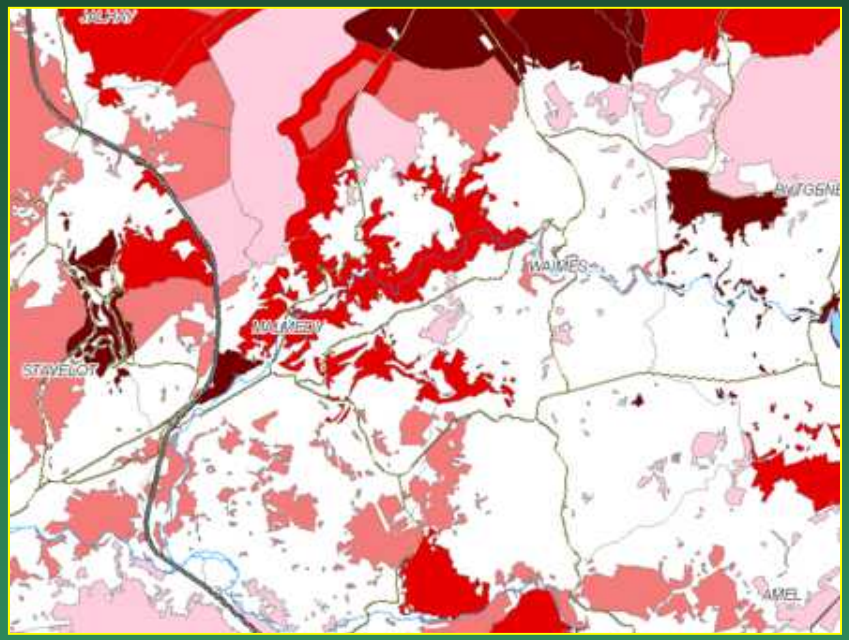
Map and Determinants of Woodlands Visiting in Wallonia



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Map and Determinants of Woodlands Visiting in Wallonia

Aims of the study:

- To map the hubs of forest recreation in the Walloon region
- To explain the level of visiting of the Walloon woodlands

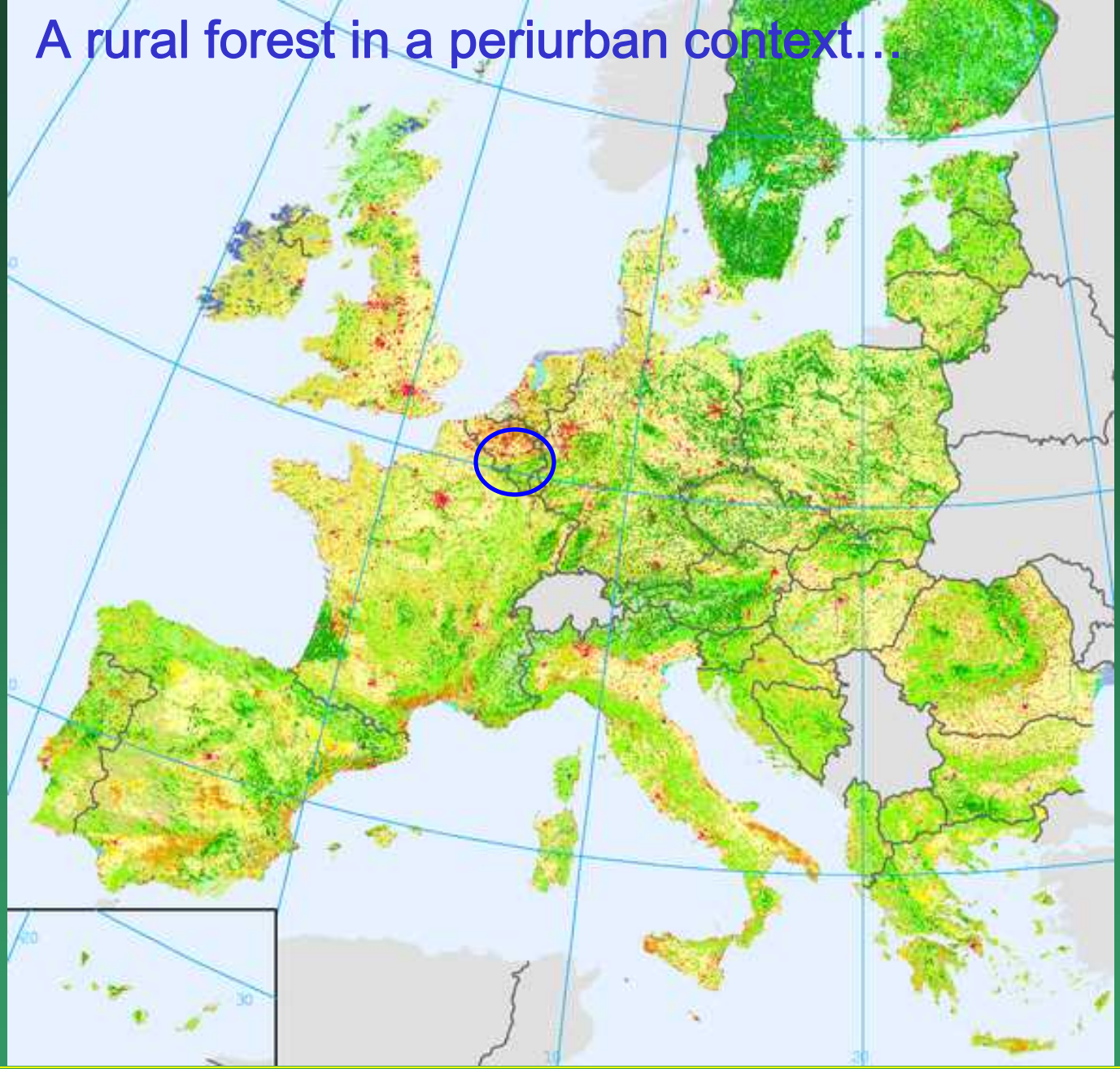
Map and Determinants of woodlands visiting in Wallonia

1. Introduction: the Walloon context
2. Methods
   - 2.1. Survey
   - 2.2. Geoprocessing
   - 2.3. Logistic regression
3. Results
   - 3.1. Interpretation
   - 3.2. The ordered logit model
4. Discussion

1.Introduction: the Walloon context

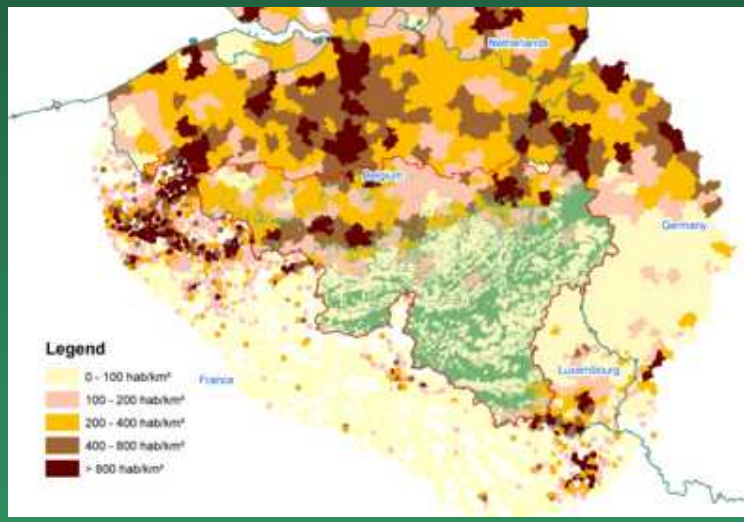
A rural forest in a periurban context

A rural forest in a periurban context…



Introduction: the Walloon context - A rural forest in a periurban context

Country	Region	Woodland cover*	Population density
Belgium	Wallonia	30 %	198
	Brussels	10%	5938
	Flanders	7%	412
France	Nord-Pas-de-Calais	8%	462
	Picardy	10%	47
	Champagnes-Ardennes	32%	62
	Lorraine	29%	118
Grand-Duchy of Luxembourg		35%	181
Germany	Saarland	28%	147
	Rheinland-Pfalz	41%	34
	Nordrhein Westfalen	24%	396
Netherlands	Limburg	10%	734



** Based on the CORINE Landcover map*

1. Introduction: the Walloon context

- Woodland covers around 30 % of the regional area
- Population density is around 198 inhab/km²
- Northern neighbouring regions are densely populated
- Road network is particularly developed
- Visits concern local population AND tourists
- Forest recreation policy focusses on access regulations

2. Methods

2.1. Survey

2.2. Geoprocessing

2.3. Logistic regression

2.1. Survey

Interview of forest service managers to map the level of visiting

2.1. Survey

- Qualitative survey
- Interview of 37 heads of the Walloon Forest Service (in charge of forests districts)
- Definition of the level of visiting of each woodland (public AND private)
- Description of forest recreation supply
- Digitisation and validation by interviewees

=> Overview of forest recreation hubs in the Walloon region

2.1. Survey

- Levels of visiting (qualitative valuation)

Code	Level of visiting	Individual visitors	Activities organised by associations
1	Low	Visitors seen only **exceptionally**	**No** activities
2	Medium	Visitors seen **occasionally** *(mostly on week-ends and during the tourist season)*	**Exceptional** activities *(less than once a year)*
3	High	Visitors seen both at **week-ends** and **in the week**	**Regular** activities *(at least every year)*
4	Very high	Visitors seen **constantly**	**Very regular** activities *(several times a year)*

2.2. Geoprocessing

Spatial data used:

- **Map of the level of visiting – attributes relative to recreation supply**
- **Digital elevation model** / slope of terrain
- **Land use**
- **Natura 2000** protected areas
- **Hydrological network** / buffer zones around watercourses
- Main **tourist attractions** related to forest and the natural environment (including or not ski runs)
- **Urban centres** with populations over 20,000 (Wallonia + neighbouring regions)
- **Road network**

2.2. Geoprocessing

Qualitative variables used:

1) Provided by manager interviews

- Types of **owrnership** (4 levels)
- Recreational **facilities** (presence/absence)
- **Sport trails** (presence/absence)
- **Youth groups** (presence/absence)
- **Campsites** (presence/absence)
- **Picking** pressure (3 levels)
- **Orienteering** (presence/absence)

2) Provided by visual interpretation of topographic map

- Types of **stand** (5 levels)
- Types of **hydrographic** (5 levels)

2.2. Geoprocessing

Quantitative variables used:

- Tourist attractions *(mean Euclidian distance)*
- Urban proximity *(mean Euclidian distance)*
- Road proximity *(mean Euclidian distance)*
- Proximity of roads and attractions *(minimal Euclidian distance)*
- Water proximity *(mean Euclidian distance)*
- Water courses *(proportion of area)*
- Tree species *(proportion of area)*
- Natura 2000 *(proportion of area)*
- Slope *(proportion of area)*

2.3. Logistic regression

- Ordinal logistic regression
- 4 ordered levels
- Explanatory variables: quantitative and qualitative (binary)

$$y^* = X' \beta + \varepsilon$$

y^* = appeal (or the utility) of woodlands for visitors (continuous latent variable)

$y = 1$ (low visiting level)	if $y^* \leq s_1$
$y = 2$ (medium visiting level)	if $s_1 < y^* \leq s_2$
$y = 3$ (high visiting level)	if $s_2 < y^* \leq s_3$
$y = 4$ (very high visiting level)	if $s_3 < y^* \leq s_4$

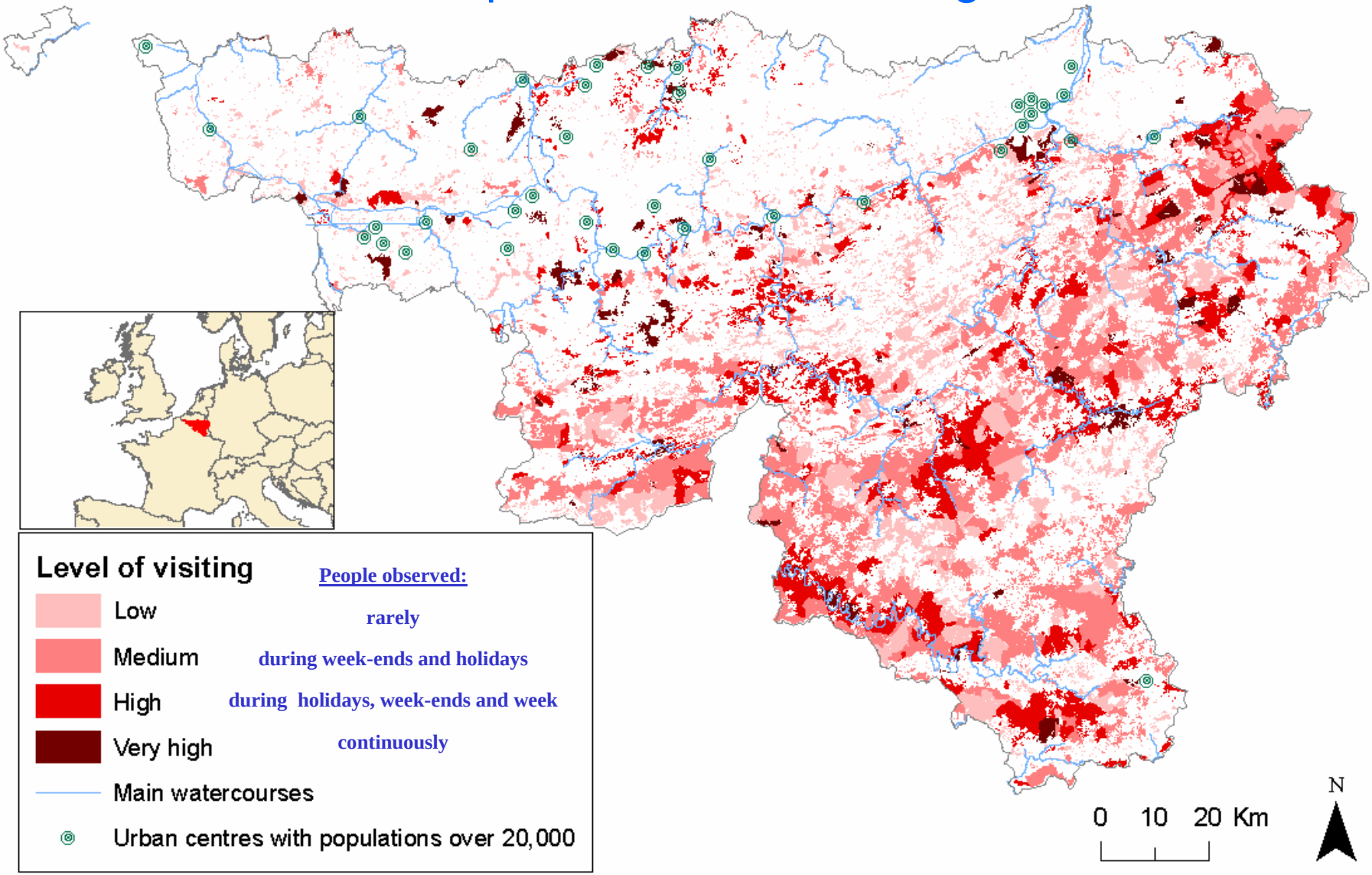
3. Results

3.1. Interpretation

3.2. The ordered logit model

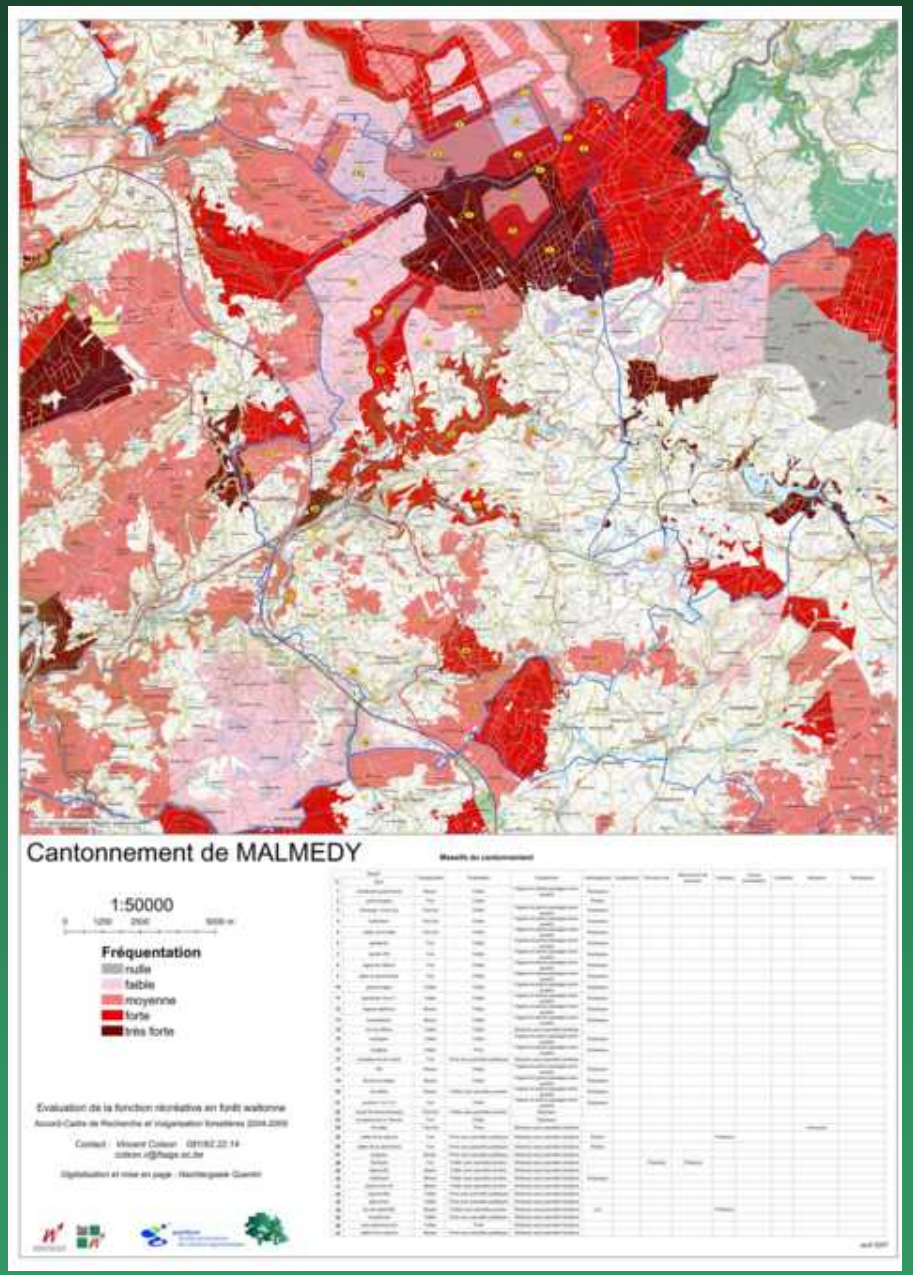
3.1. Results: Interpretation

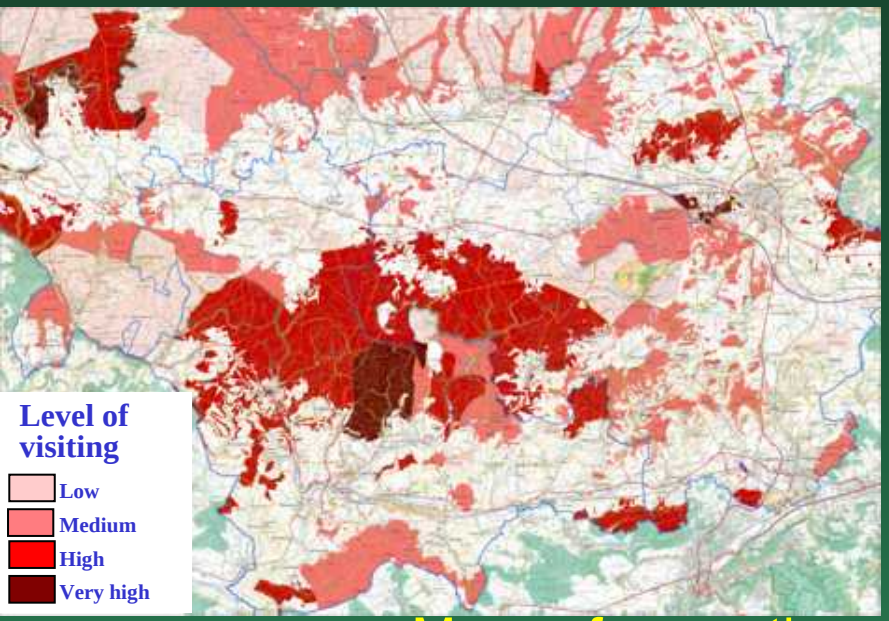
Map of the level of visiting

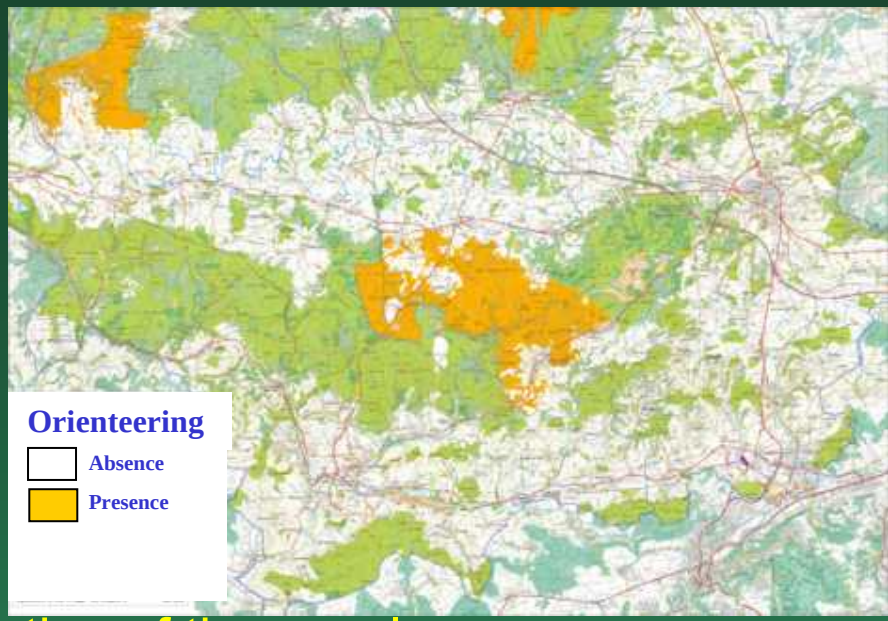


Output for managers:

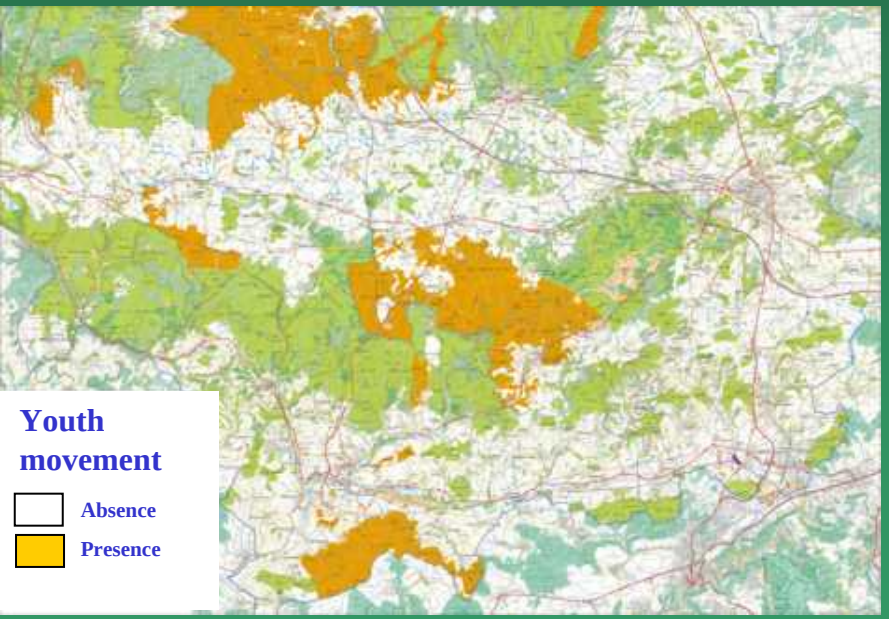
Map (1/50,000) of each forest district with description of the woodlands

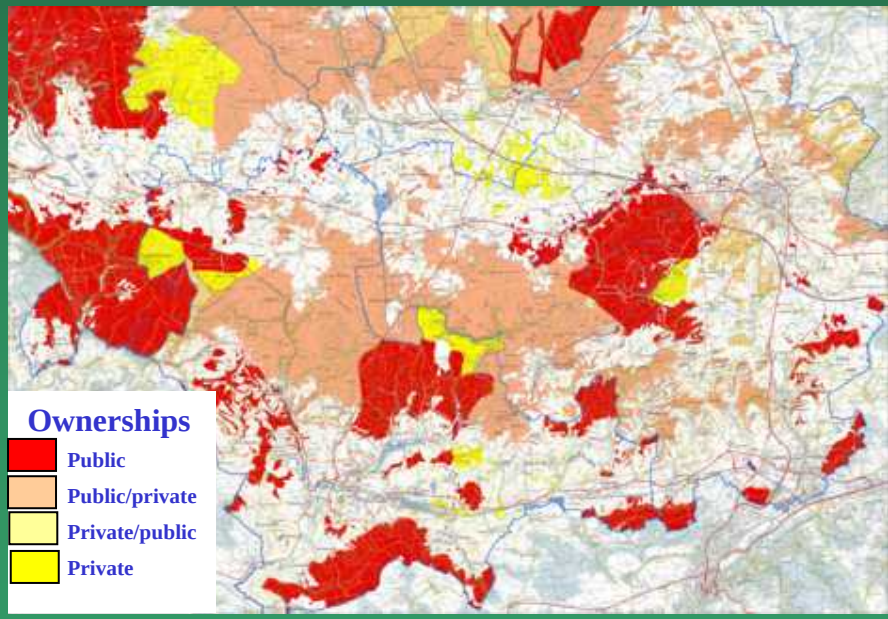






Maps of recreation, description of the supply





3.2. Results: The ordered logit model

Ordered Logit model with fixed effects estimated by maximum likelihood:

Variable	Coefficient	Standard deviation	*t*-stat	Prob
public	2.4942	0.1840	13.5538	0.0000
maj_pub	2.0103	0.2014	9.9831	0.0000
maj_priv	0.7079	0.2214	3.1972	0.0014
Broad_conif	-1.0902	0.3660	-2.9785	0.0029
Conif_broad	-0.7796	0.3248	-2.3999	0.0164
Conif	-1.1281	0.3078	-3.6647	0.0002
Pond	0.3496	0.2432	1.4374	0.1506
Lake	0.6683	0.2629	2.5424	0.0110
Facil	1.8978	0.8065	2.3532	0.0186
Sport	1.8212	0.1860	9.7909	0.0000
Youth	1.3874	0.2871	4.8327	0.0000
Camp	0.6034	0.1726	3.4963	0.0005
Orient	0.7887	0.2878	2.7401	0.0061
Slop_mean	0.2611	0.0831	3.1428	0.0017
Slop_inf10	2.4042	1.4683	1.6374	0.1015
Slop_sup30	-5.9180	2.8659	-2.0649	0.0389
Prop_broad	0.0203	0.0046	4.4465	0.0000
Prop_conif	0.0115	0.0048	2.4205	0.0155
Dist_tour	0.1510	0.0609	2.4777	0.0132
Dist_tour_ski	-0.0756	0.0465	-1.6260	0.1040
Dist_min	-0.1438	0.0494	-2.9123	0.0036
Prop_hydro	0.1119	0.0354	3.1627	0.0016
s_1	7.7132	1.8914	4.0780	0.0000
s_2	9.8798	1.9014	5.1962	0.0000
s_3	12.0973	1.9140	6.3204	0.0000
# Observations	1195			
# Cantonnements	37			
ln L	-1160.23			
Pseudo-R^2 of McFadden	0.2534			
Correct predictions	58%			

Main factors acting upon the level of visiting:

- Types of ownership: public >> private
- Recreational facilities: presence >>absence
- Relief: neither too much, nor too little
- Types of stans: Broadleaves >> coniferous

4. Discussion

4. Discussion

Weaknesses

Compilation of 37 subjective appraisals
Problems for woodlands with high seasonal variations (skiing, youth campsites,…)
Updating of the map (how to distinguish modification of appraisal and real modification)

Strength

Regional map elaborated quite easily
Providing a basic information if no counting
Relevant data for regional studies on forest recreation

Good tool for policy makers

Improvements

Validation by countings in several woodlands of each forest district


Thanks for your attention
and see you in Belgium !