

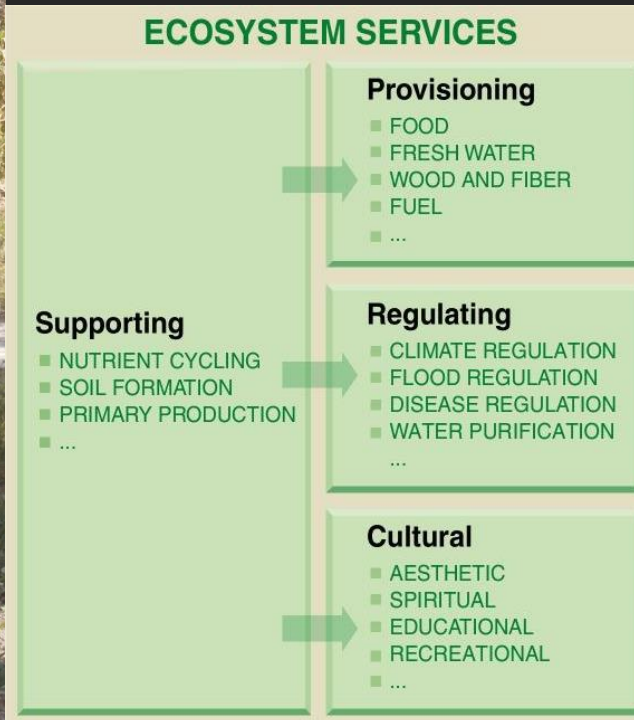
# Mapping ecosystem services trade-offs and synergies in a pioneer front context (Brazil)

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# Ecosystem Services (ES) :

Benefits people obtain from ecosystems  
(MEA, 2005)

Underlines societal dependency towards the  
ecosystems (Daily, 1997)

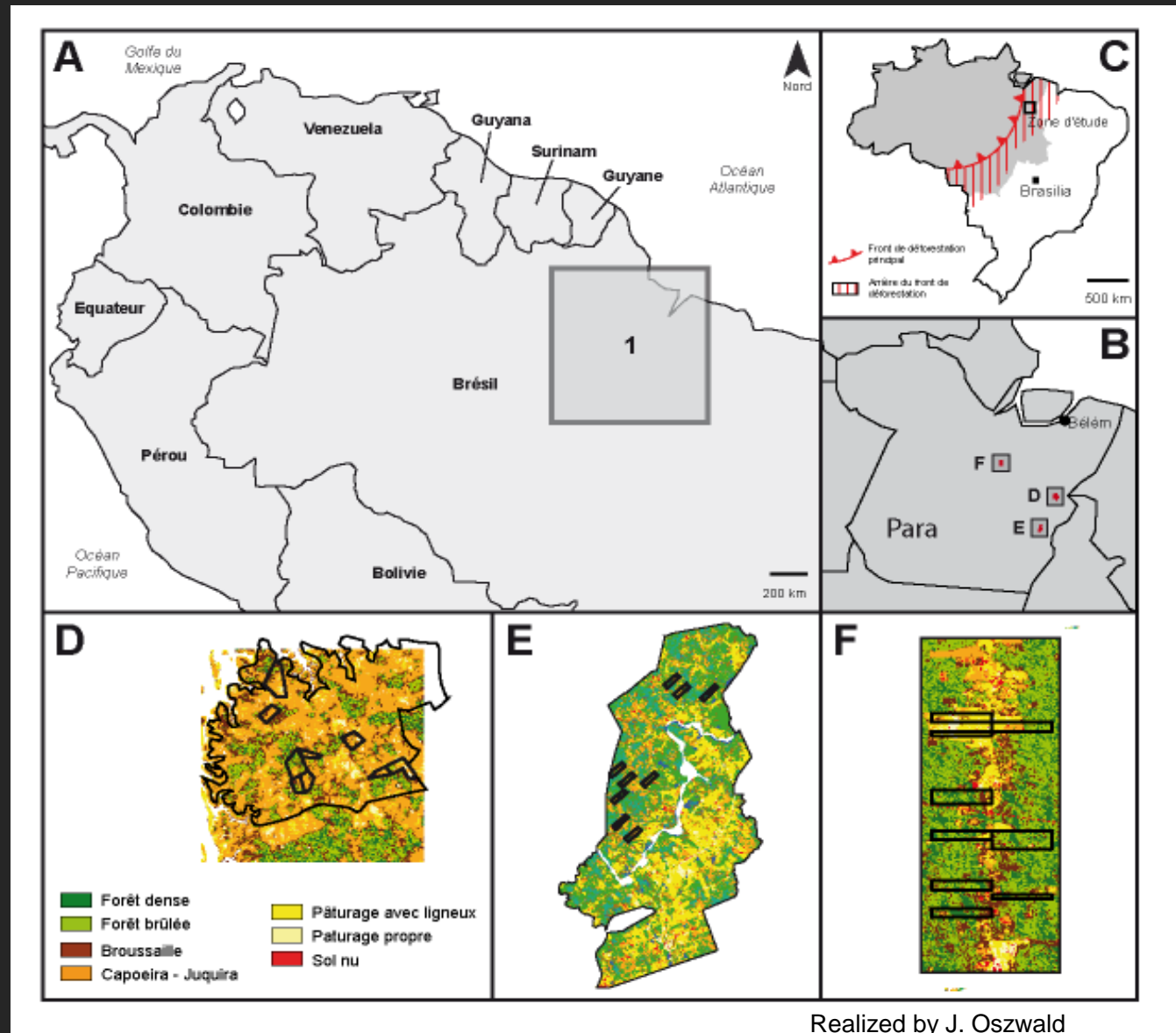


## Ecosystem Services (ES) :


- Considered in an operational way
- Operationalized through the maps
- In interrelations

**How to map ecosystem services trade-offs and synergies and what for ?**







A photograph of a forest path with a fallen tree trunk leaning against it. The path is dirt and leads into a dense forest. The trees are mostly green, but some are bare, suggesting a transition or a specific type of forest. The lighting is bright, suggesting daytime.

# How to map ecosystem services trade-offs and synergies and what for ?

## 1. Combinaison of single ES maps :

1. Map from a **scoring**
2. Map from a **PCA**

## 2. Map from **landscape units**

**SCORING****PCA****LANDSCAPE UNITS**

**Maps for each ES - *Le Clec'h et al., 2013***

*Statistical models linking sampling and remote sensing data.*

**Scoring classes**

**Scoring map**

*Sum of all the scores*

**PCA**

**Trade-offs map**

*On the synthetic variables*

**Distance matrix**

*Land cover map  
(6 types)*

**Landscape units**

*Mean value of ES by  
landscape units*

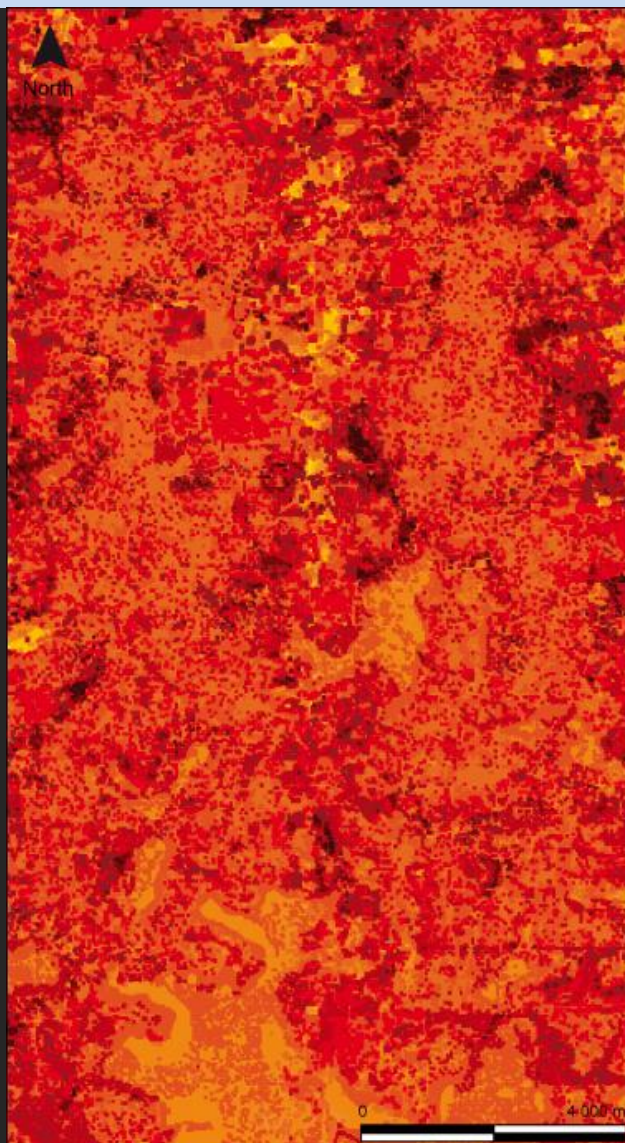
**Landscape units map**

*Sum by landscape units*

## Unequal capacity to modeled ES

<b>Proxy</b>	<b>R<sup>2</sup> (decision tree)</b>
Carbon stocks in vegetation	0.74
Biodiversity index	0.65
Available water for plants	0.39

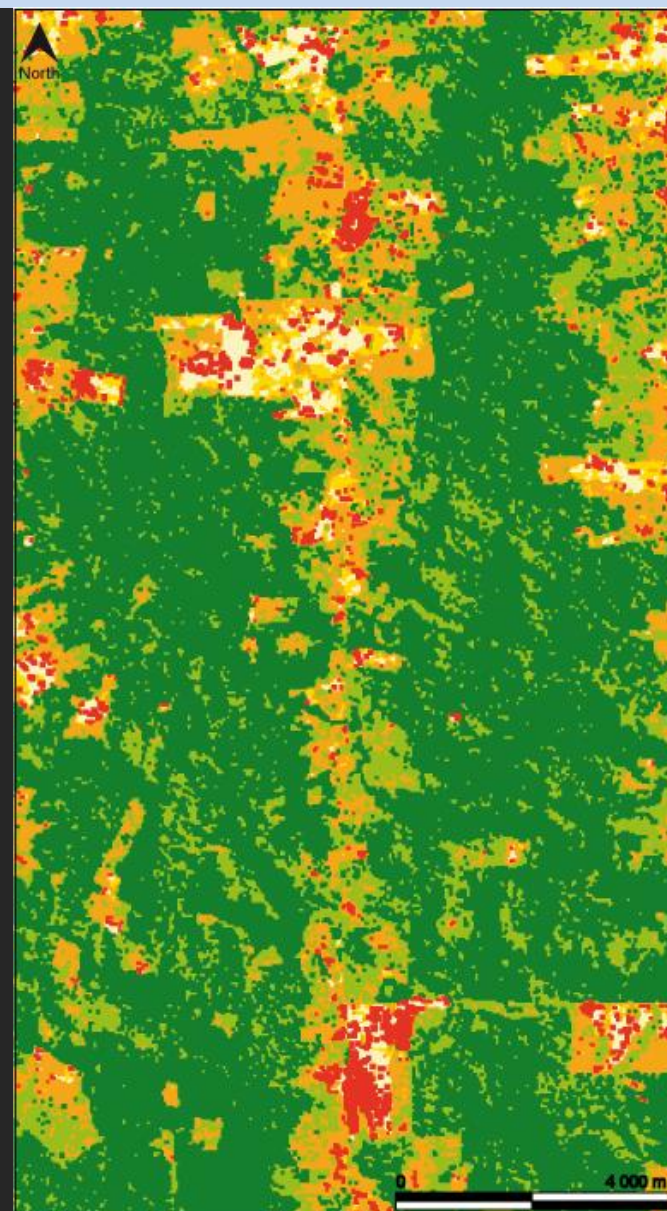
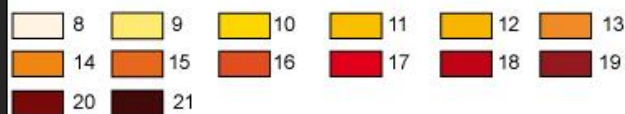




Richness in ecosystem services in Pacaja in 2007

Proxies : biodiversity's index, pollinators, carbon stored in vegetation and in soil, soil water infiltration rates into soil and soil chemical quality

**A**

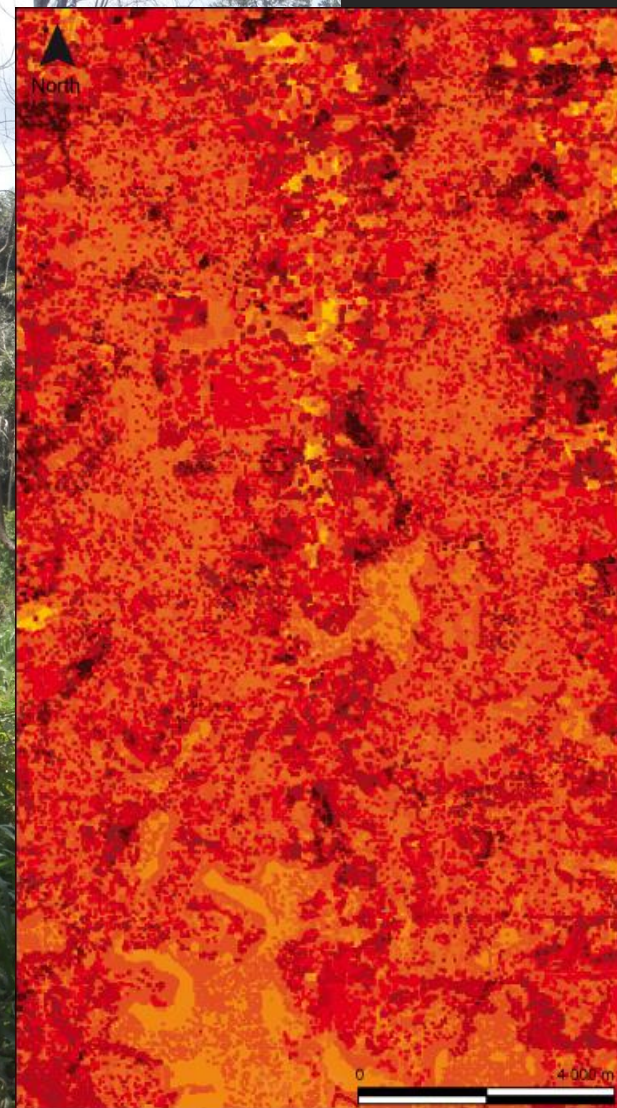


Land cover in 2007



**C**

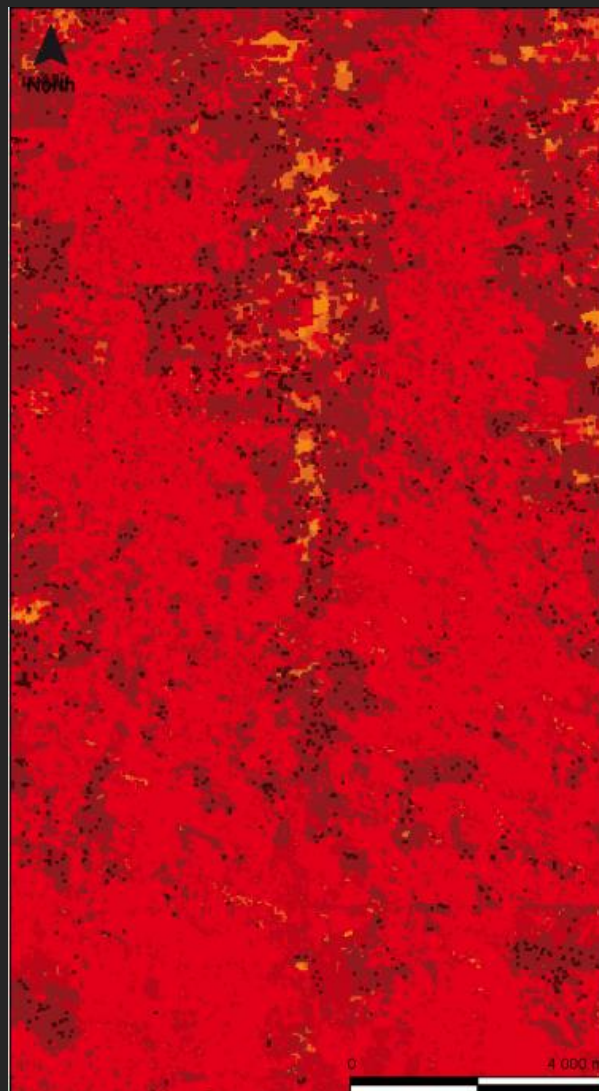
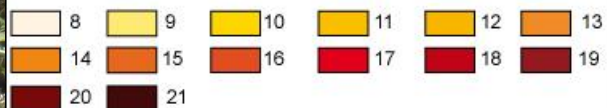
# Sensitivity to modeled indicators



Richness in ecosystem services in Pacaja in 2007

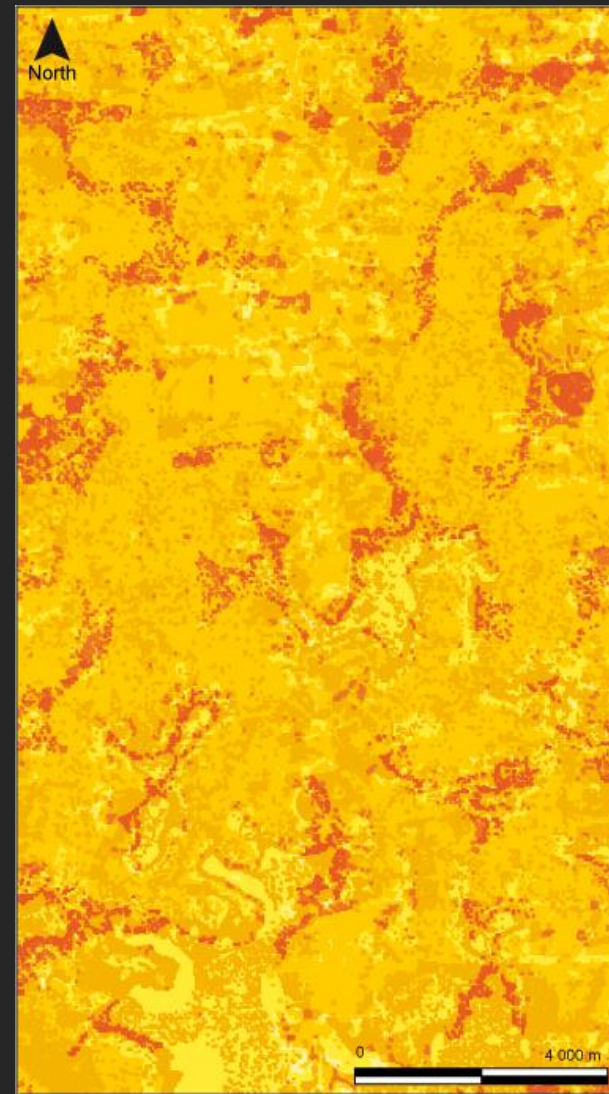
Proxies : biodiversity's index, pollinators, carbon stored in vegetation and in soil, soil water infiltration rates into soil and soil chemical quality

**A**



Richness in ecosystem services in Pacaja in 2007

Proxies : index of biodiversity and carbon stored in vegetation and in soil



Richness in ecosystem services in Pacaja in 2007

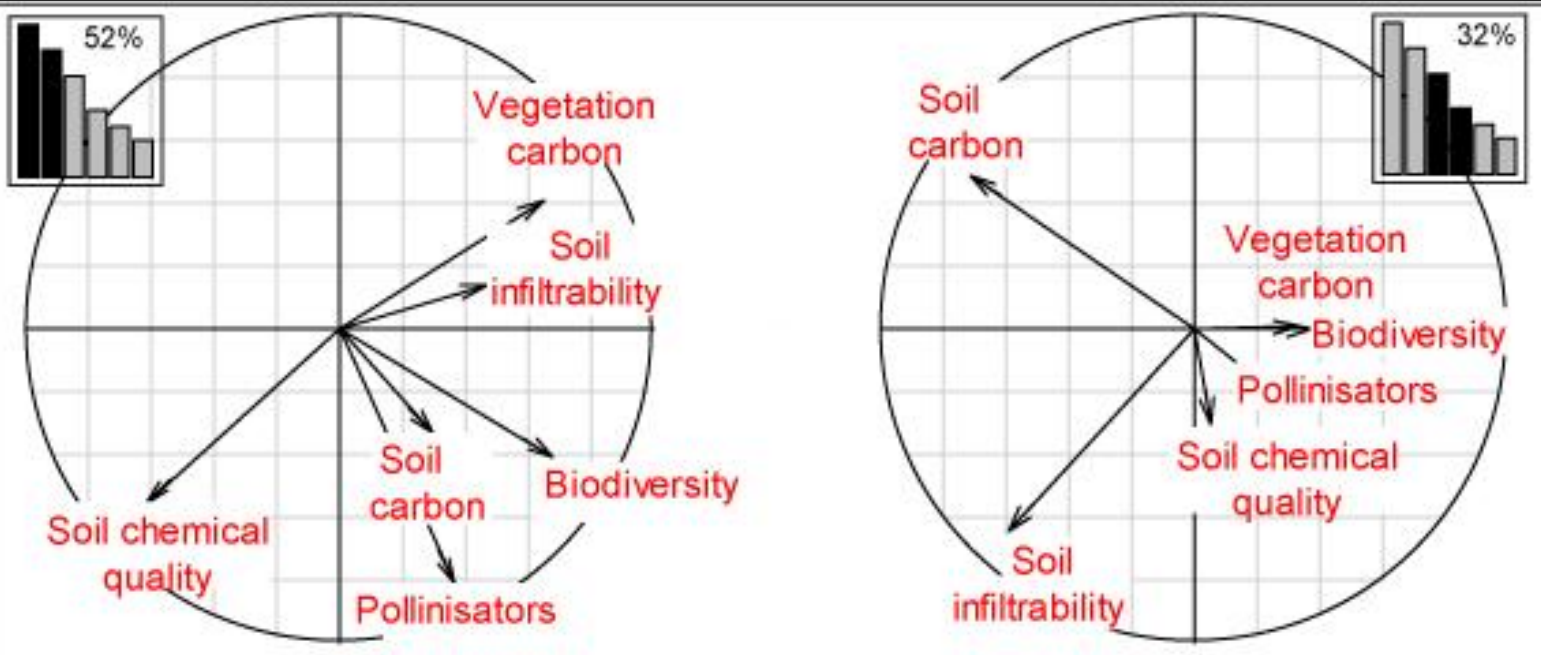
Proxies : Soil infiltrability, carbon stored in soil and soil chemical quality

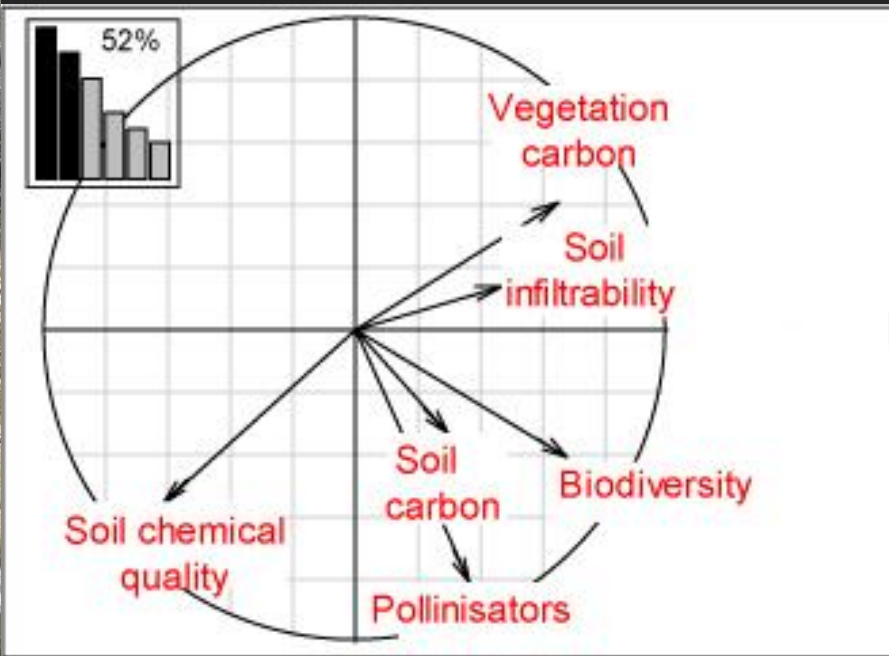


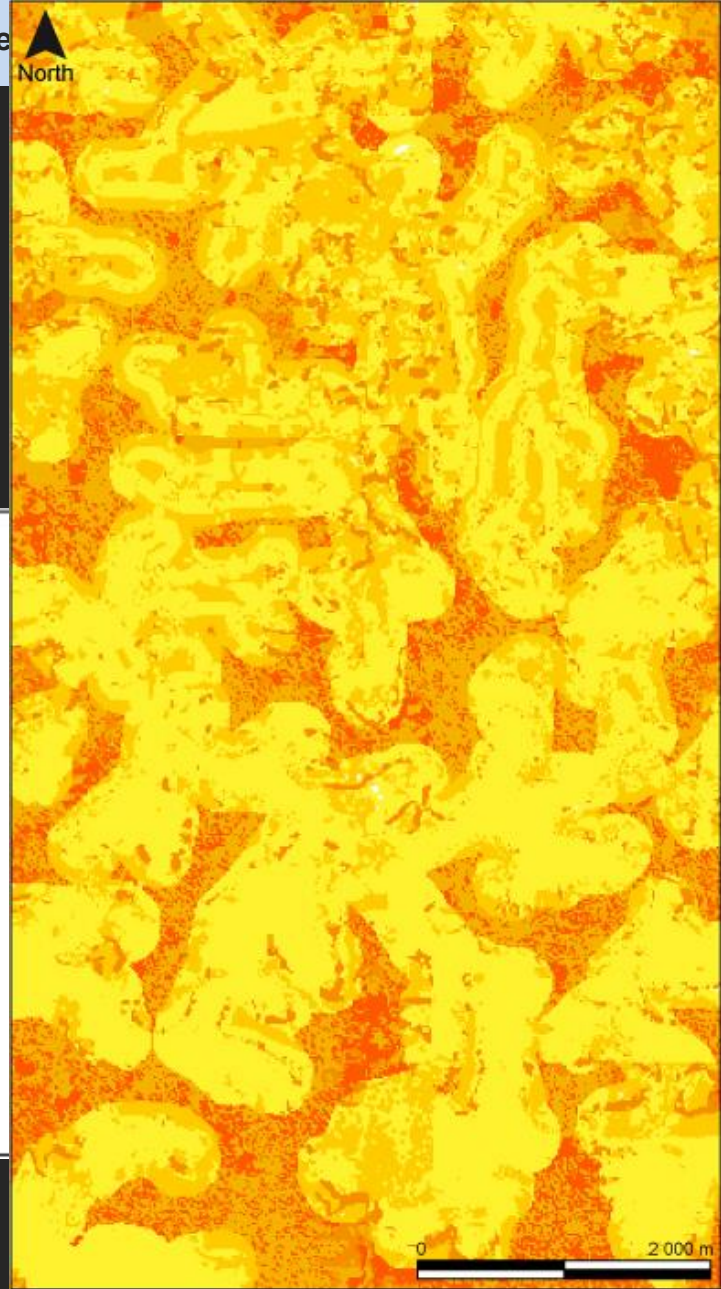
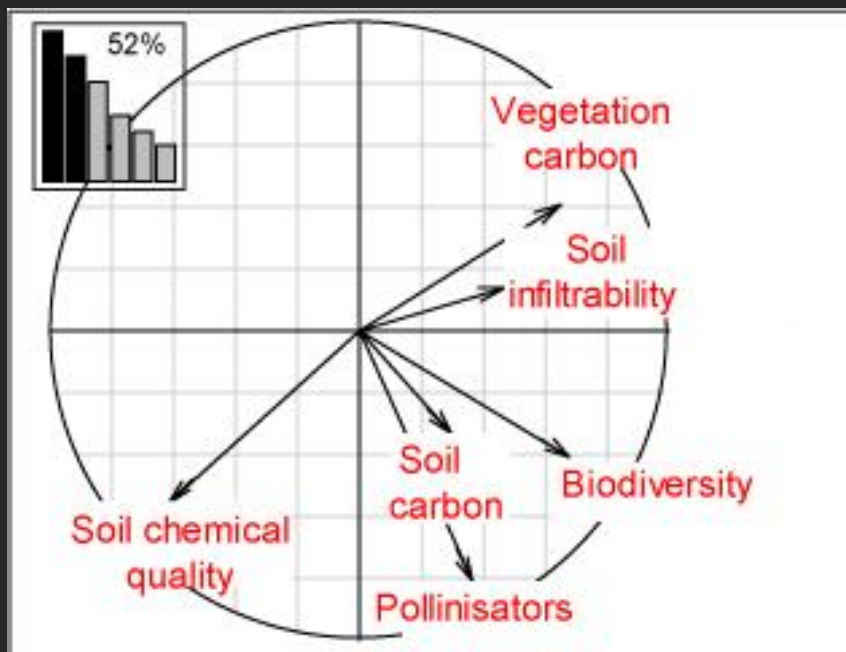
**B**

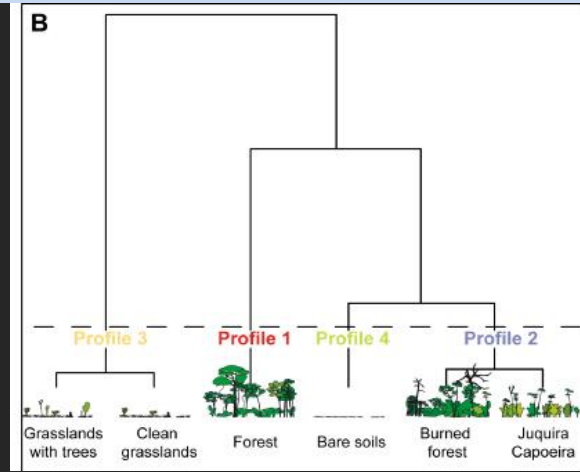
# PCA

Very synthetic but less explicit









## Mapping ES trade-offs rises technical questions

There is no one single way to map ES and trade-offs.

Methodological questions : uncertainty, site effect, choice of ES, scale change.

Undeniable questions but questions that exist in all mapping practices.






Context	Methodology	Results	Discussion
<i>Method</i>	<i>Advantages</i>	<i>Limitations</i>	
<b><i>PCA</i></b>	<p>Explanatory tool to understand the correlations between the indicators; Data driven mapping tool.</p>	<p>Difficulties to interpret and explain in terms of the original data (landscape characteristics); Based on monothematic maps (uncertainty); Difficulties to take the interrelationships into account.</p>	
<b><i>Scoring</i></b>	<p>Overview of ES hotspots; Opportunity of scoring particular indicators; Easy to implement.</p>	<p>Non data driven; Failure to address the relations between the ES; Limited by the impact of the subjective discretization choice; Based on monothematic maps (uncertainty).</p>	
<b><i>Landscape units</i></b>	<p>Very simple method; Very easy map to interpret; Overview of the roles played by the different areas in the ES providing.</p>	<p>Limitation in the remote sensing data use to map (simplification); Limitation of studied indicators; The interrelationships are not taken into account.</p>	



## Mapping ES trade-offs rises questions about the uses

Several uses of the notion of ES. Necessity to adapt the maps and their methods to these uses.

<b><i>Pedagogical</i></b>	<b><i>Heuristic</i></b>	<b><i>Policies / political</i></b>
<p><i>Understanding of social dependance to ecosystems</i></p> <p><b>Landscape units method :</b> Easy to explain Landscape easily monitored and affected</p>	<p><i>Reflexion on the exercice of mapping</i></p> <p><i>Reflexion on the notion itself</i></p>	<p><i>Quantitativist approach : tool to evaluate policies</i></p> <p><i>Qualitative approach : tool to bring and lead public debate.</i></p> <p><b>PCA and scoring methods</b> Flexible concerning the choice of ES</p>



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*Merci pour votre attention*