Origin(s) and retrospective trajectory(ies) of the biodiversity in the *Pays de Bitche*: a knowledge base at the service of territorial stakes

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According the PhD work of Emilie Gouriveau and David Gocel-Chalté, and the postdoc of Hannes Knapp

"Biodiversity" Session

International Symposium of LabEx DRIIHM

Inter-Disciplinary Research Facility on Human-Environment Interactions - ANR-11-LABX-0010

June 5th-7th, 2023 – Strasbourg (France)

The Bitcherland

Castle of frankenstein

A open agricultural plateau on clay rich loamy soils on the East

A wooded low mountain range on sandy soils on the West

Semi-continental climate

≈600 km2 with 35 000 inhabitants

Today ⟶ no large industries beside farming and forestry

Past ⟶ mining, metal and glass works, farming and forestry

Ancient human presence with local lordships and monasteries

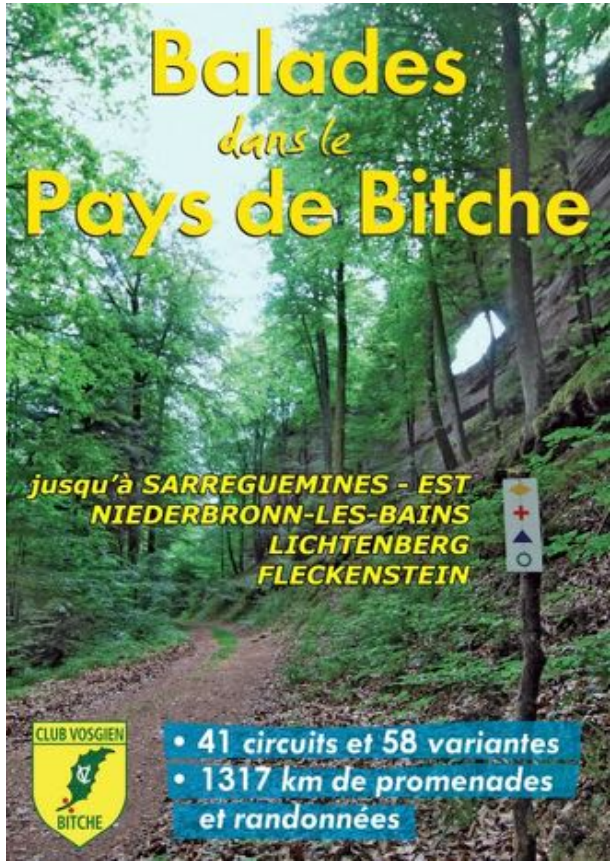
Territorial stakes about social-ecological system

NATURA 2000

FR4100212 - LANDES ET TOURBIÈRES DU CAMP MILITAIRE DE BITCHE

FR4112006 - FORÊTS, ROCHERS ET ÉTANGS DU PAYS DE BITCHE

Réserve Naturelle
ROCHERS ET TOURBIÈRES DU PAYS DE BITCHE



Parc naturel régional des Vosges du Nord

Réserves de BIOSPHERE
UNESCO
MaB
FRANCE

RBI du Rothenbruch

Office National des Forêts

"Biodiversity" Session

OHM PAYS DE BITCHE

=> Aims to study the **disruptions** that have occurred in the territory, while measuring the capacities and strategies for human and ecosystem **resilience** at the scale of the local **social-ecological system**

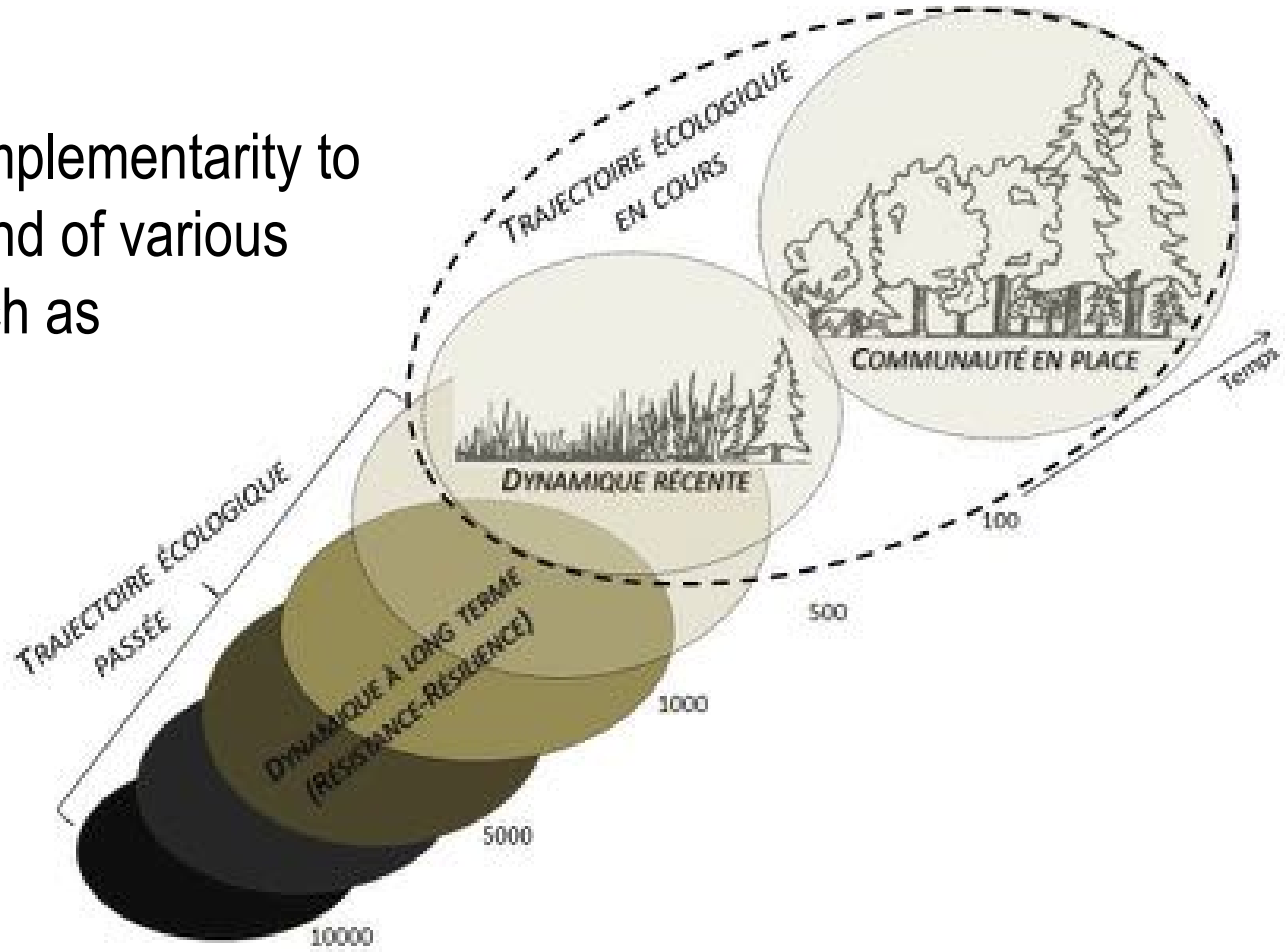
This transformation must be examined particularly closely given that, from a historical point of view, **land-use planning** has been based on the **extraction and management of natural resources** (by industrial players and farmers/farm labourers) and on the control of space (by the military)

Visit of Kaiser Wilhelm II of Germany in 1903

General aim => Acquiring and setting up a **knowledge base** (i.e., socle de connaissance) about the origin(s) and trajectory(ies) of the biodiversity in the territory

=> various tools and indicators used in a complementarity to reconstruct images of the past biodiversity and of various socio-ecosystems of the Pays de Bitche, such as peat bogs, forests, and agricultural areas

= Interdisciplinary and muli-site approach



Robin, 2021. Revue forestière française

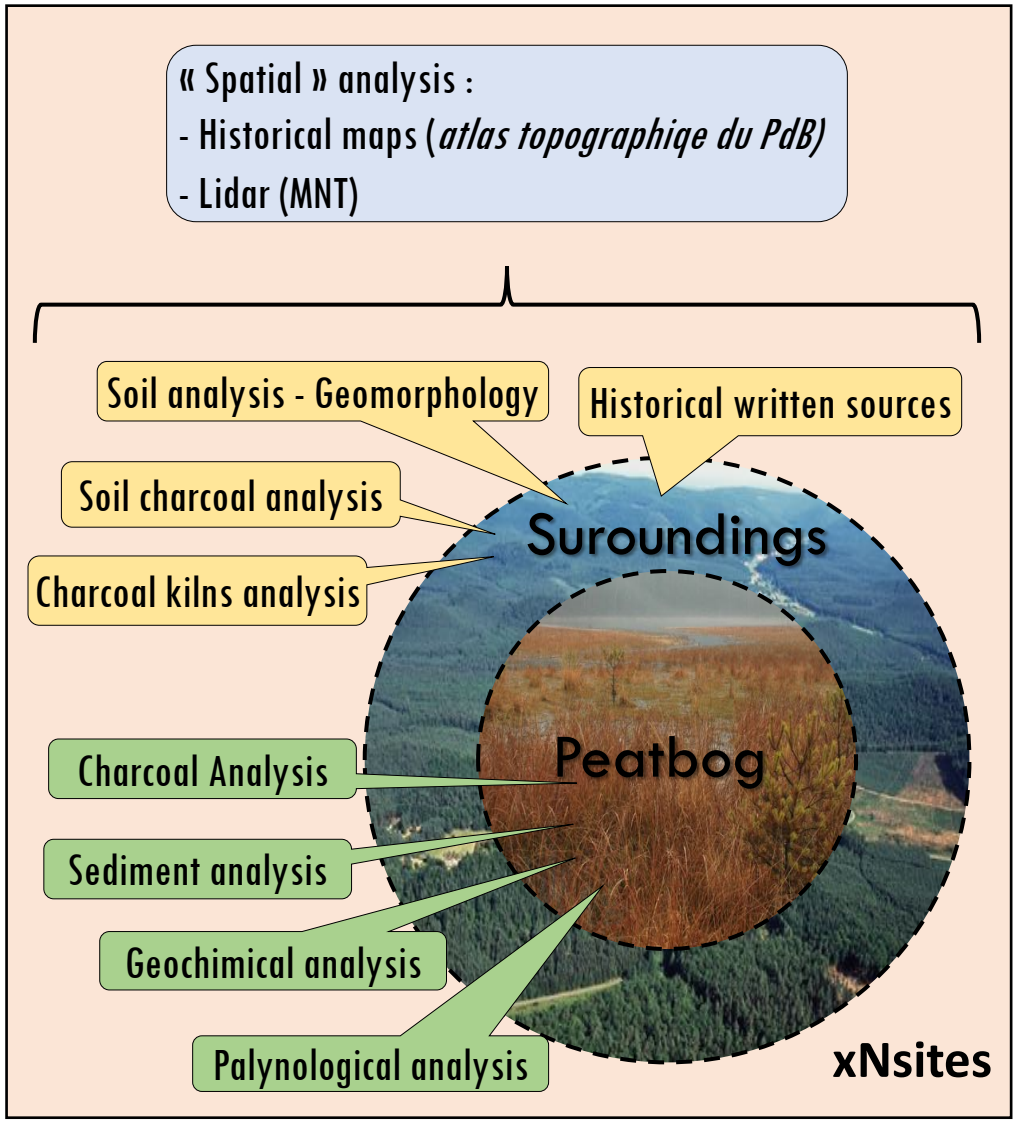
Methods

Various “paleo-works” have been realized to reconstruct the **past links between human and their environments**, related to the **use of natural resources** (soil, wood and water)

This interdisciplinary approach combines **environmental sciences and ecology**, such as palynology and anthracology, with **human sciences**, such as geoarchaeology and history

-> About ten OHM projects from 2016 to 2022
-> Five type of indicator and related approches :

- **Pollens** } *Paleoecology*
- **Charcoals** }
- **Soils** *Soil sciences / geomorphology*
- **Landforms** } *Geography*
- **Historical written sources** }



"Biodiversity" Session

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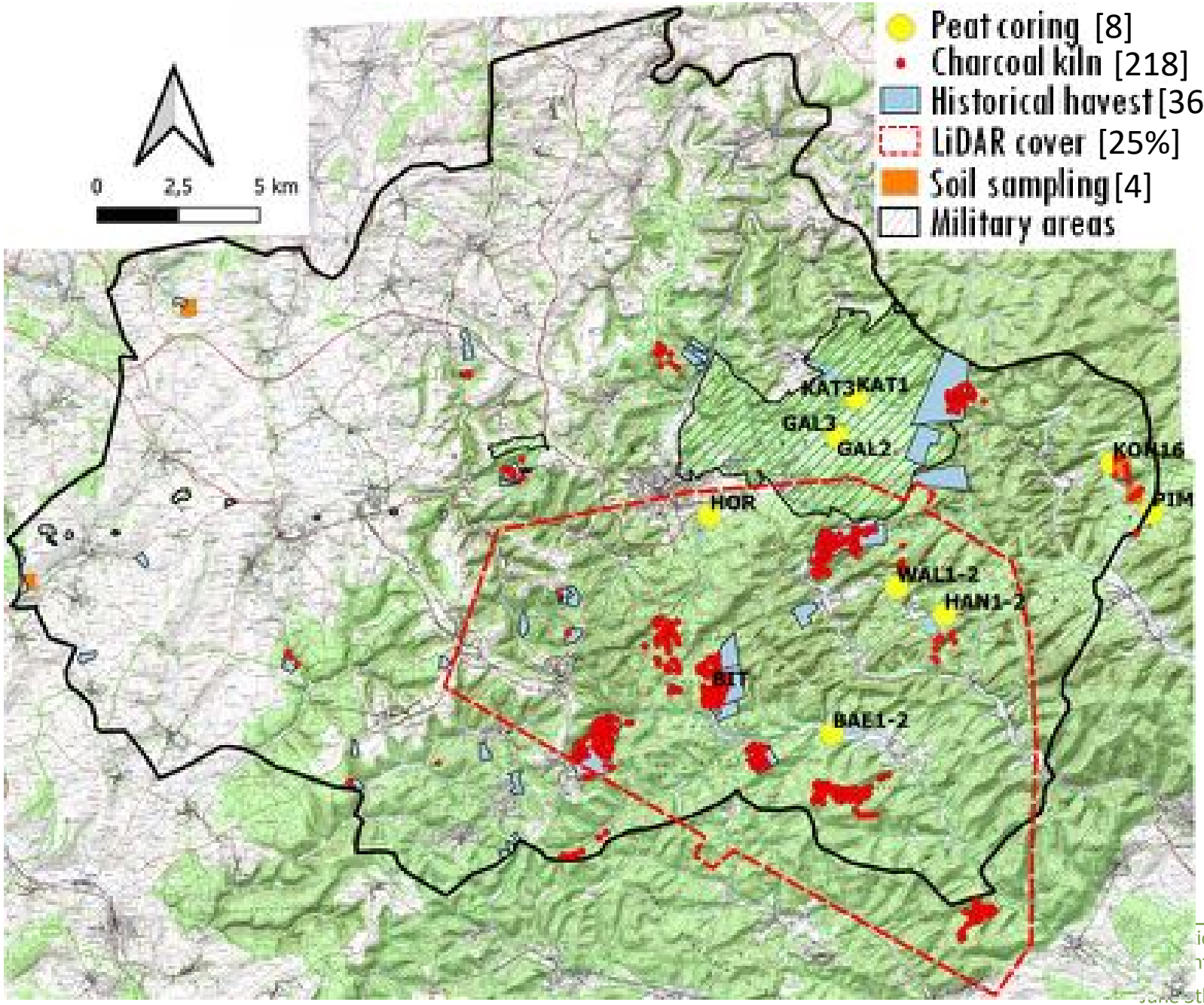

Main results and insights

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↳ Landscapes long term trajectories

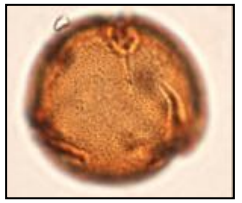
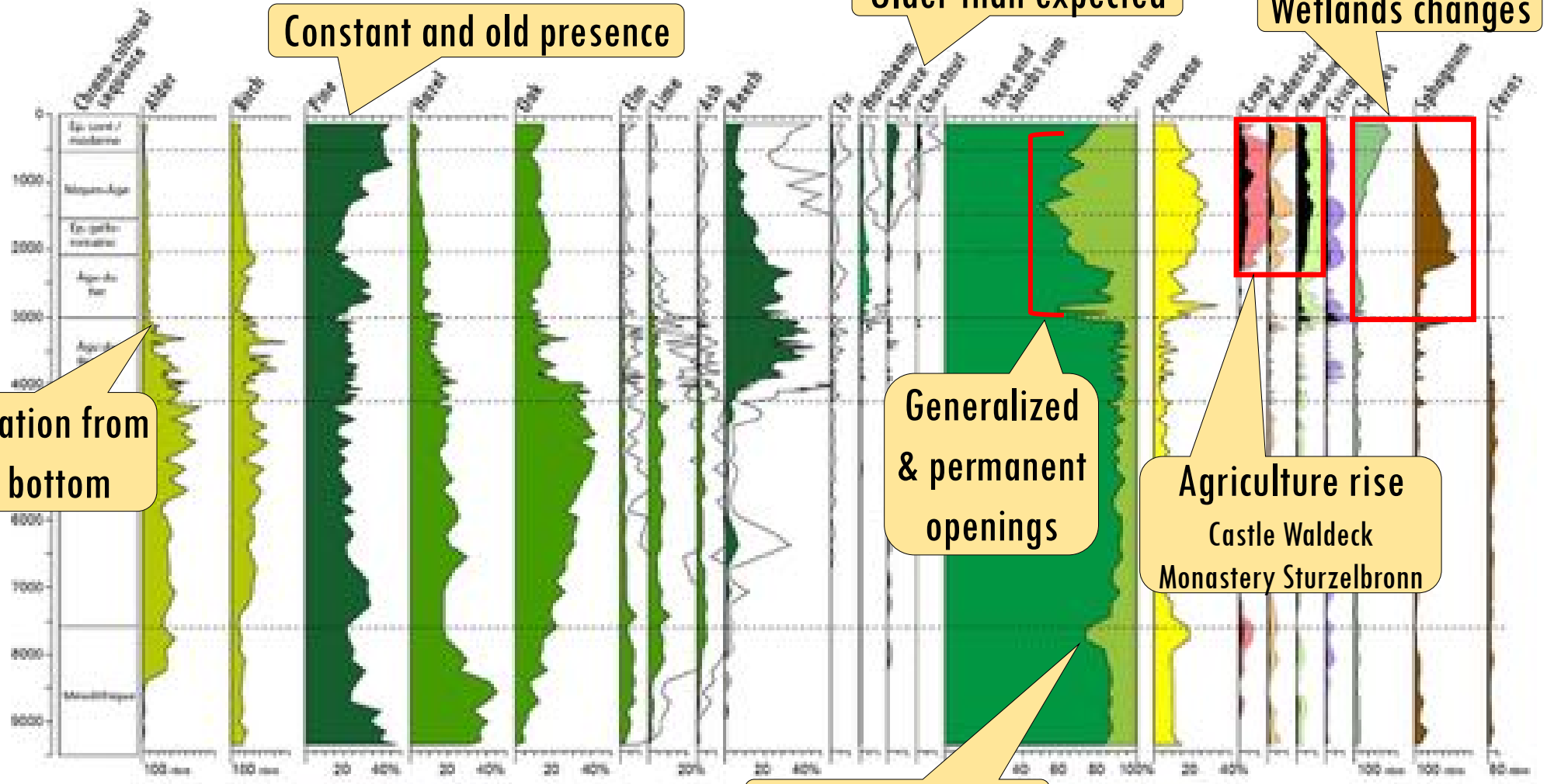


Diagramme pollinique de la Horn représenté en âge (cal. BP).

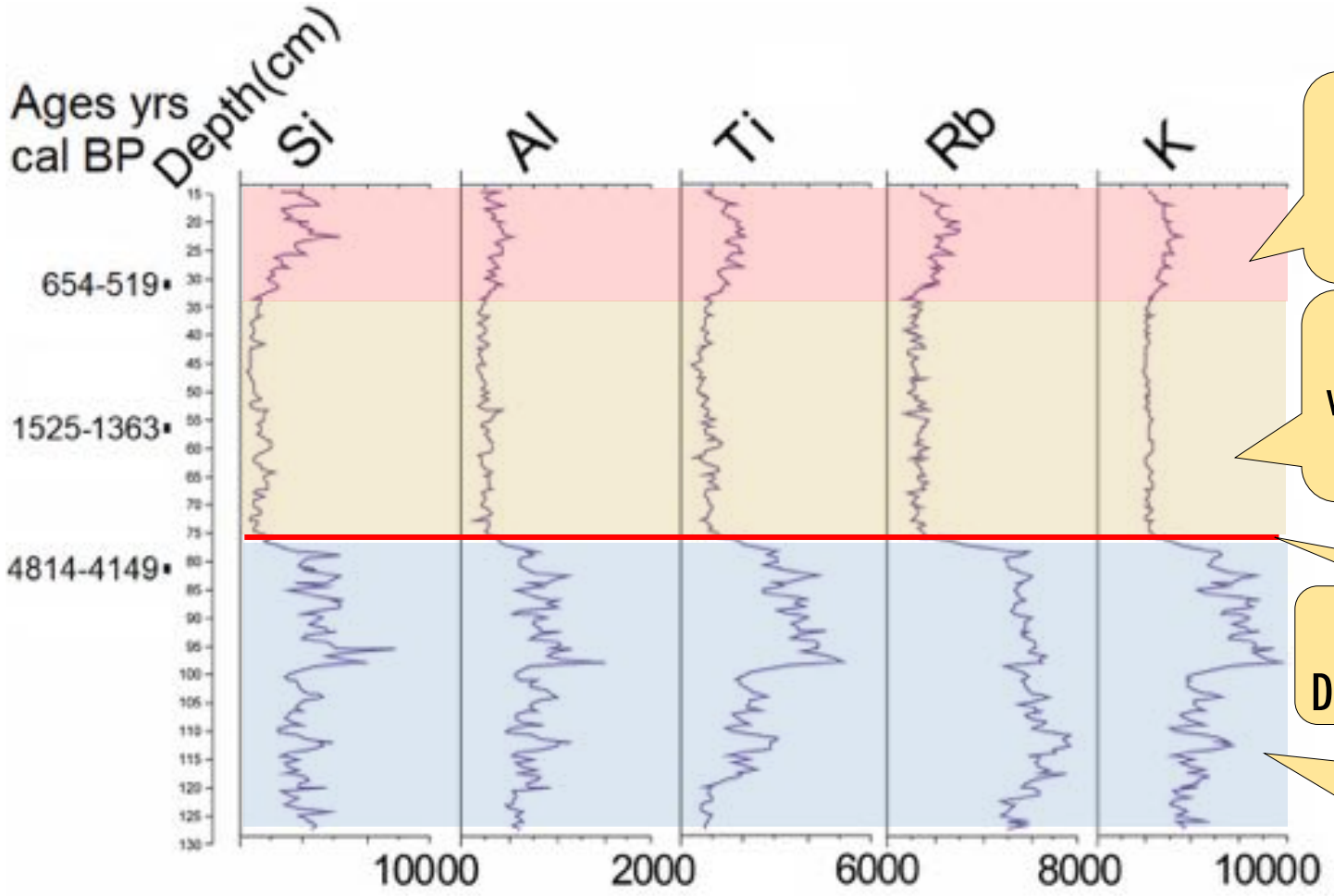
Waldeck Hanau Katzenbruch



Gouriveau et al. 2020. The Holocene

Main results and insights

↳ Wetland long term trajectories

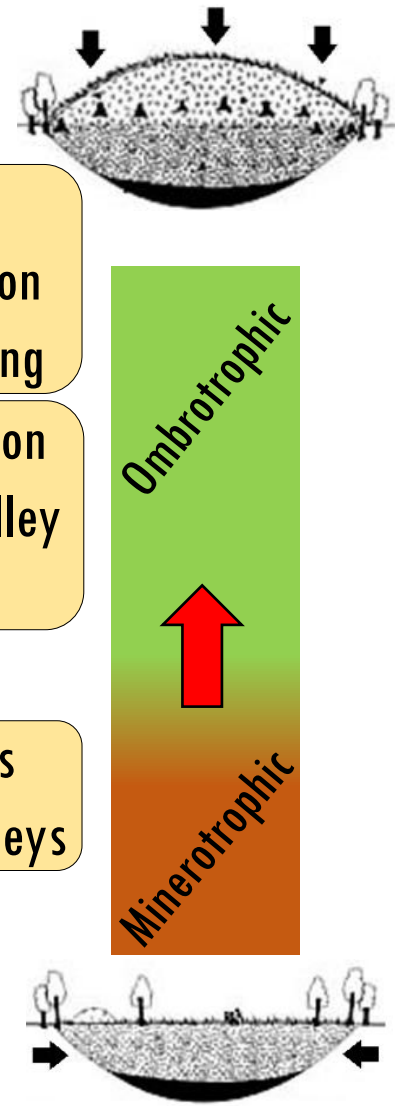


Erosion increase
Deforestation intensification due to local wood harvesting

Week sediment accumulation while agriculture rise at valley bottom

Hydrological local changes
Deforestation at bottom valleys

High erosion due to local deforestation



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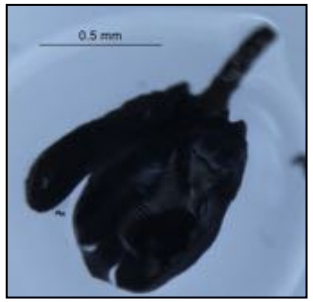
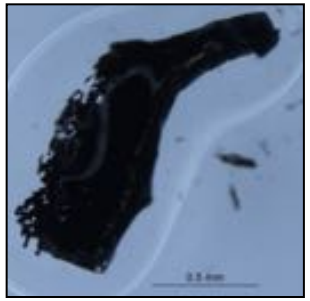
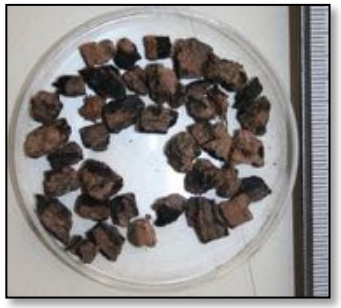
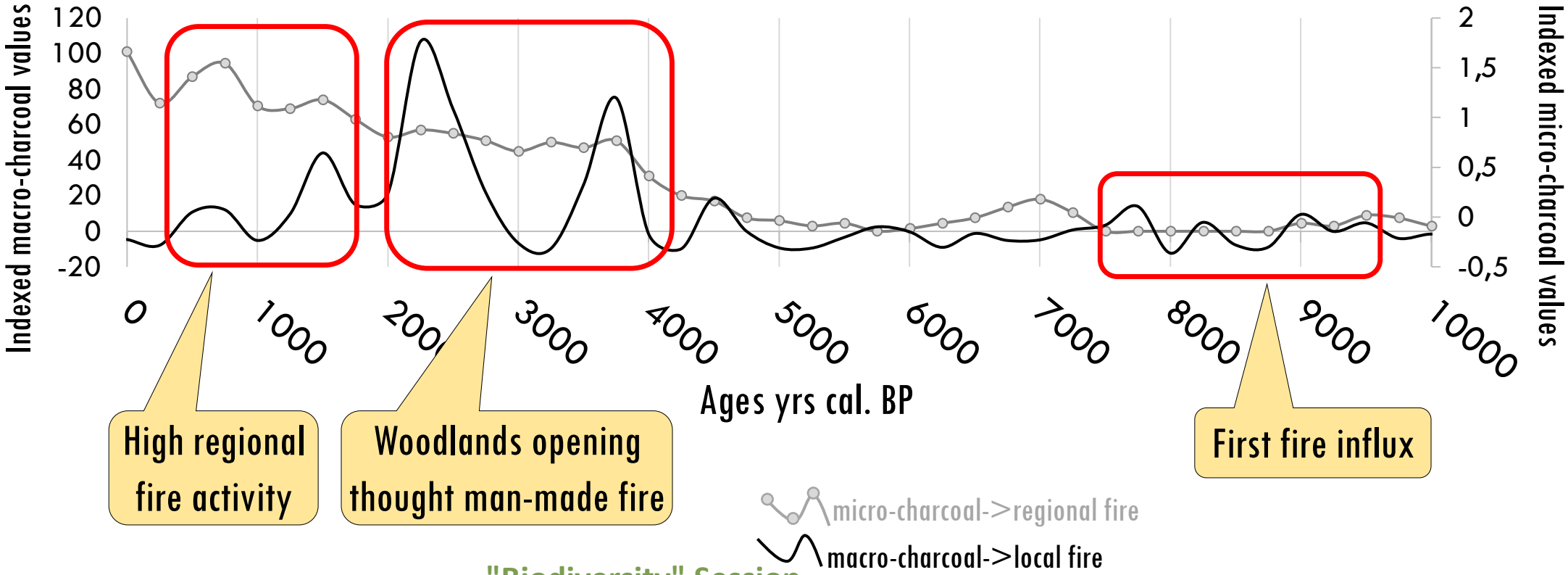


Indexed charcoal signal from seven sequences from the Pays de Bitche



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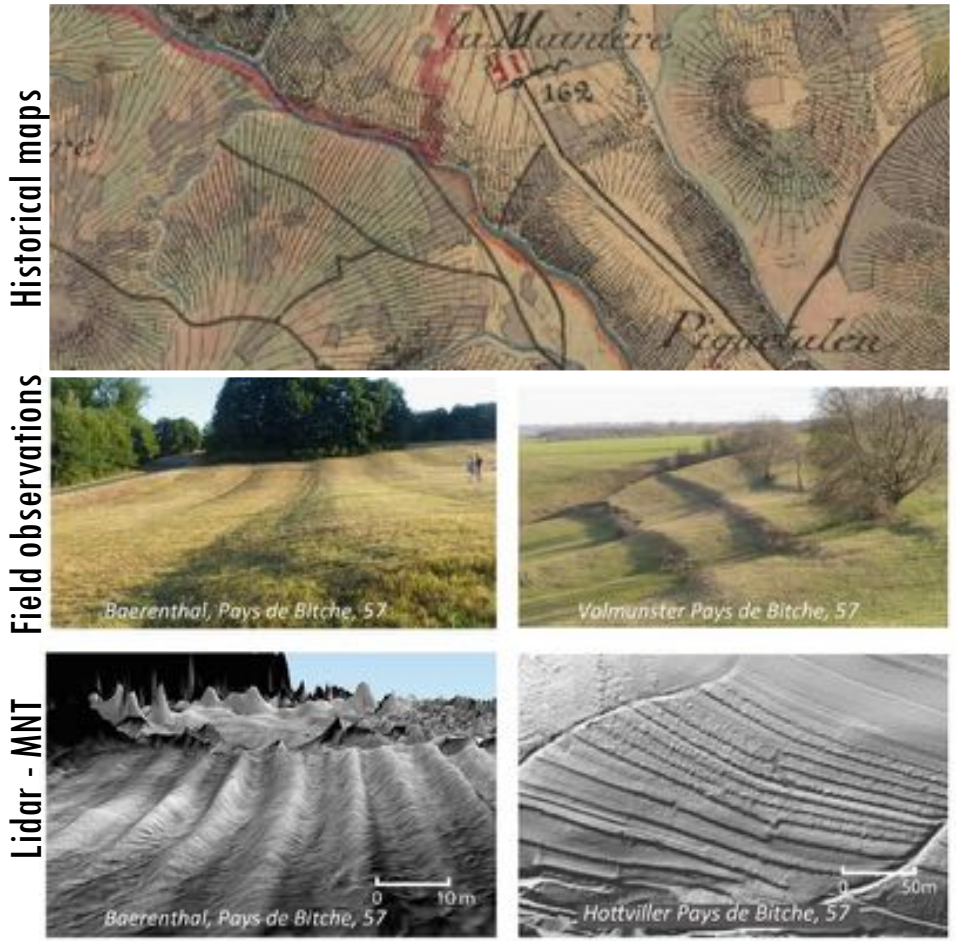

Study area = area covered with LiDAR (app. 180km²)

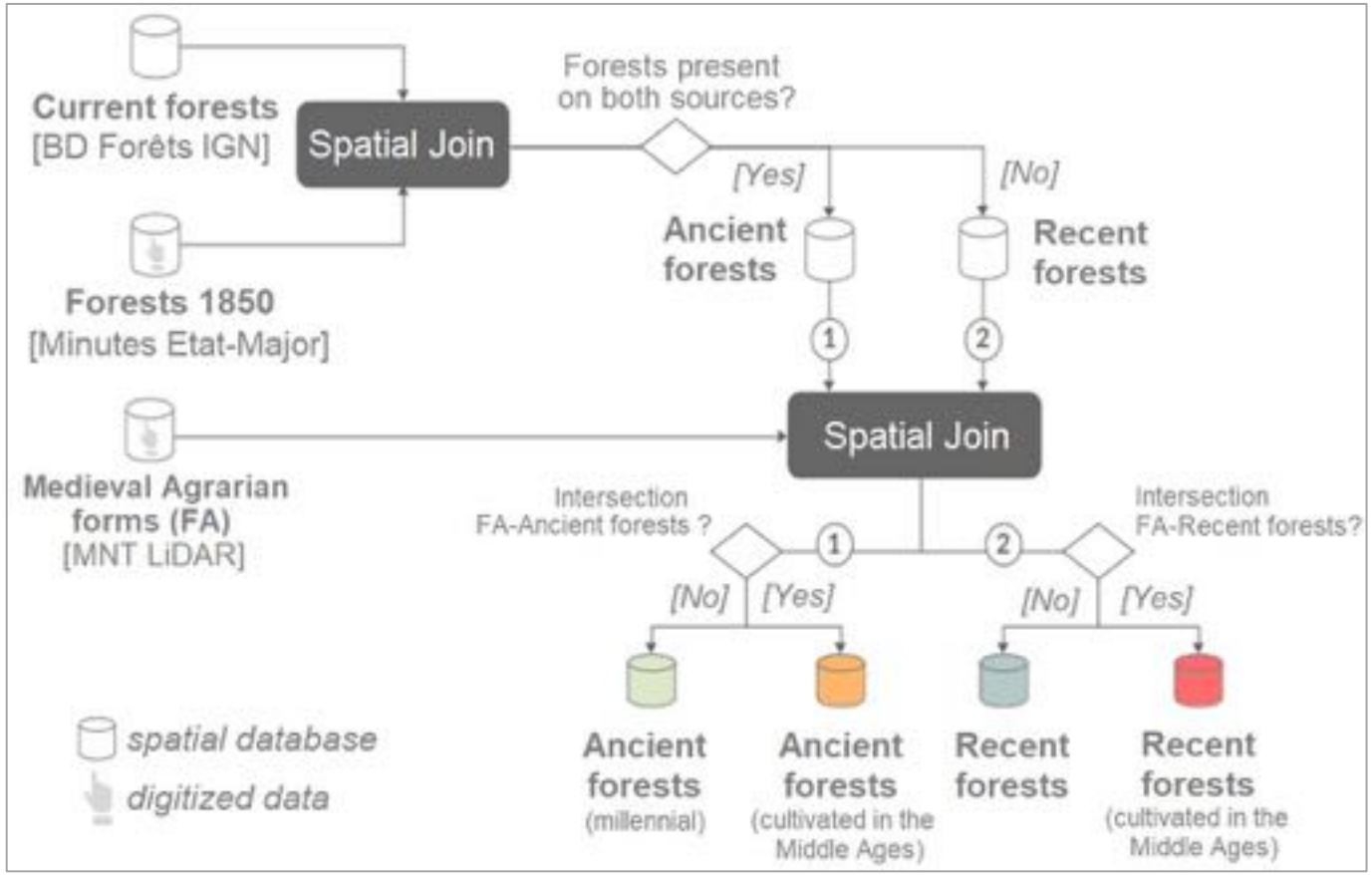

Diagram of reconstruction of temporal trajectories established from inherited agrarian forms (FA ; Herrault et al., according Duclos 2022)

*Area covered with LiDAR (app. 180km²)

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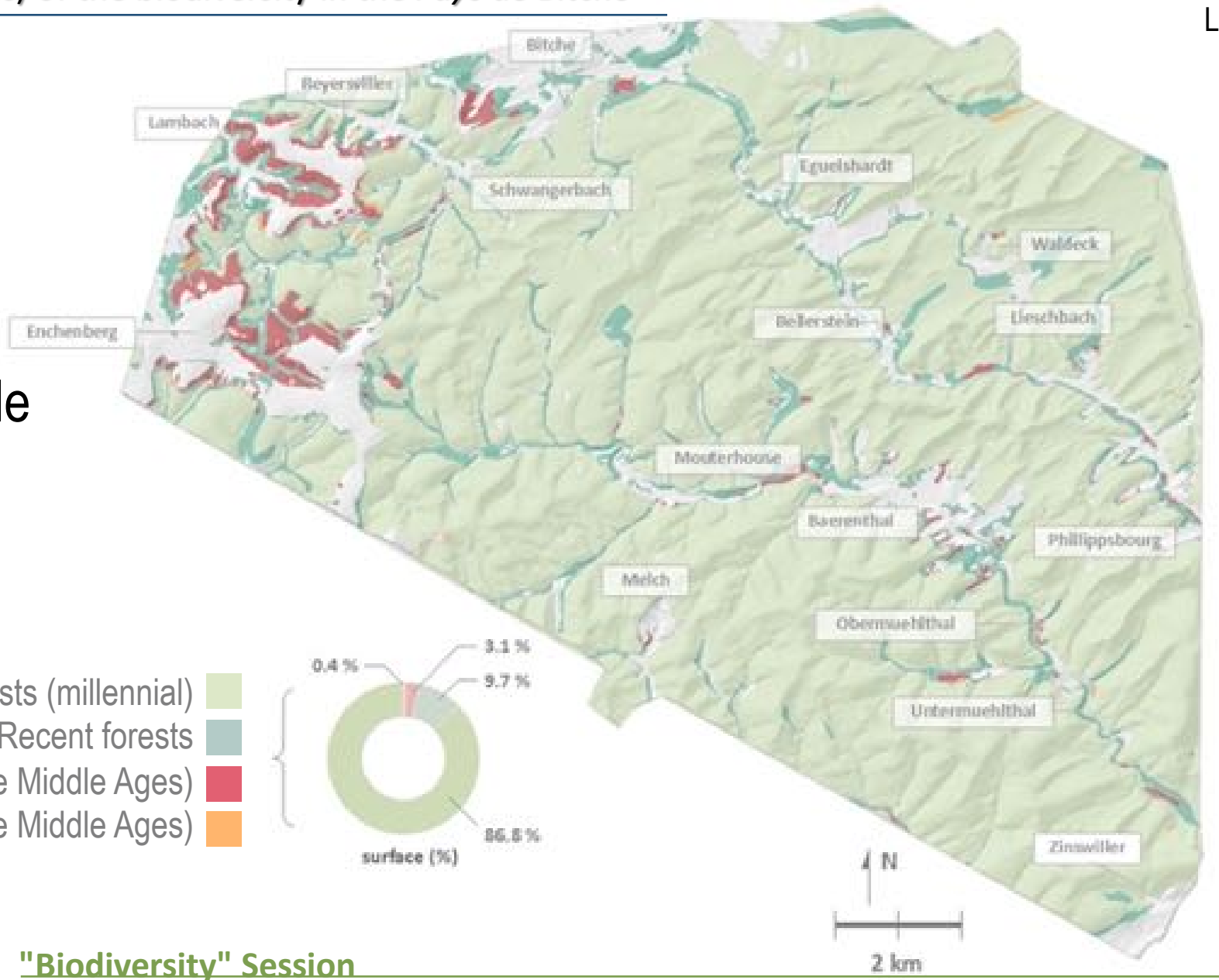
Forest trajectories of the study area* from the Middle Ages to the present day

(Herrault et al., according Duclos 2022)



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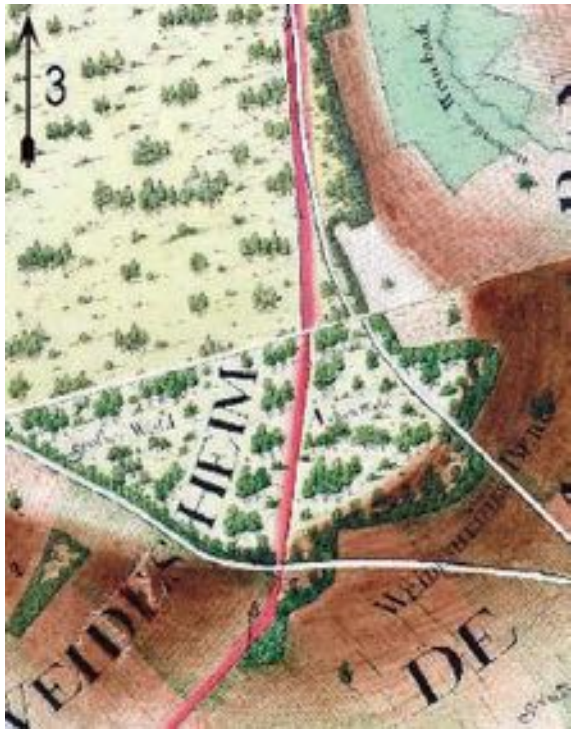
« atlas topographique du Pays de Bitche » **1758**



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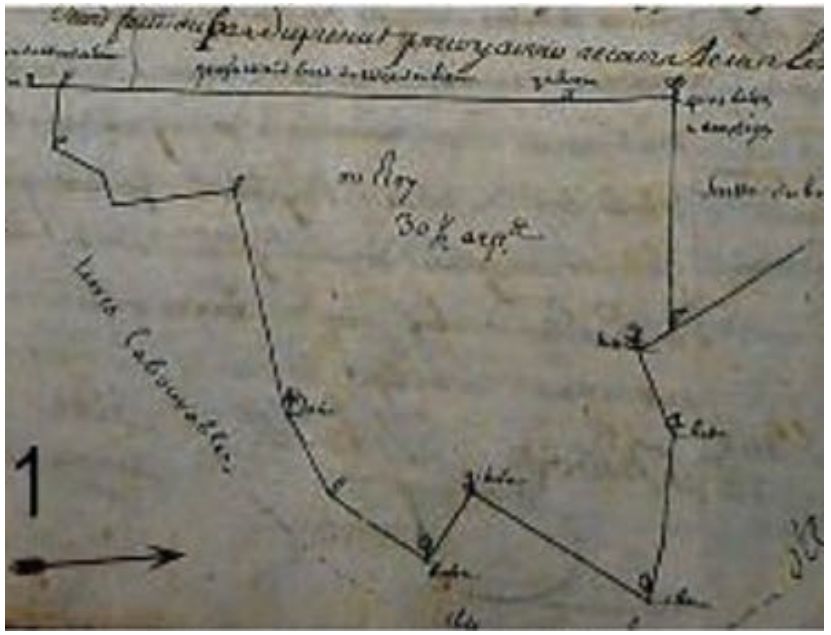

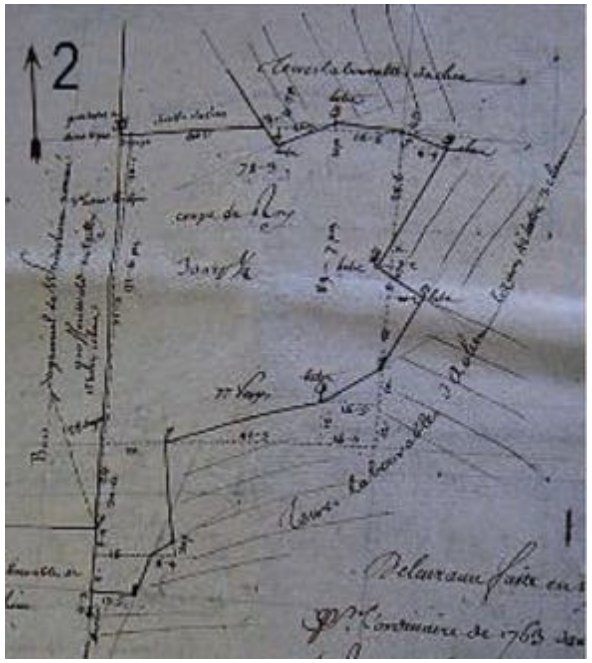

=> Gathering data relating to 415 coppices with standards and 340 000 trees earmarked to be cut down **between 1762 and 1785**

Rochel, 2017. Histoire & mesure, XXXII-2

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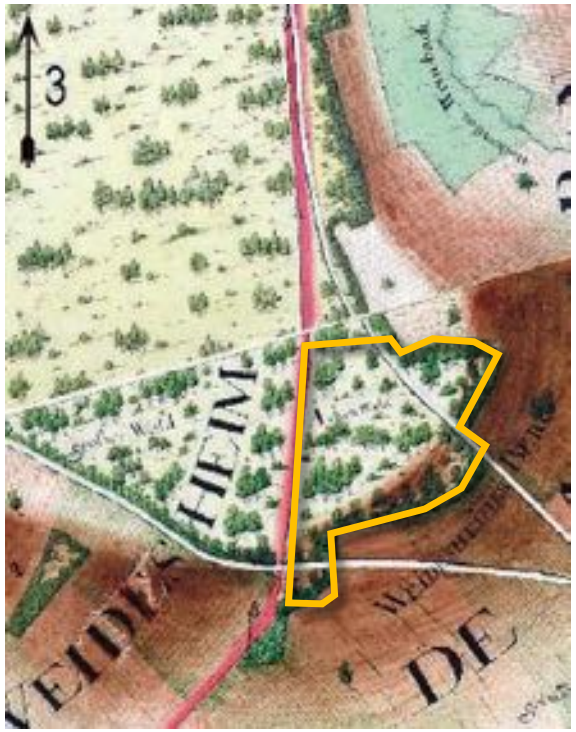

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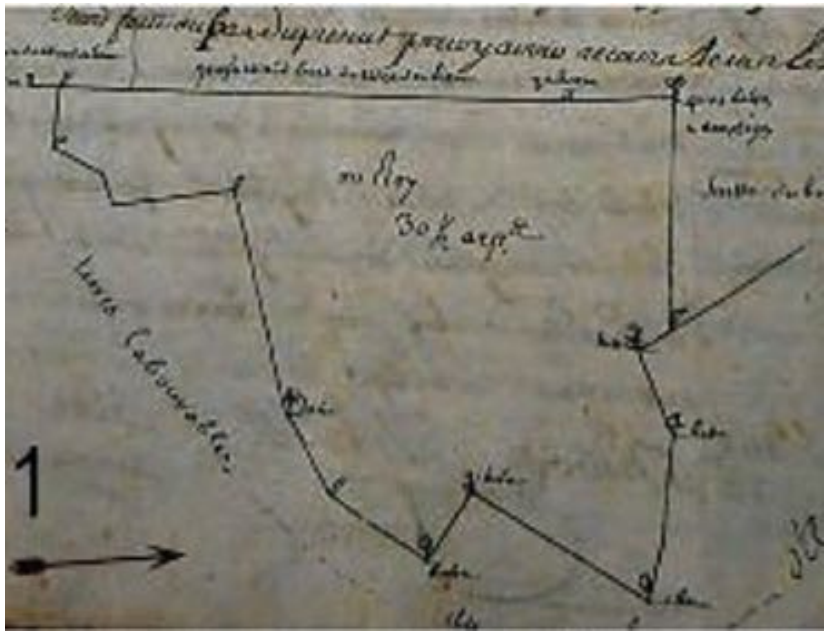

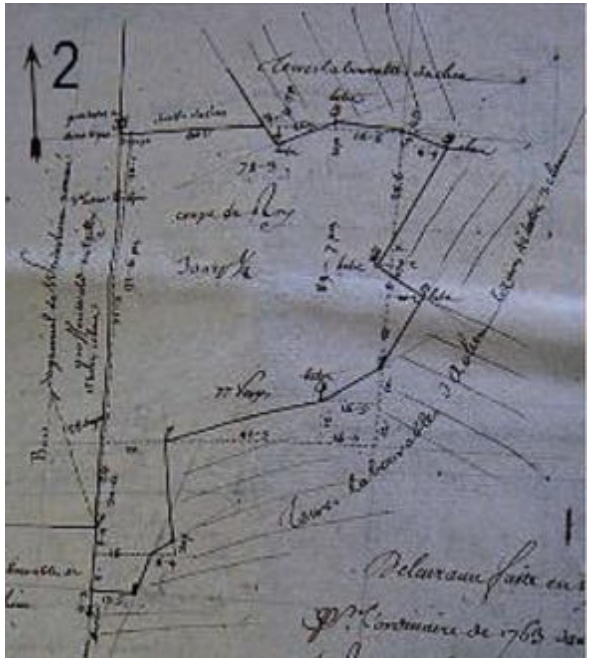

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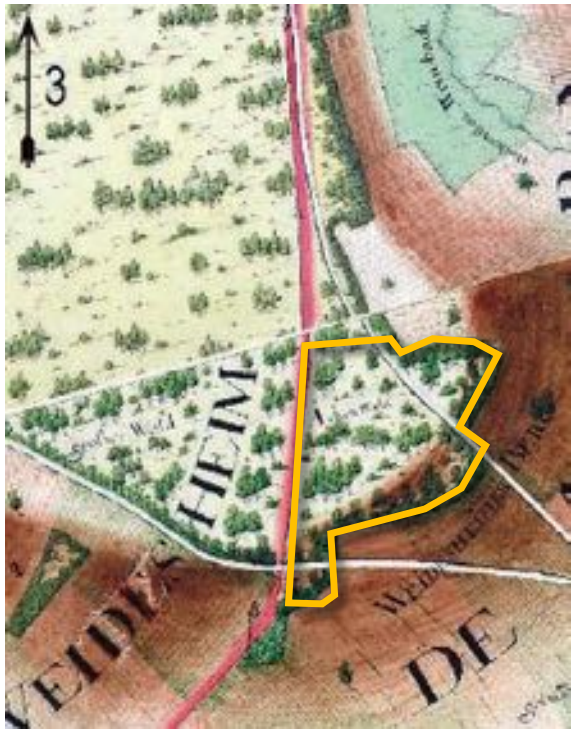

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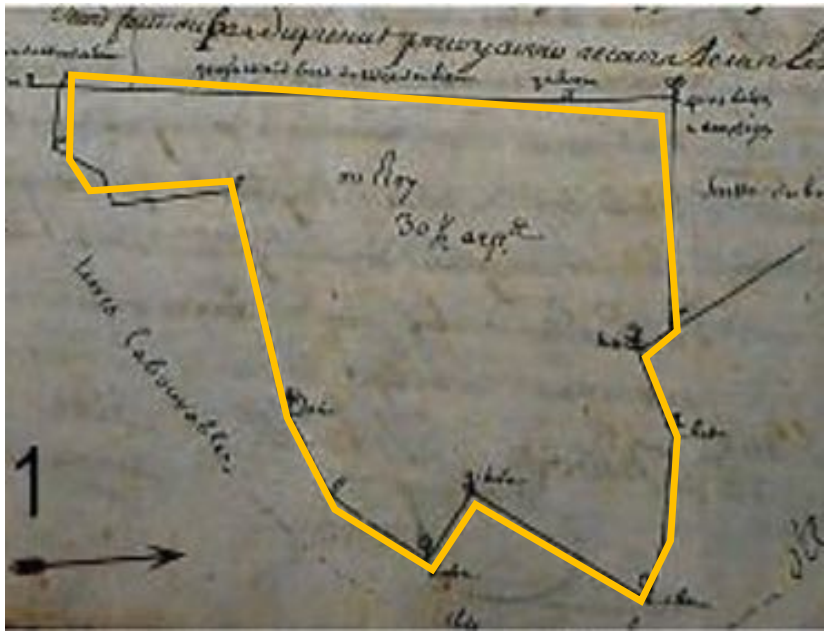

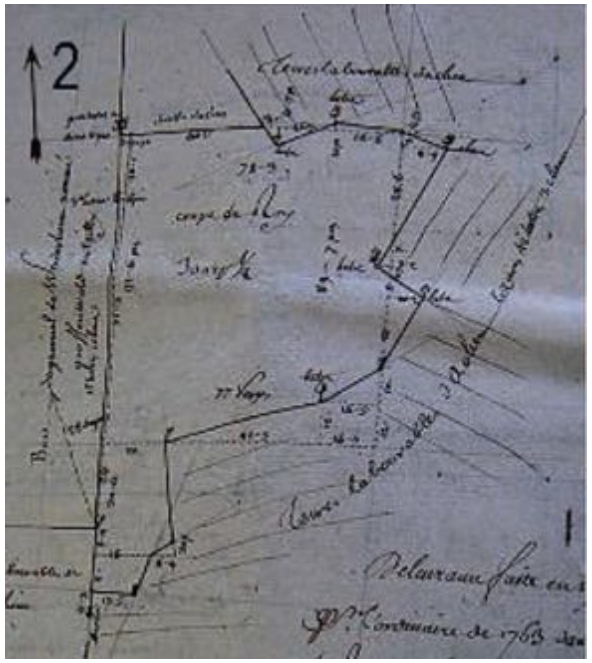

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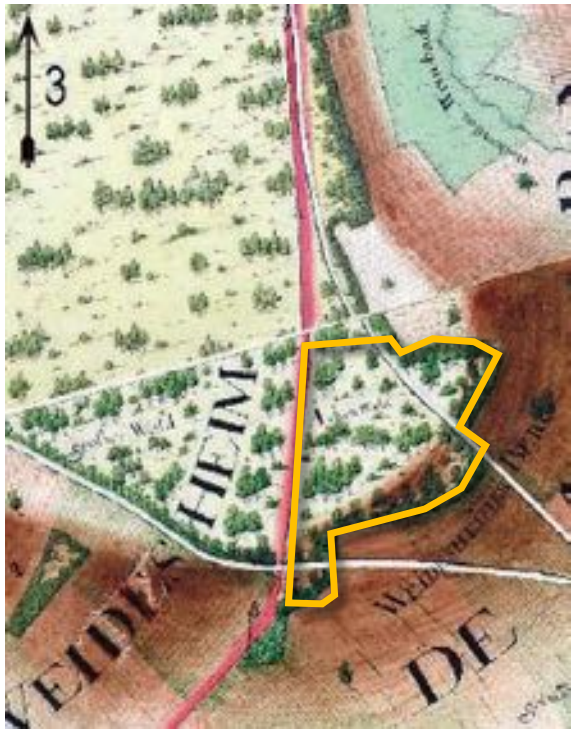

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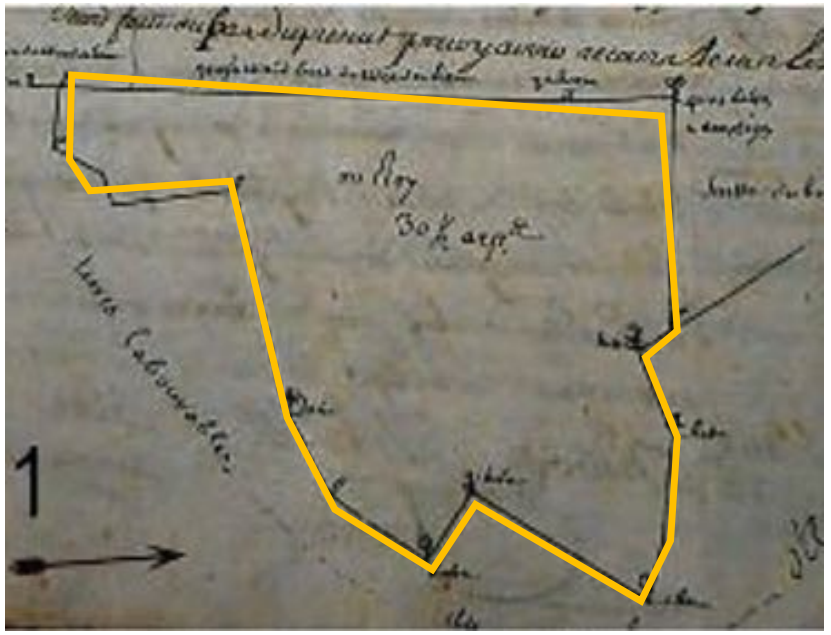

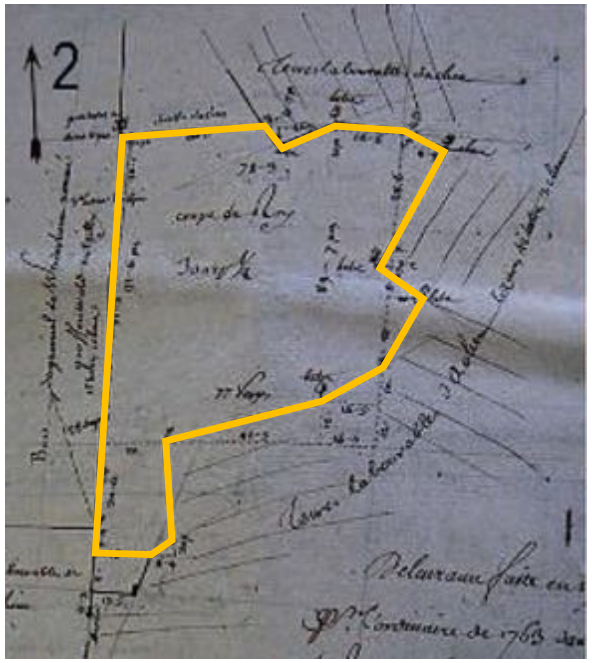

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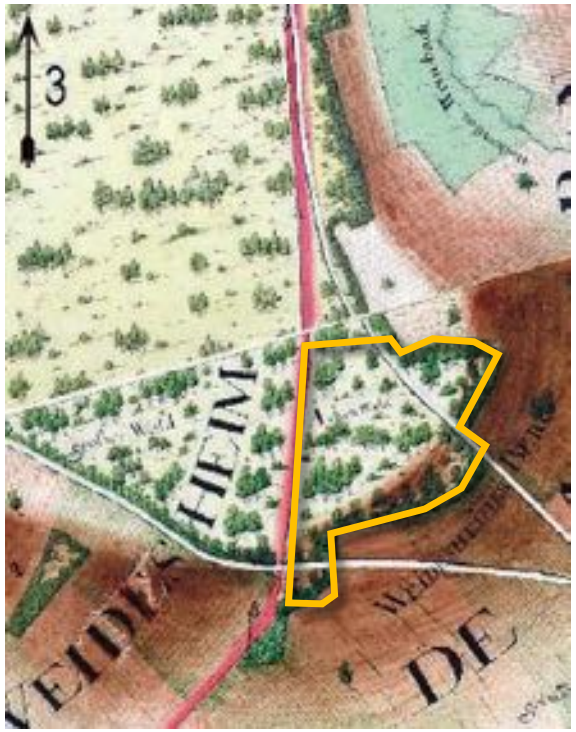

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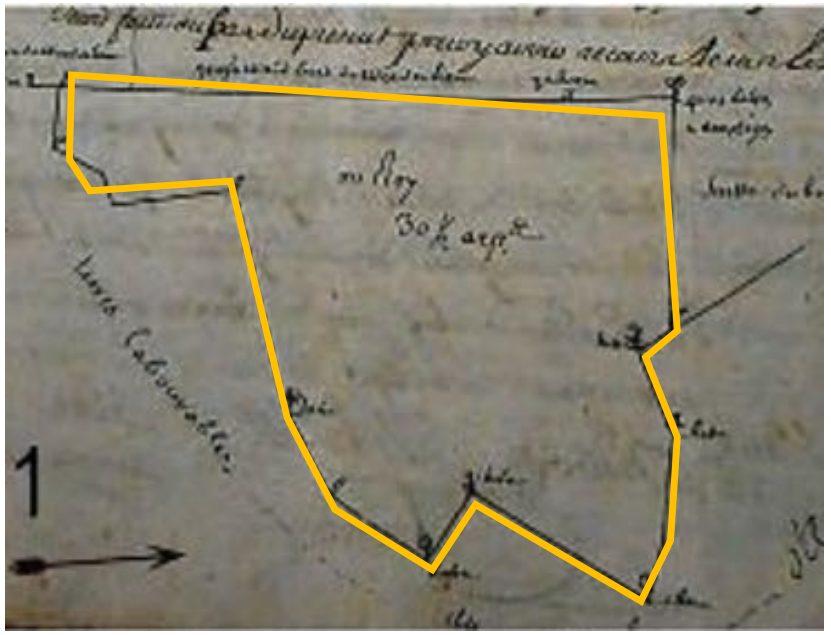

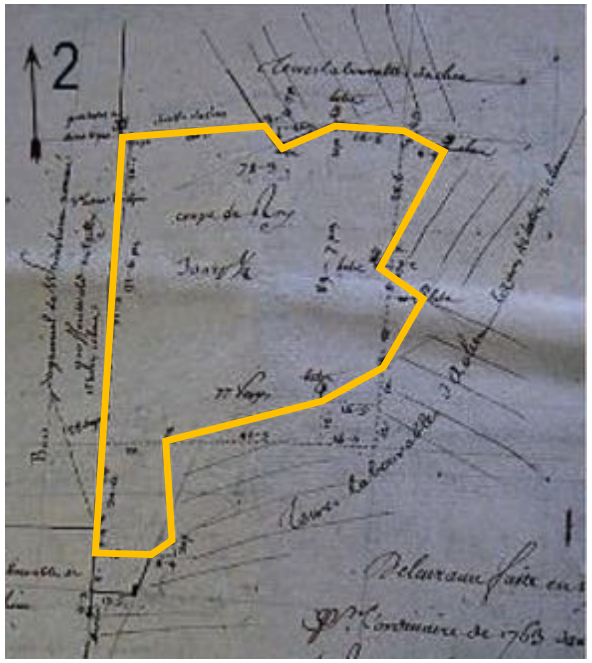

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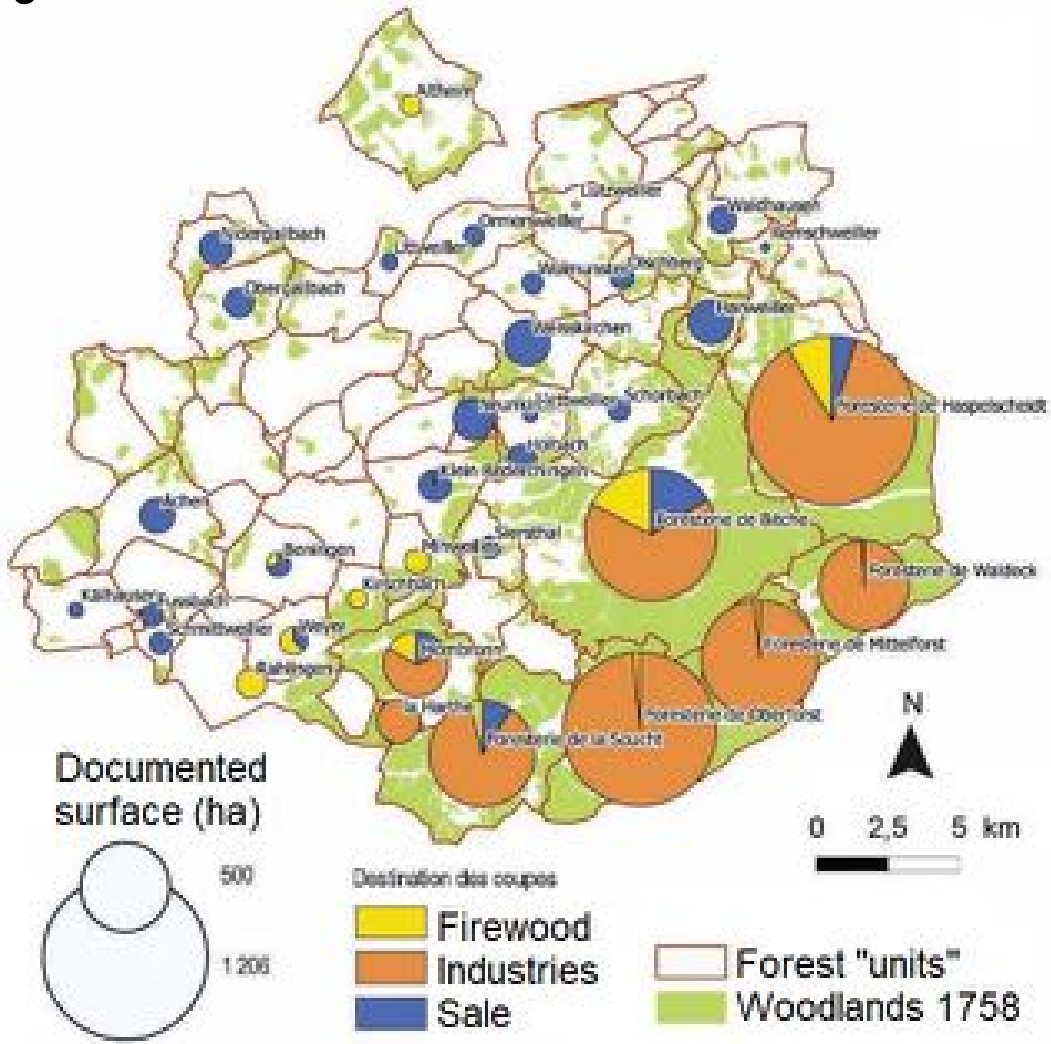
= **Does not indicate forest over-exploitation**

=> exploitations destined for industrial uses were not more intensive than those destined for other uses by local people or for sale

	MOD/ha 1st rotation	*ANC/ha* 2d rotation	*VEC/ha* 3rd rotation	*Total*
Beech	22,4	21,3	11,4	55,1
Oaks	0,5	0,9	1,5	2,9
Others	0,4	-	-	0,4
Total	23,3	22,2	12,9	58,4



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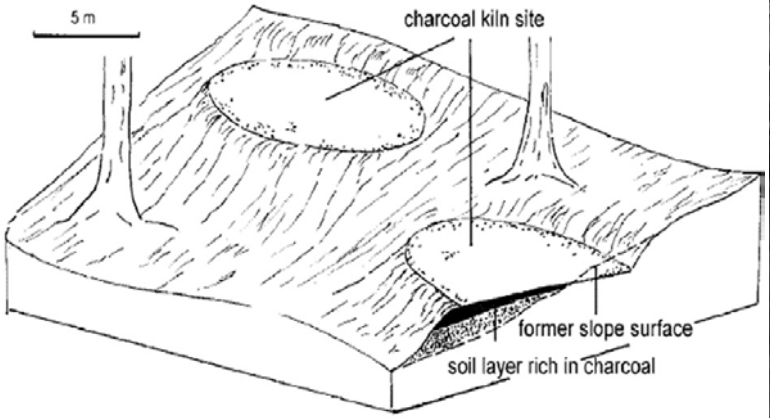
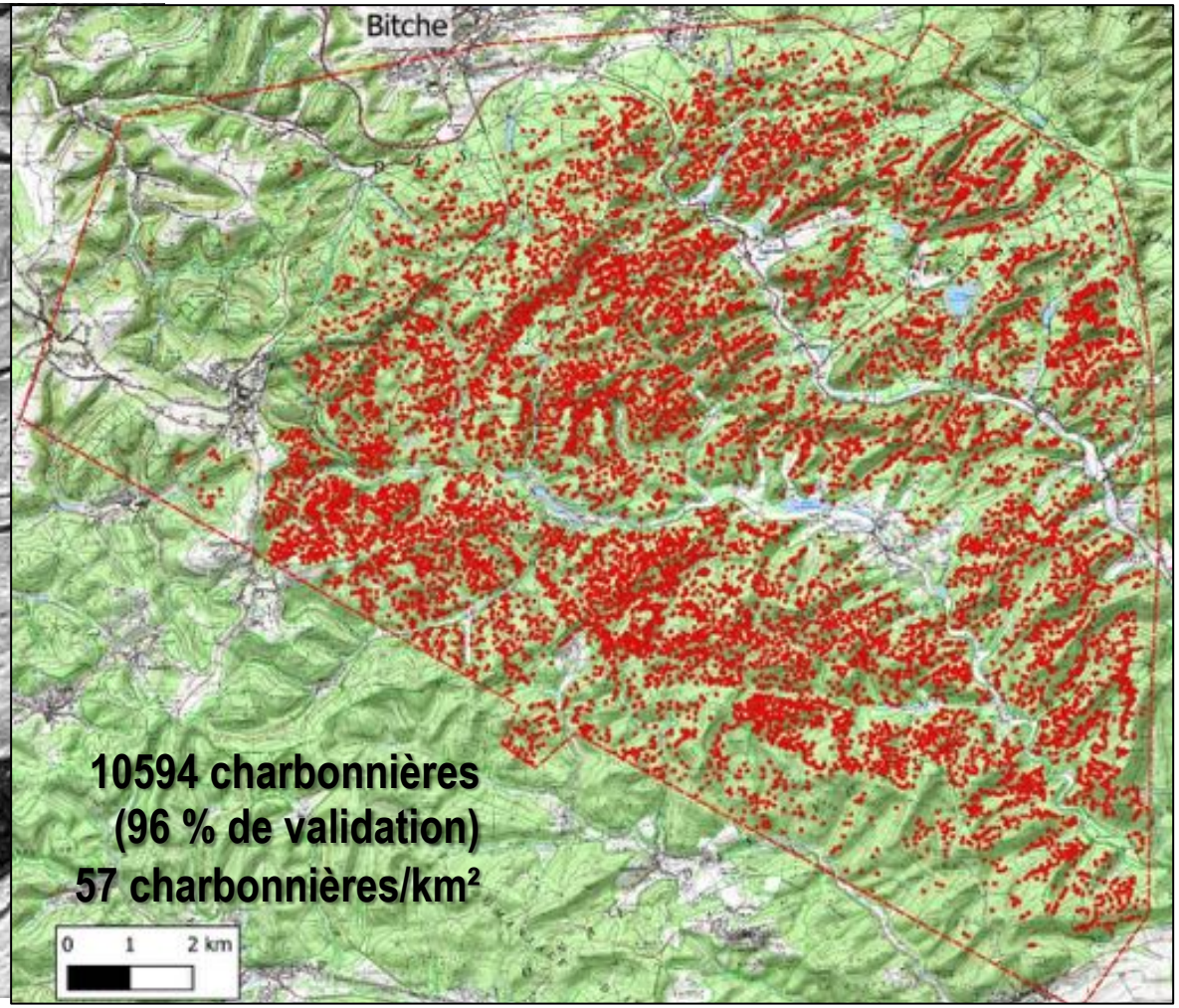


Gocel-Chalté et aL, 2021. VHAB

Wood resources exploited for charcoal production
=> according charcoal kilns analysis



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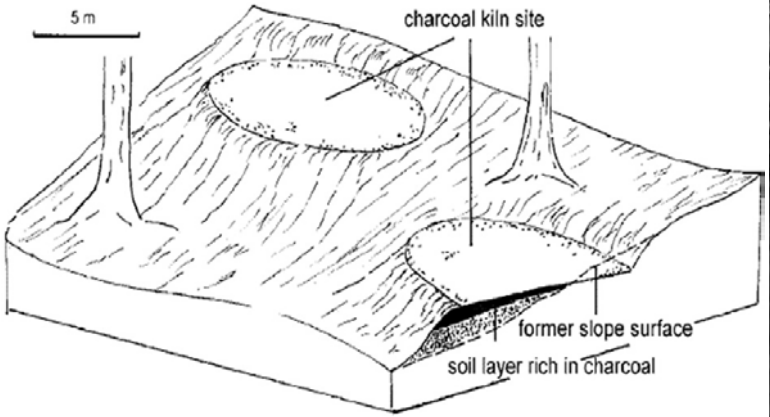

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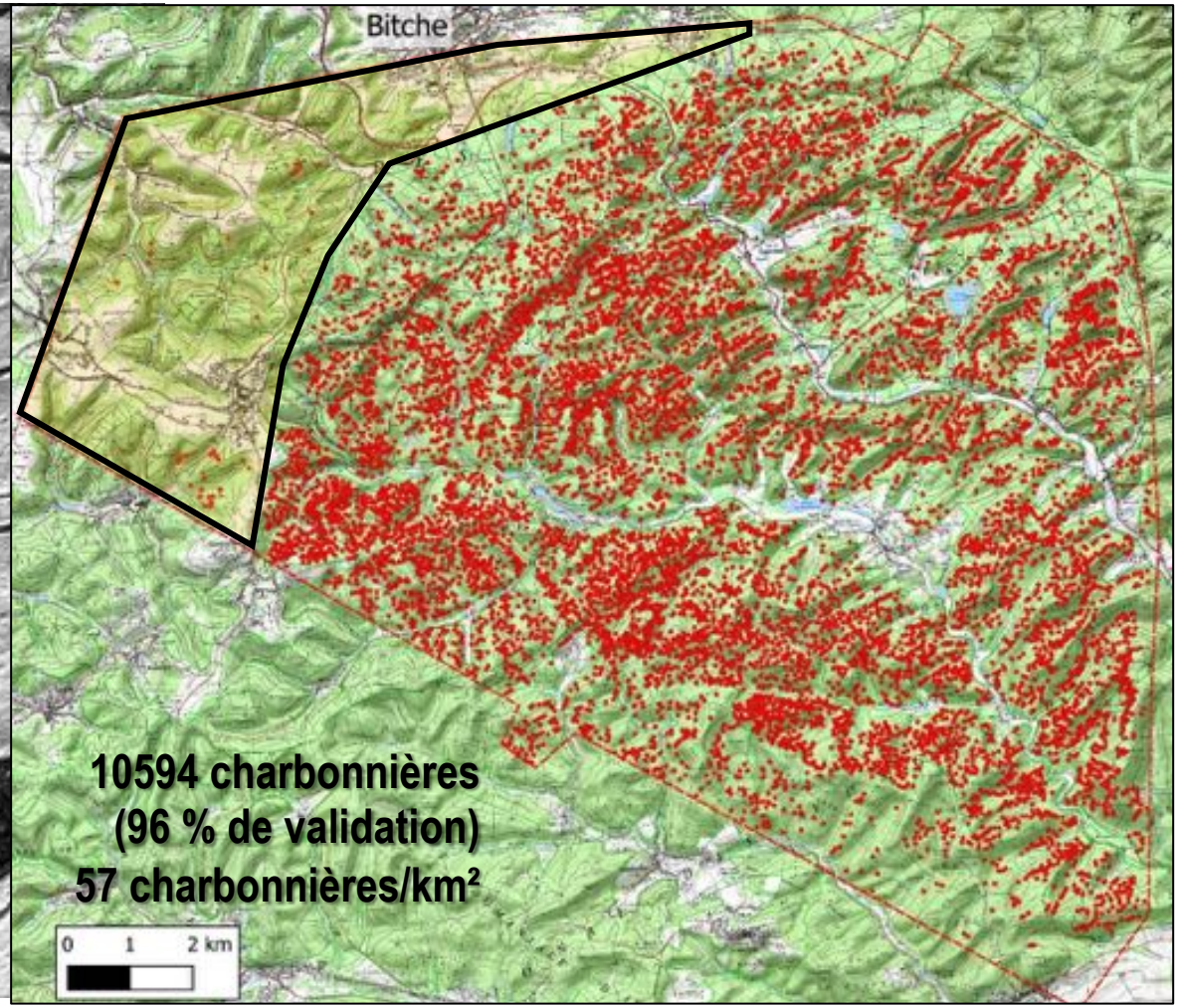

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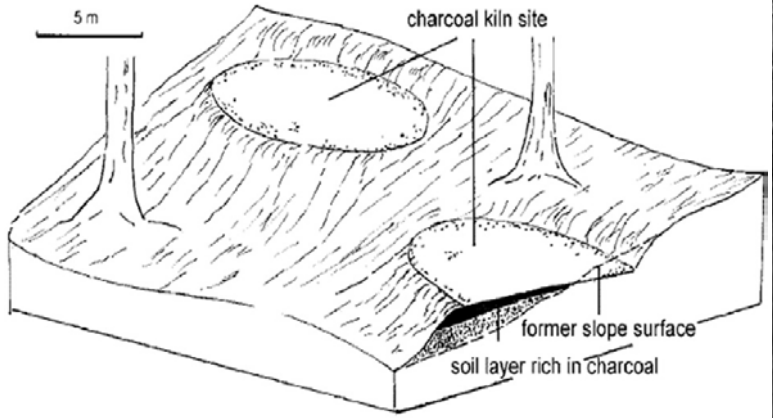

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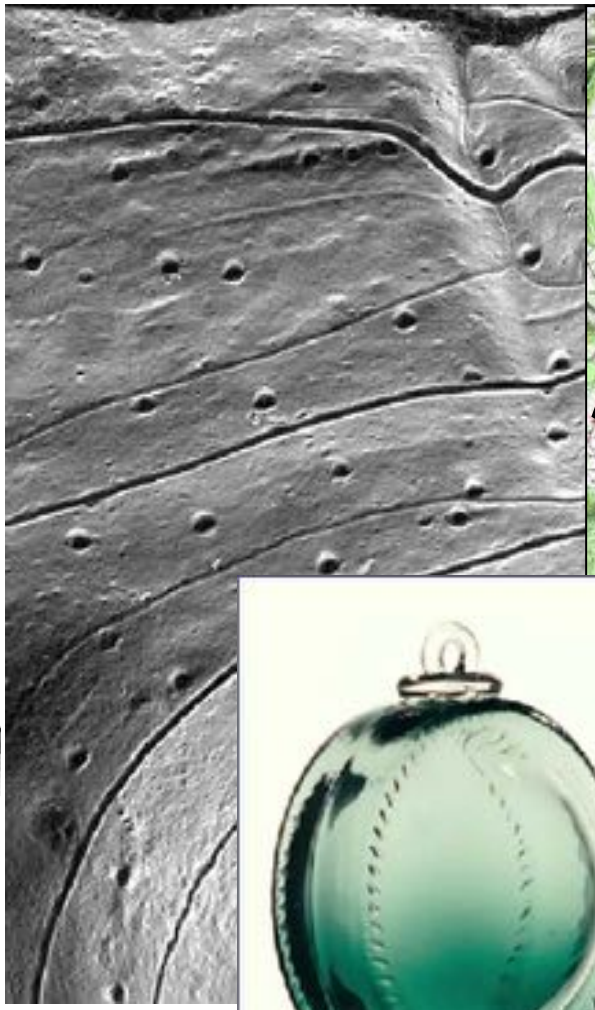

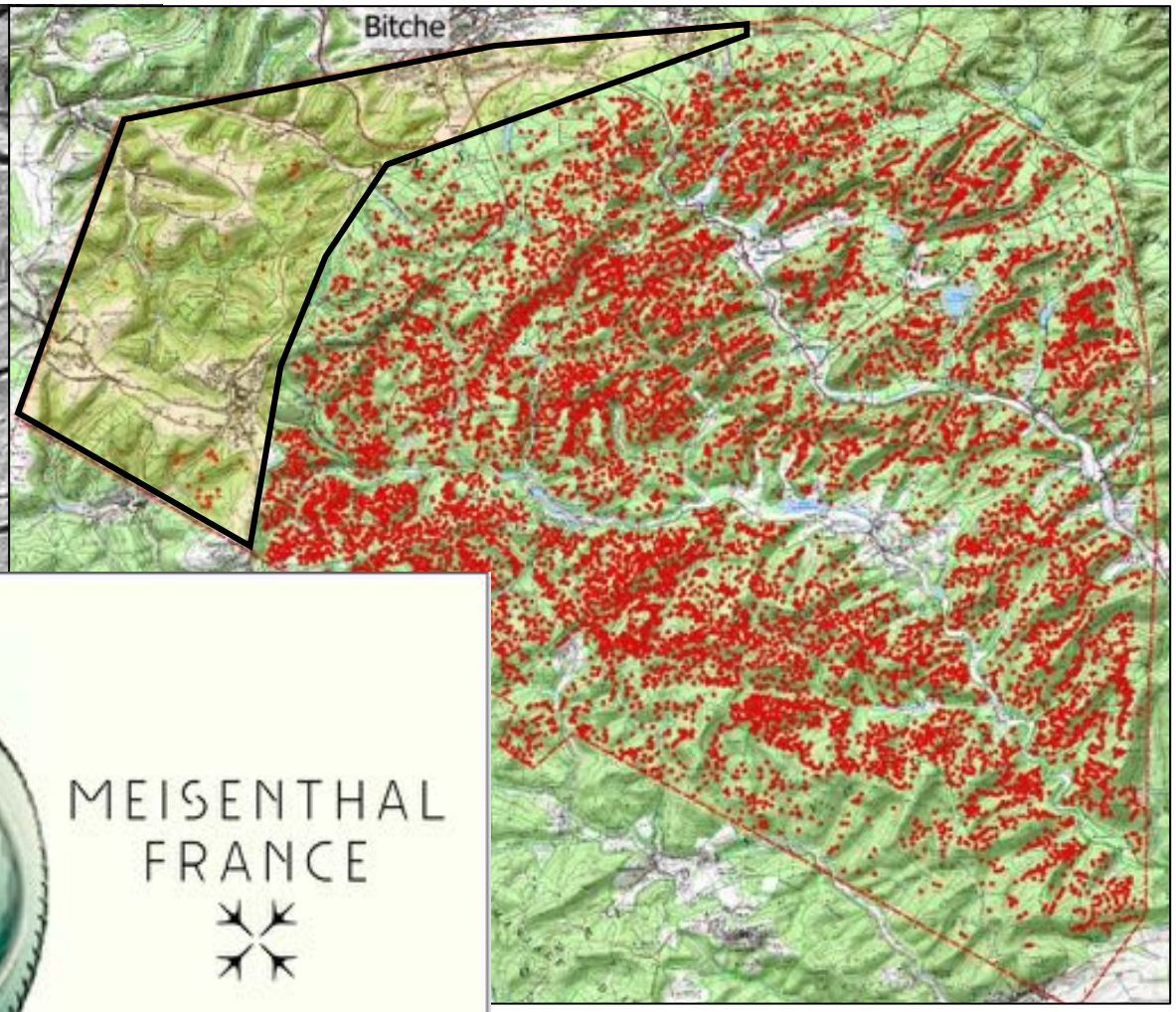

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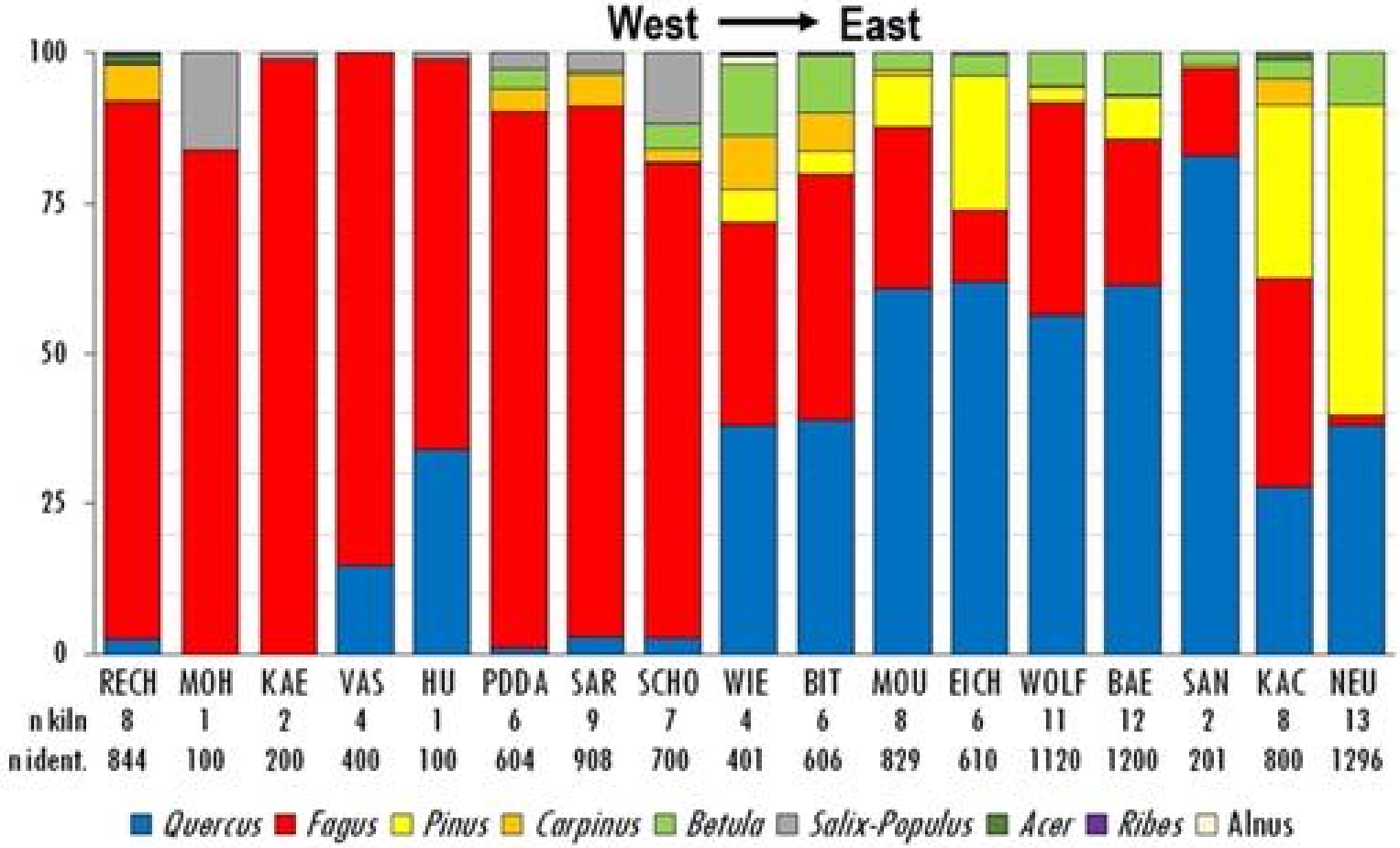

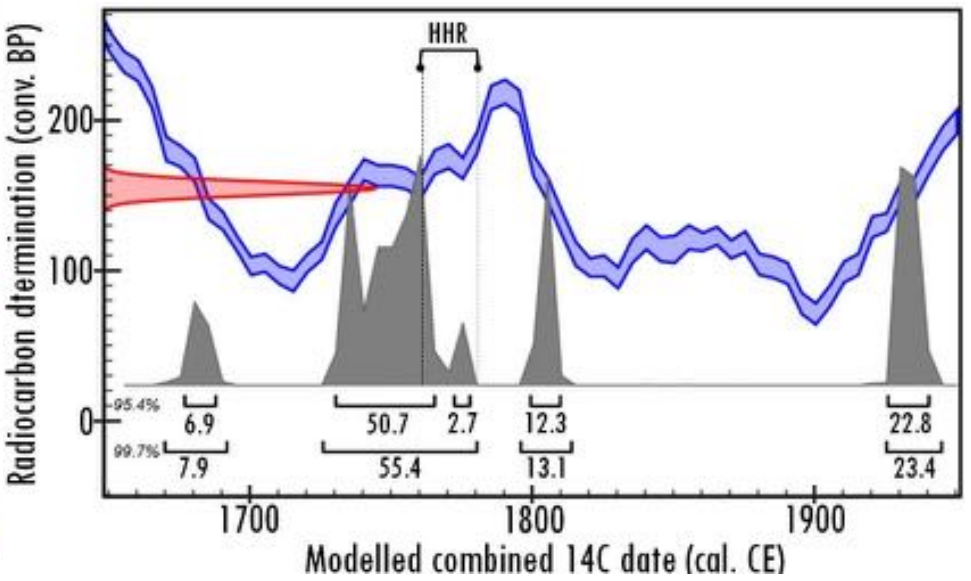

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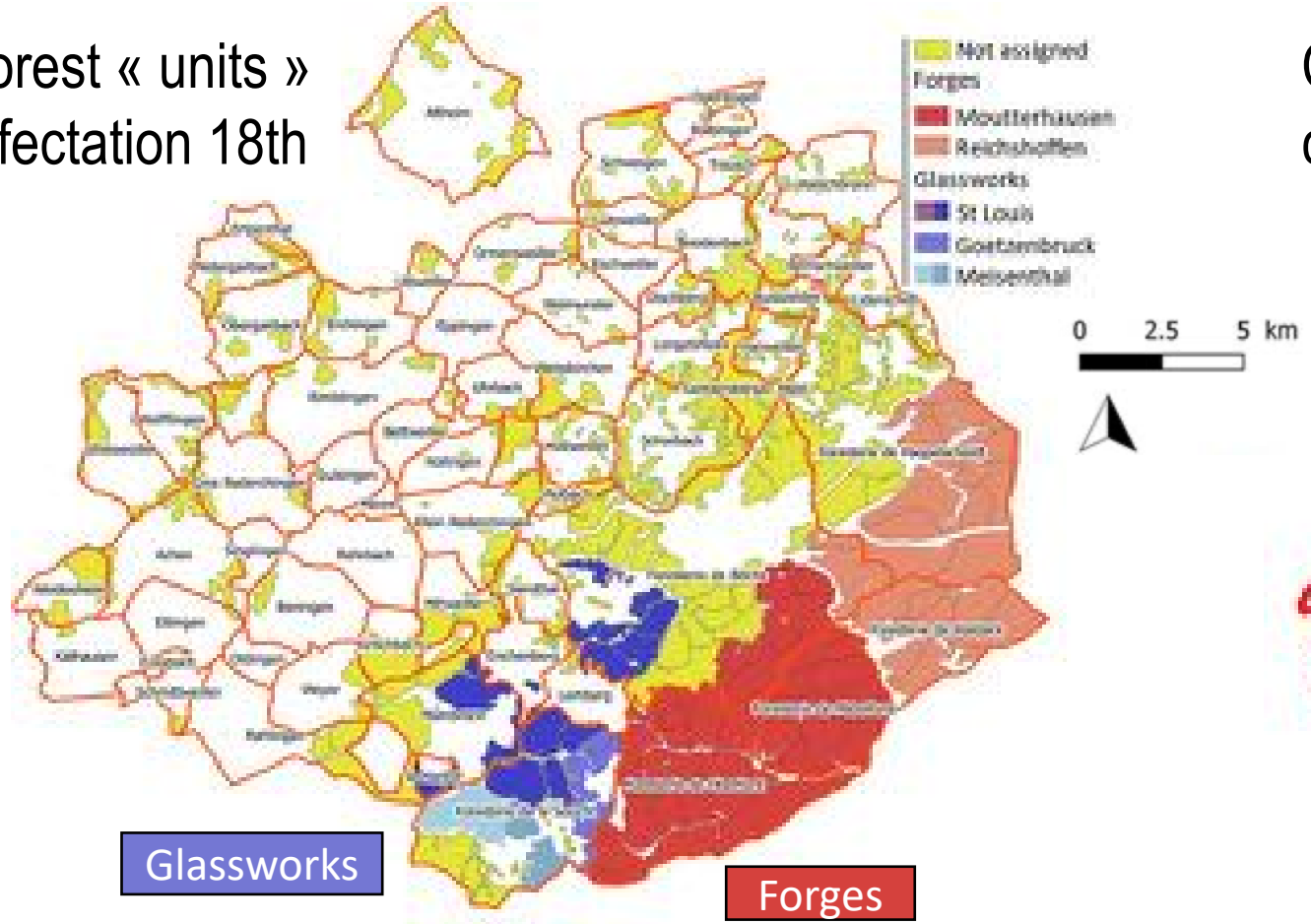
Planned wood resource use
=> long term consequences **= reference state(s)**

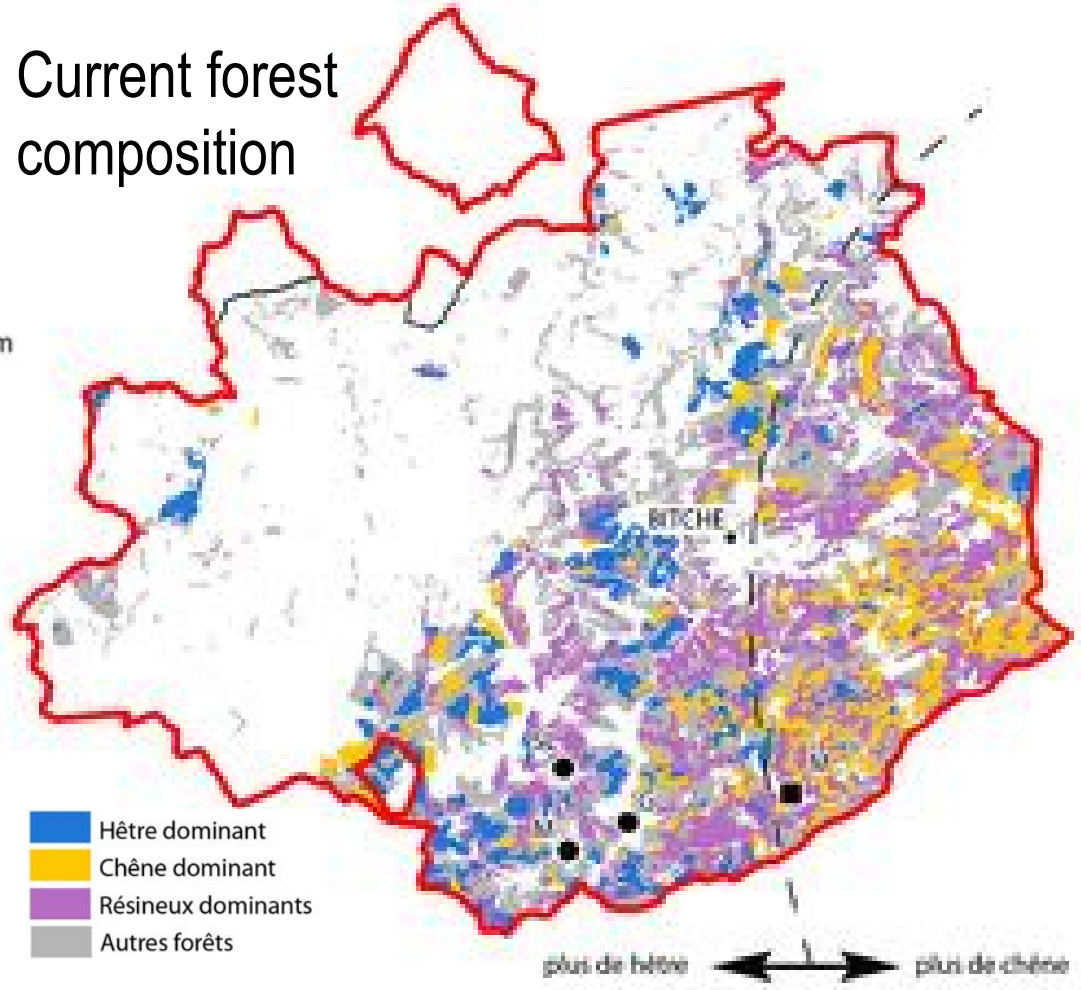
Forest « units » affectation 18th



Glassworks

Forges

Current forest composition



"Biodiversity" Session

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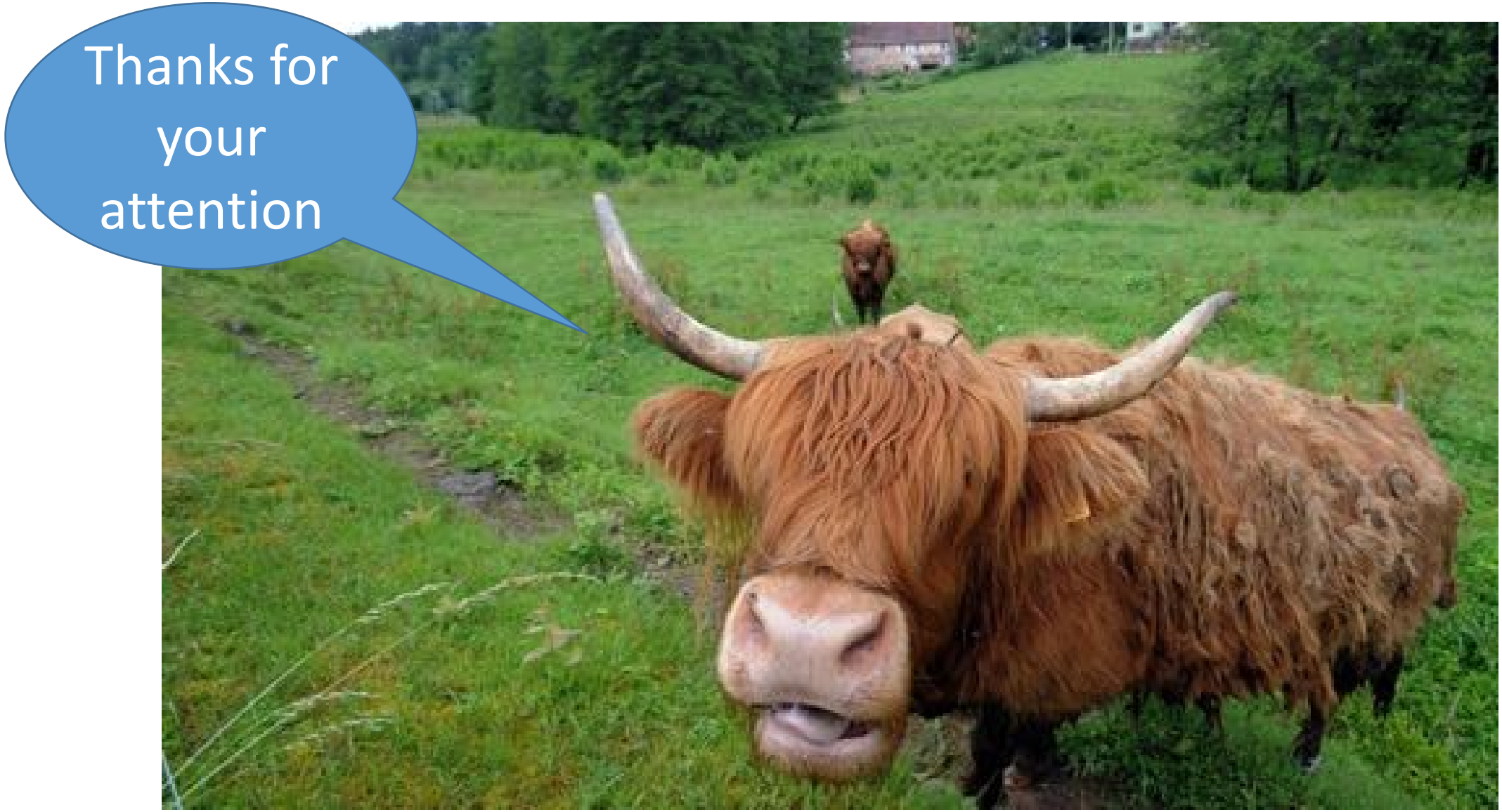
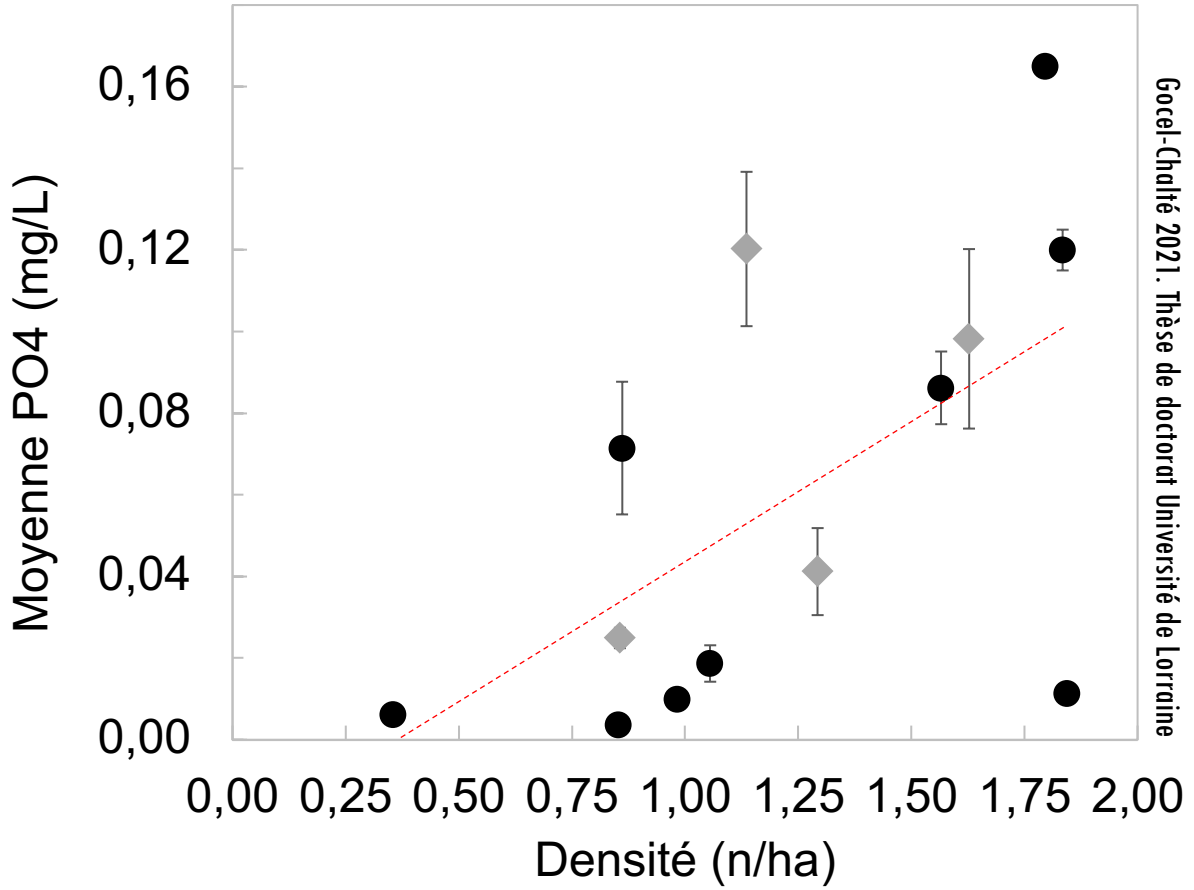
= **Management practises in the territory**, such as maintaining pastoralism in wet meadows (program "le paysage a du goût"), forest conservation, wetland restoration, but also forestry, or even the military activities, **are consistent with the long term landscape dynamics** observed in our studies


Thanks for your attention

Main results and insights

↳ Legacies on modern ecosystems from past human activties