

# THE FORESTS OF CASSINI

## A quantitative analysis and comparison to current forests

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### INTRODUCTION



**Figure 1.** Part of the first sheet of the map: forests in the surroundings of Paris (1749).

In 1747, King Louis the XV<sup>th</sup> missions Cassini to undertake a « General map of France ». The main aims were to finalise the measurement of the kingdom and to determine the number and position of villages, towns, rivers, and main roads. In less than 40 years, 96% of the current area of France, but also 1.8 million ha nearby its frontiers, have been mapped (for more details, see Pelletier, 1990).

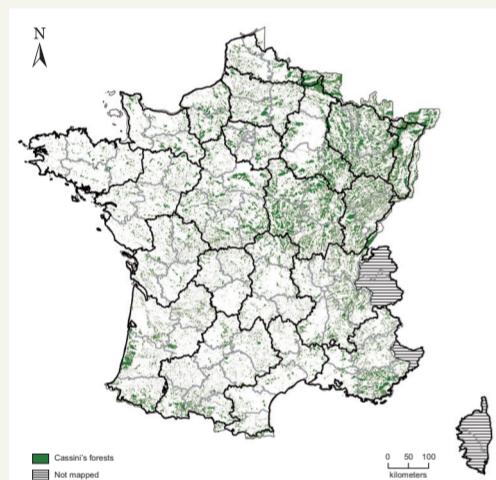
Regularly used by foresters to get an idea of forest history in their region (figure 1), this map had never been globally analysed using modern GIS methods.

### AIM OF THE STUDY

The current study seeks to fill this gap, especially with the aim to explore and specify the strengths and limits of this map for various possible uses, such as: identification of ancient forests, landscape dynamics studies, impact of ancientness on biodiversity, dynamics or fertility of current ecosystems...

Using the 181 sheets of the geolocalised Cassini's map (1:86400), we digitised all the forest contours, whatever their area. Beyond providing new insights into numerous methodological aspects (geometric errors of the map, quality and exhaustiveness of forest representation...) which are discussed in the full report (Vallauri *et al.* 2011), numerous polygons (closed to 50.000) give us a synthetic vision of the forests in kingdom of France during the second half of the XVIII<sup>th</sup> century.

### FRENCH FORESTS IN THE XVIII<sup>th</sup> CENTURY



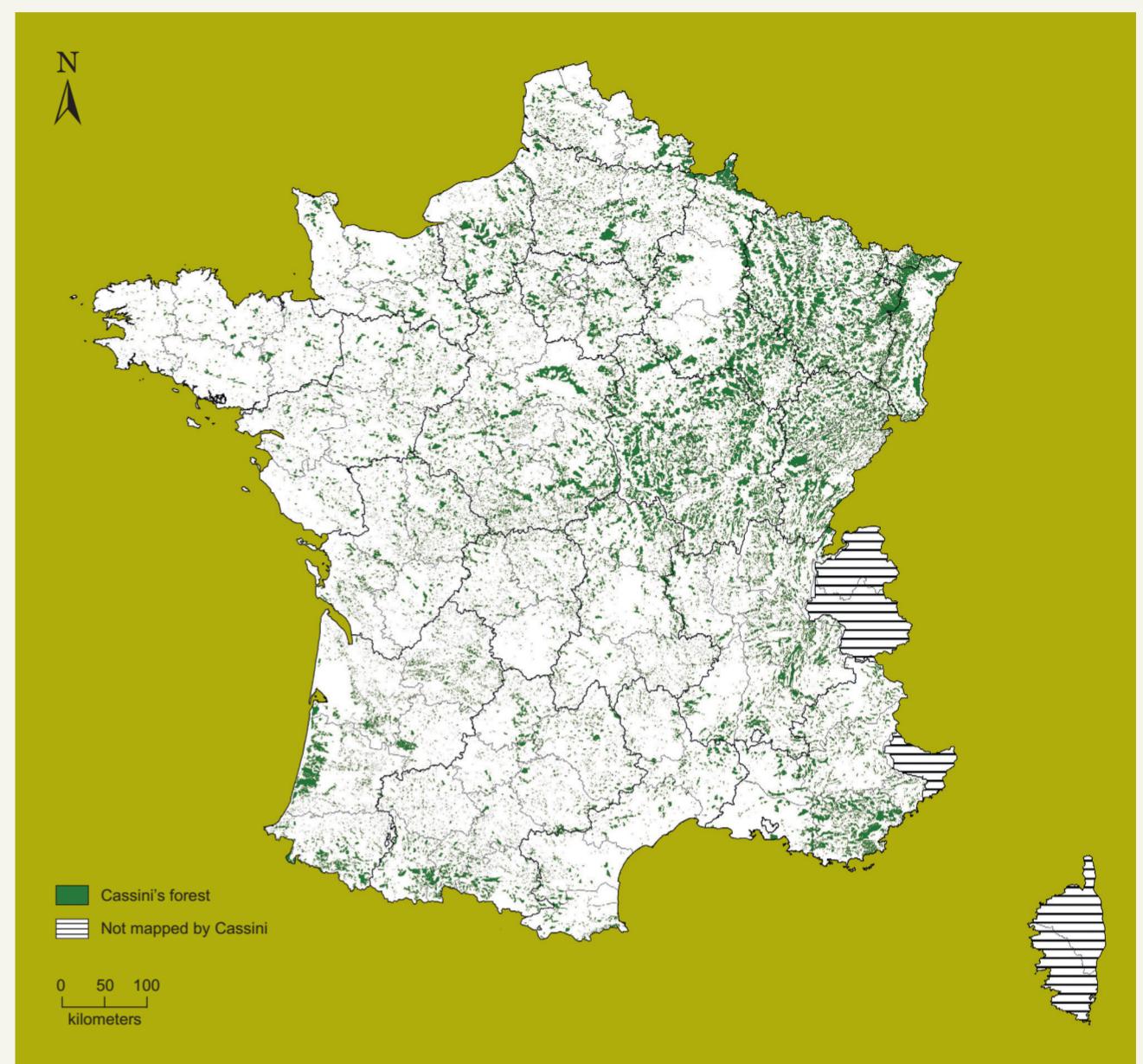
**Figure 2.** Map of the forests in the XVIII<sup>th</sup> century. This GIS layer is available, at national or regional scale, free of copyright and for any use.

Out of the 54.5 million ha covered by the map, 7.1 million ha are woods, i.e. forest cover is 13%. On the current French territory covered by the map (52.6 million ha), forest cover percentage is the same, with 6.6 million ha of forests. Compared with statistics gathered during the first cadastral survey, undertaken a few decades later, these figures appear significantly lower, by more than 20%. Indeed, small woodlands were not always mapped by Cassini as we could observe by comparing Cassini's map with other, independent, contemporary maps of land use.

Forest cover was highly heterogeneous, with some regions almost deforested such as the centre of France (figure 2). Ardennes, Lorraine, Alsace, Franche-Comté, Bourgogne, but also Var for example, were the most forested regions at that time (>25%), whereas Auvergne and Limousin were heavily deforested.

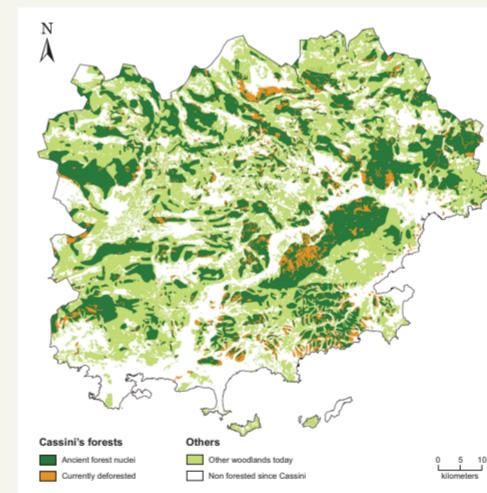
**Tableau 1.** Area and percentage of forests on Cassini's map and today (CORINE Land cover 2006), at regional level. All percentage calculated based on the French territory during the XVIII<sup>th</sup> century.

	Forests on Cassini's map		Today's forests		Ancient forests nuclei
	km <sup>2</sup>	%	km <sup>2</sup>	%	
Alsace	2.562	30.7%	3.362	40.3%	1.967
Aquitaine	3.730	8.9%	18.579	44.3%	2.453
Auvergne	2.325	8.9%	7.742	29.5%	1.224
Basse-Normandie	1.282	7.2%	1.519	8.5%	628
Bourgogne	8.340	26.3%	9.710	30.6%	5.113
Bretagne	917	3.4%	3.154	11.6%	513
Centre	5.283	13.4%	8.793	22.2%	2.761
Champagne-Ardenne	4.835	18.9%	7.050	27.5%	3.657
Franche-Comté	4.452	27.3%	7.305	44.8%	3.516
Haute-Normandie	1.745	14.1%	2.239	18.1%	1.046
Île-de-France	1.499	12.5%	2.837	23.6%	990
Languedoc-Roussillon	1.516	5.5%	12.854	46.3%	1.154
Limousin	961	5.6%	6.002	35.3%	431
Lorraine	7.383	31.2%	8.959	37.8%	5.253
Midi-Pyrénées	3.364	7.4%	12.785	28.1%	2.063
Nord-Pas-de-Calais	1.298	10.4%	925	7.4%	496
Pays de la Loire	1.951	6.0%	2.789	8.6%	808
Picardie	2.573	13.2%	3.271	16.8%	1.299
Poitou-Charentes	1.878	7.2%	3.859	14.9%	843
Provence-Alpes-Côte d'Azur	3.832	13.3%	13.384	46.3%	3.038
Rhône-Alpes	4.335	12.5%	13.630	39.3%	2.809
Total France (only mapped parts)	66.059	12.6%	150.745	28.6%	42.060



**Figure 3.** Revealing Cassini's forests within the French forest matrix of the beginning of the XXI<sup>st</sup> century. A comparison between Cassini's map and CORINE 2006 land cover map.

### COMPARISON TO CURRENT SITUATION



**Figure 4.** Revealing Cassini's forests within the current forest matrix of Var. A comparison between Cassini's map and national forest inventory (1995).

Compared to the current situation (CORINE land cover), a preliminary exploration of the quantitative, qualitative and spatial trends in forest cover is presented for 21 administrative regions of France (figure 3, table 1).

A more detailed comparison (figure 4) has been made for some key large forest regions chosen to be representative of different forest histories (Var, Hautes-Alpes and Pyrénées-Orientales).

### A LARGE FIELD OF RESEARCH AND APPLICATIONS IS OPENED

The information on forests from the Cassini's map is reliable at large scale and for large ancient woodlands. Compared to the different old maps of forest available for France (Dupouey *et al.* 2007), Cassini's map presents some advantages (large scale, old survey, easy to digitalise, good overall geodesic accuracy) and disadvantages (poor accuracy of forest contours and position, lack of small woodlands, survey made before the French forest area minimum). More recent maps, from the beginning of the XIX<sup>th</sup> century, are currently being digitalised in some regions of France, leading to complementary and more accurate information.

This study is only at its beginning and opens many new perspectives on large scale mapping of forest ancientness in France, and is rich of scientific (history, natural sciences) and management perspectives. Among these are:

- Researches in various fields of ecological history (studying large scale impacts of agricultural history on today's repartition of indicator species, soil carbon stocks, habitat dynamics...).
- Nature conservation and forest planning (identification of ancient and high conservation value forests, congruence of the reserve network, mitigation of climate change, delineation of networks of leave islands...).

References	The full report	Contacts
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