses*

# Biodiversity analysis

## 3 Management practices

Community forests

Selective logging

Protected area

Composition

Synthetic image for each management practice for comparisons

State indicators

Animal diversity

Vegetal diversity

Rare habitats

Functioning

Structure

*Hypotheses*

Protocol + quantification for each indicator

# Biodiversity analysis

## 3 Management practices

Community forests

Selective logging

Protected area

## State indicators

Synthetic image for each management practice for comparisons

Composition



Functioning

Structure



Stem density

Standed volume

Basal area

*Hypotheses*

Protocol + quantification for each indicator

# Biodiversity analysis

## 3 Management practices

Community forests

Selective logging

Protected area

## State indicators

Synthetic image for each management practice for comparisons

Non pioneer species

Wood density

Regeneration

Composition

Functioning

Structure

*Hypotheses*

Protocol + quantification for each indicator



# Biodiversity analysis

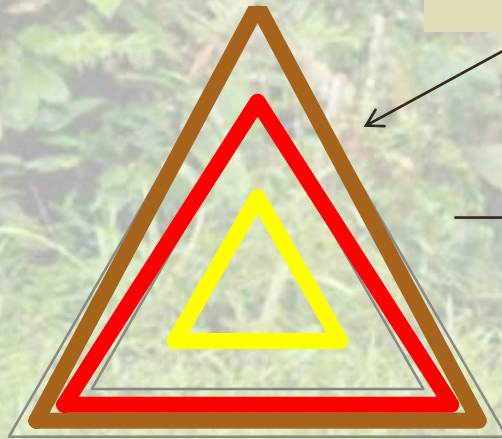
## 3 Management practices

- Community forests
- Selective logging
- Protected area

## State indicators

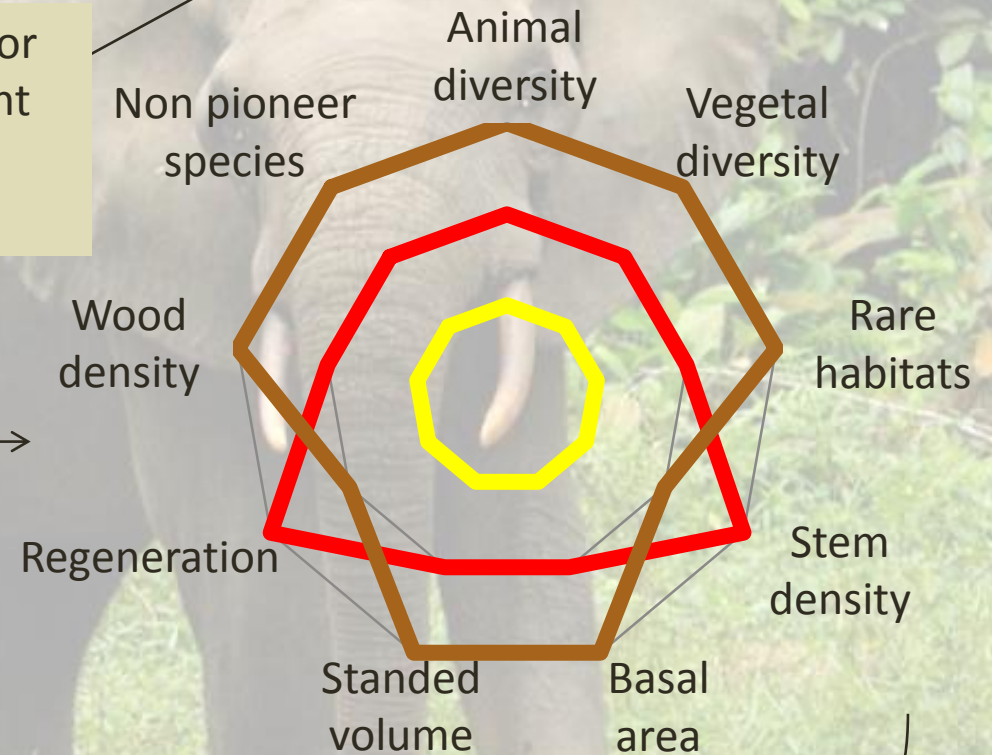
Synthetic image for each management practice for comparisons

Composition



Functioning

Structure



*Hypotheses*

Protocol + quantification  
for each indicator

# Ecosystem services analysis

## 3 Management practices

→ Impact indicators

Community forests

Selective logging

Protected area

# Ecosystem services analysis

## 3 Management practices

Impact indicators

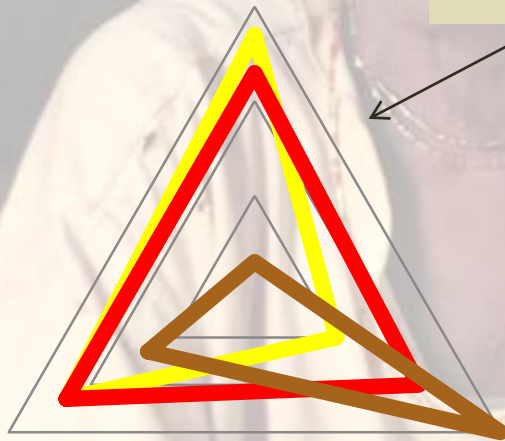
Community forests

Selective logging

Protected area

Synthetic image for each management practice for comparisons

Production



Culture

Regulation

*Hypotheses*

# Ecosystem services analysis

## 3 Management practices

## Impact indicators

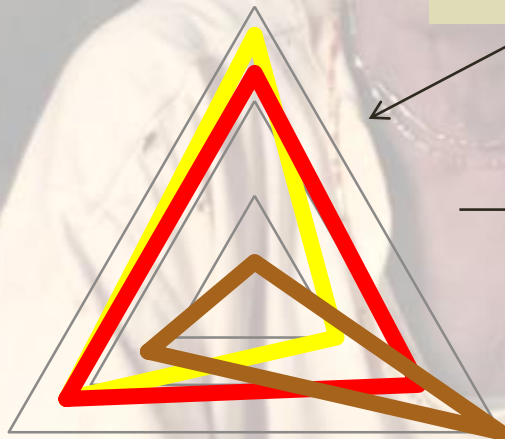
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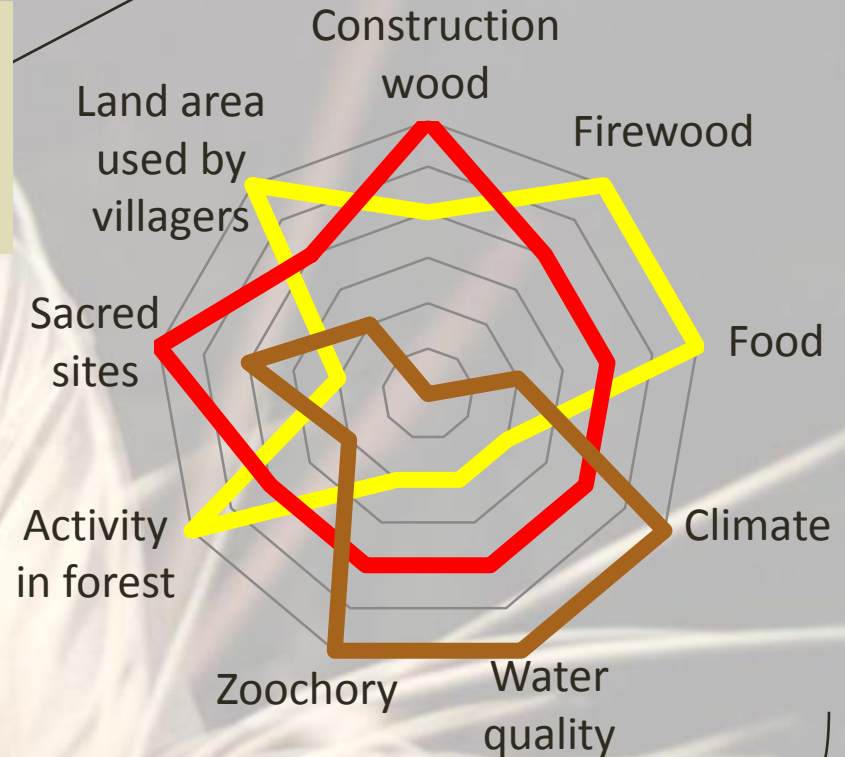
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# Data acquisition

Many research projects and studies in the region since the 90's...



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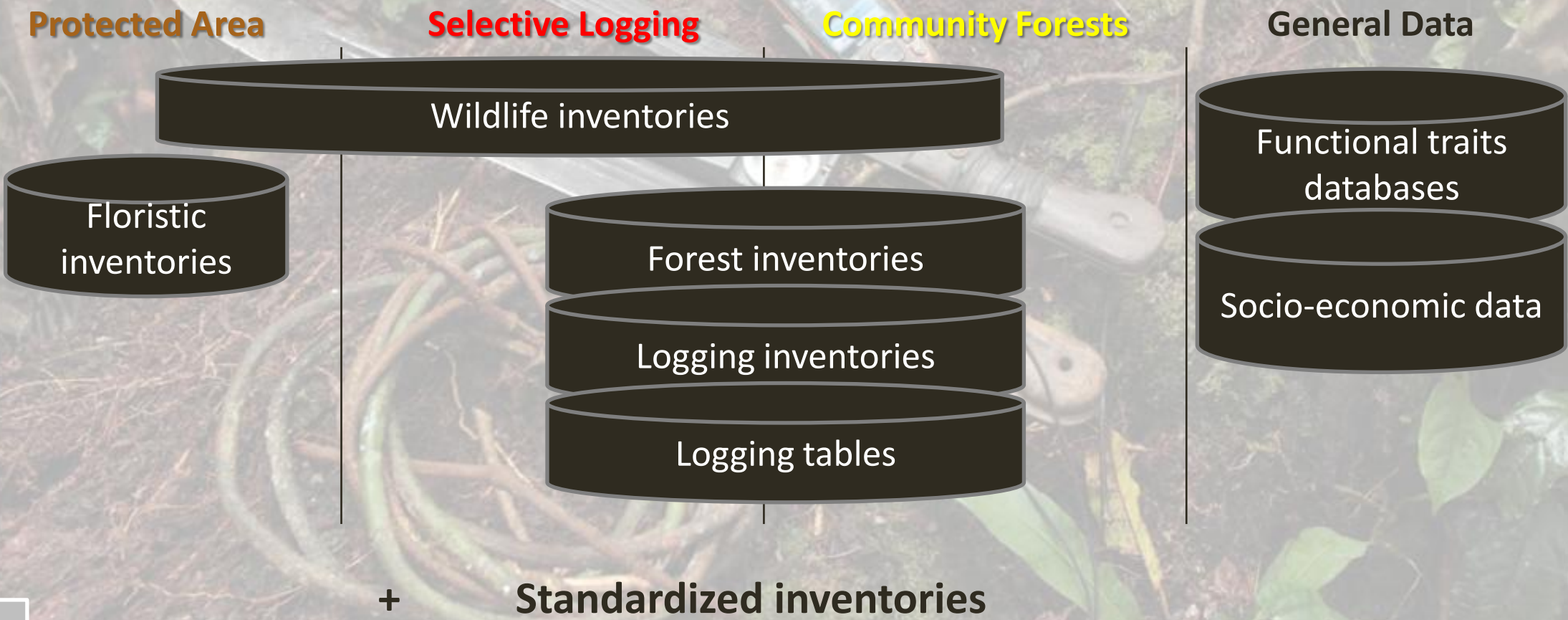
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→ ... and many available databases!



**Thanks for your attention!**



Gembloux Agro-Bio Tech  
Université de Liège



**SIMON LHOEST**  
*simlho@hotmail.com*