

A CONCISE GEOGRAPHY OF BELGIUM

National Committee of Geography of Belgium

IGU, 2012

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Editor: National Committee of Geography

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THIRD NATIONAL ATLAS OF BELGIUM

The Third National Atlas of Belgium is made of 6 booklets (in Dutch with English abstracts or in French with German abstracts).

Published

- Part 1: Géographie politique - Politieke geografie (Political Geography)
- Part 2: Paysages, monde rural et agriculture - Landschap, platteland en landbouw (Landscapes, Countryside, Agriculture)
- Part 4: Habitat - Wonen (Housing)

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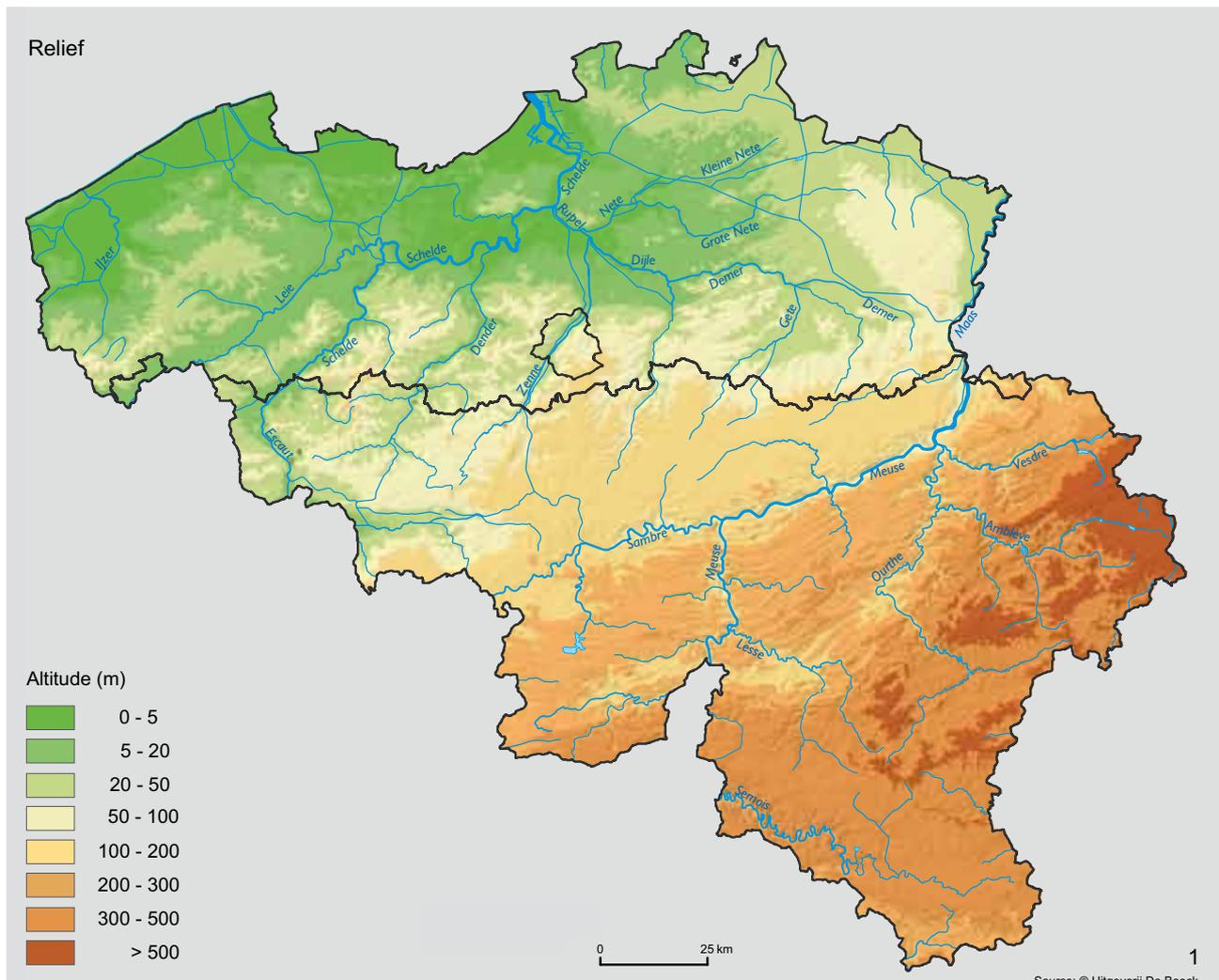
PHYSIOGRAPHY AND GEOLOGY

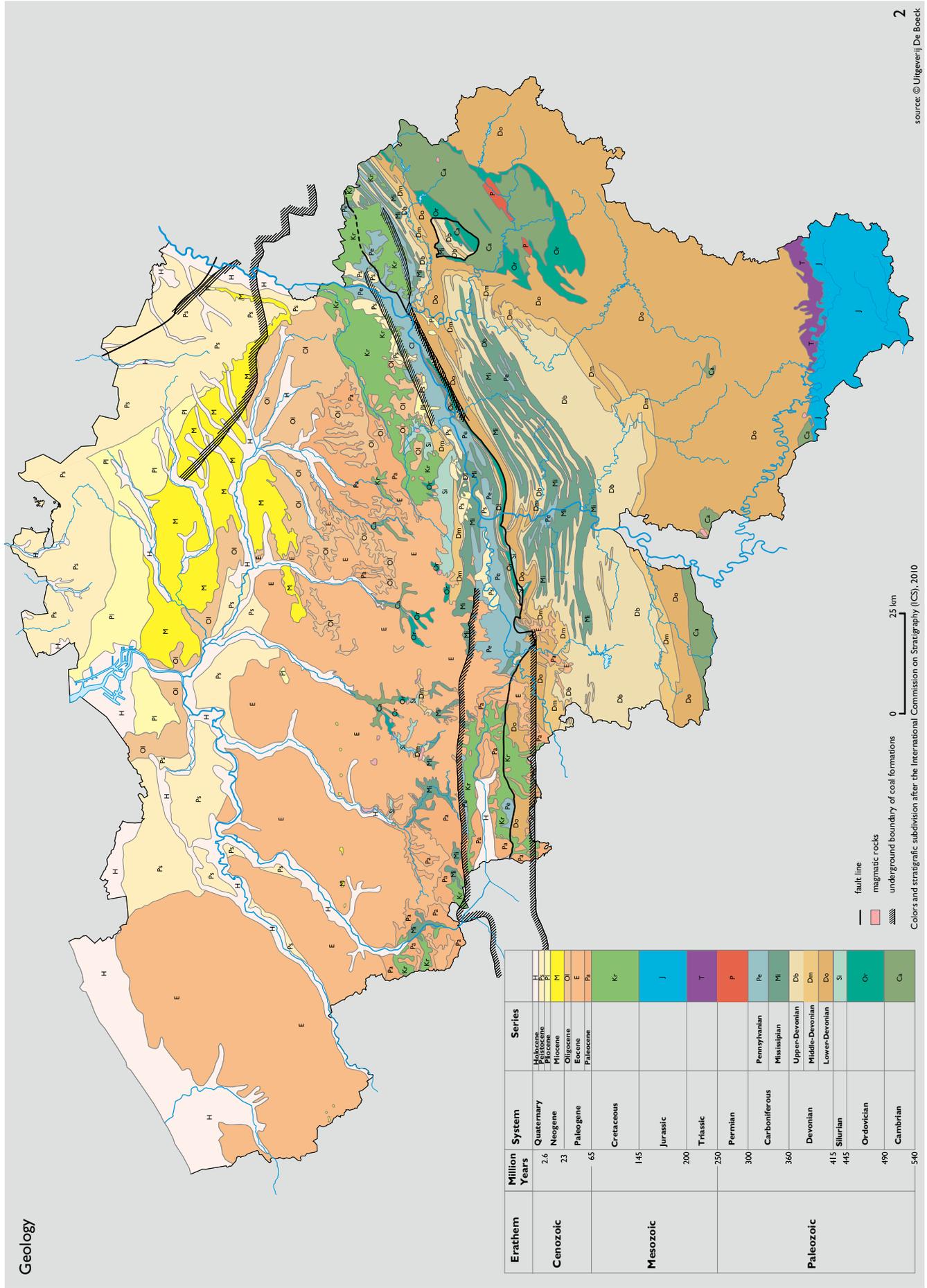
The rectilinear NE-oriented valley of the Sambre and middle Meuse ENE-trending valleys separates two distinct physiographic domains of Belgium [1]. To the south of this axis, the topography results from the erosion of ancient surfaces recently uplifted and incised by the river system. Starting from the Meuse valley, one successively crosses the narrow ridge of the so-called Ardennian Condroz, then the Condroz Plateau [3], which alternates elongated sandstone ridges and depressions eroded in Carboniferous limestones at elevations between 250 and 350 m. South of the Condroz, the Fagne-Famenne area corresponds to an elongated, 5 to 10-km wide depression due to Quaternary erosion of highly erodible Famennian shales. With altitudes of ~200 m, the Fagne-Famenne is in sharp topographic contrast with the Ardennes heights to the south. The transition is realized by a 250 m erosional scarp divided in two parts by the narrow floor of the Calestienne. This moderately sloping scarp forms the highly dissected margin of the Ardennes Plateau, whose interior displays a much more monotonous, gently undulating topography at elevations between 450 m (and even 350 m west of the Meuse valley) and 700 m in the Hautes Fagnes area to the NE. In SE Belgium, the southern rim of the Ardennes is represented by another

prominent scarp leading down to the cuesta landscape of the Belgian Lorraine.

North of the Sambre-Meuse axis and of the wide Haine depression that relays it to the west, one first encounters the low plateau area of Middle Belgium. Its southern part is fairly uniform at elevations between 100 and 200 m. Composed from east to west of the Hesbaya, Brabant and Hainaut plateaus, it displays a slightly WNW-sloping topography covered by thick loess deposits. To the north, these low plateaus give way to similarly sloping dissected interfluvial valleys that separate regularly spaced linear NNE-trending valleys and end by an irregular gentle slope leading northward from 50 to 20 m altitude. In the Hageland area in the east and between the Scheldt and Dender valleys in the west, these interfluvial valleys are dominated by lines of hills up to more than 100 m in altitude.

The northern part of Belgium is composed of a patchwork of smaller physiographic units, from east to west: the broad valley of the lower Meuse; the fairly regular Campine Plateau covered by Meuse gravels, with altitudes between 100 m in the south and 45 m at its northern rim; a region of low cuestas and wide intervening subsequent depressions drained to the west; the so-called Flemish Valley, a low-lying sandy plain between







5 and 10 m altitude; and the Scheldt polders and the coastal plain constituting a roughly east-west arc of lowlands, below 5 m elevation.

The territory of Belgium displays a remarkable wealth of rocks encompassing the whole Phanerozoic, from Cambrian to Holocene [2]. In the map presented here, the eolian sands and loesses of the last (Weichselian) glaciation have been removed to show the underlying geology. The loesses of Belgium cover an east-west belt across Middle Belgium.

Paleozoic rocks mainly crop out in High Belgium, where they constitute the slaty Ardennes massif (lower Devonian) and the neighbouring Condroz area that displays alternating sandstones and limestones (middle Devonian to lower Carboniferous). The Variscan fold-and-thrust belt of the Ardennes has in fact been superposed on structures inherited from the Caledonian orogeny, still visible in small areas (e.g., the Stavelot and Rocroi massifs).

In southeastern Belgium, the Ardennes massif gives way to transgressive Triassic and Liasic sands and marls corresponding to the northeastern end of the monoclinical basal formations of the Paris basin.

To the north, the coal-rich upper Carboniferous formations of the Sambre-Meuse furrow makes the transition towards the Meso-Cenozoic basins of Middle and Low Belgium.

There, Cretaceous sands and chinks presently crop out especially in the west (Mons basin) and the east (SE Hesbaye and Herve plateaus) of the country. In between, they are covered by subhorizontal Eocene and Oligocene marine and continental sands and clays. Northwards, these deposits are in turn overlain by Neogene sands with a progressively more continental character, and by Pleistocene deposits in northernmost Belgium.

To the northeast, the Roer graben, an active tectonic structure belonging to the northern segment of the European Cenozoic Rift System, extends in the Campine area, where Pleistocene Meuse gravels cover the top of the up to 1.5 km-thick graben filling. The major NNW-striking Feldbiss fault defines the SW boundary of this seismically active graben in Belgium.

Finally, the Holocene (Flandrian) transgression encroached on the coastal plain and adjacent areas along the Scheldt estuary, where it leaved a few meters of sand, clay and peat.

THE NORTH SEA

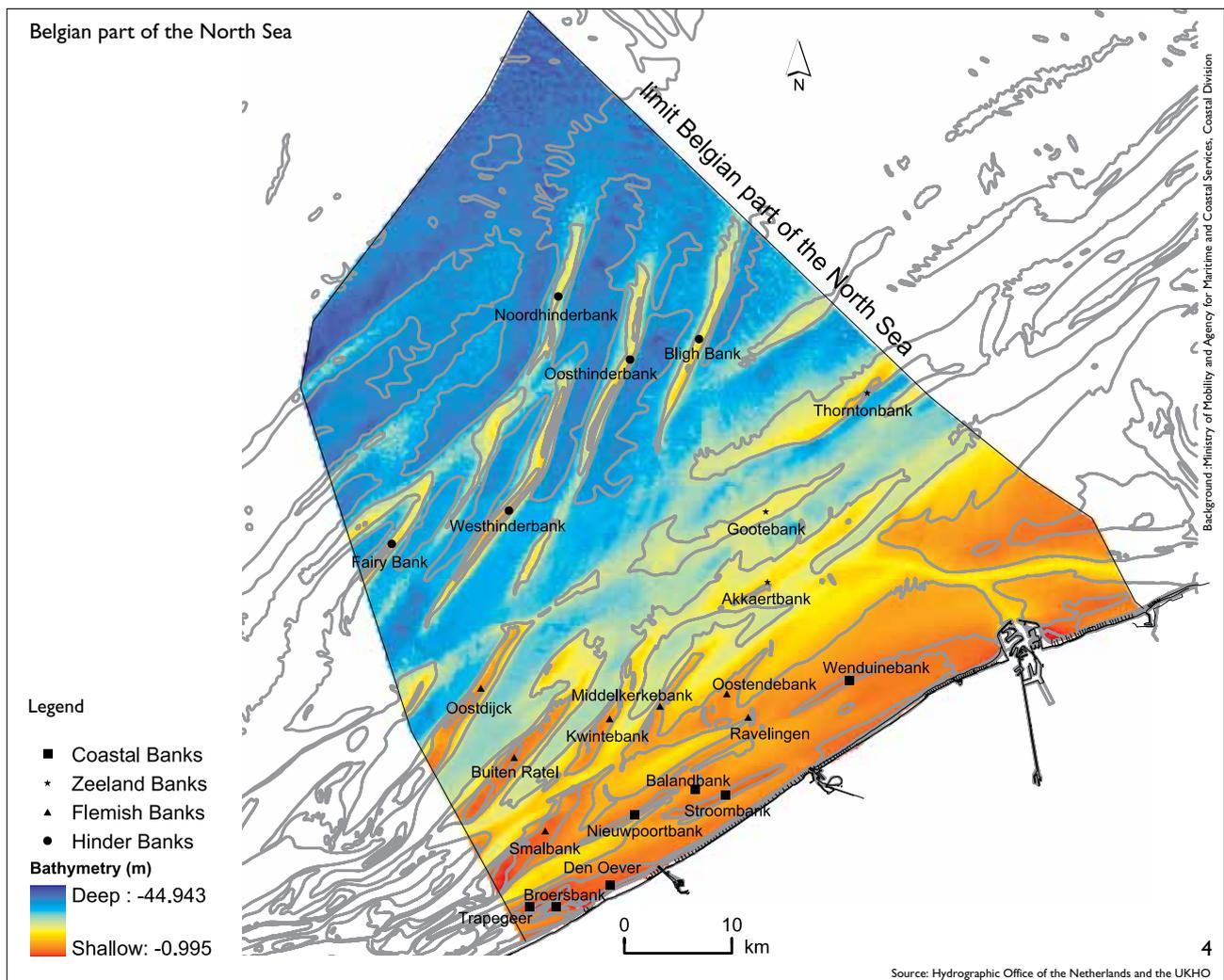
The Belgian Part of the North Sea (BPNS) is part of the Greater North Sea and is situated on the north-west European Continental Shelf. Its area is 3600 km² (0.6 % of the north-west European shelf). The BPNS is characterized by its relative shallowness. The depth of the seabed ranges from 0 m to -46 m (Mean Lowest Low Water at Spring, MLLWS). In the coastal zone (10-20 km), depths range between 0 m and -15 m MLLWS, followed by a central zone of -15 m to -35 m. Towards the northern part of the shelf, water depths range between -35 and -50 m MLLWS.

The seabed surface is characterized by a highly variable topography, with a series of sandbanks and swales. Sandbanks are characteristic for continental shelves with a high amount of sand and sufficiently strong currents. Along the BPNS, numerous large sandbanks occur in parallel groups: the Coastal

Banks and the Zeeland Banks are quasi parallel to the coastline, whereas the Flemish Banks and the Hinder Banks have a clear offset in relation to the coast. On the BPNS, sandbanks play an important role in natural coastal defense and as a source for marine aggregates.

The substratum of the BPNS is composed of solid layers of various ages. The Palaeozoic basement (London-Brabant Massif), flooded since Late Cretaceous times, is covered with a series of Cretaceous, Palaeogene (Tertiary) and Pleistocene and Holocene (Quaternary) sediments.

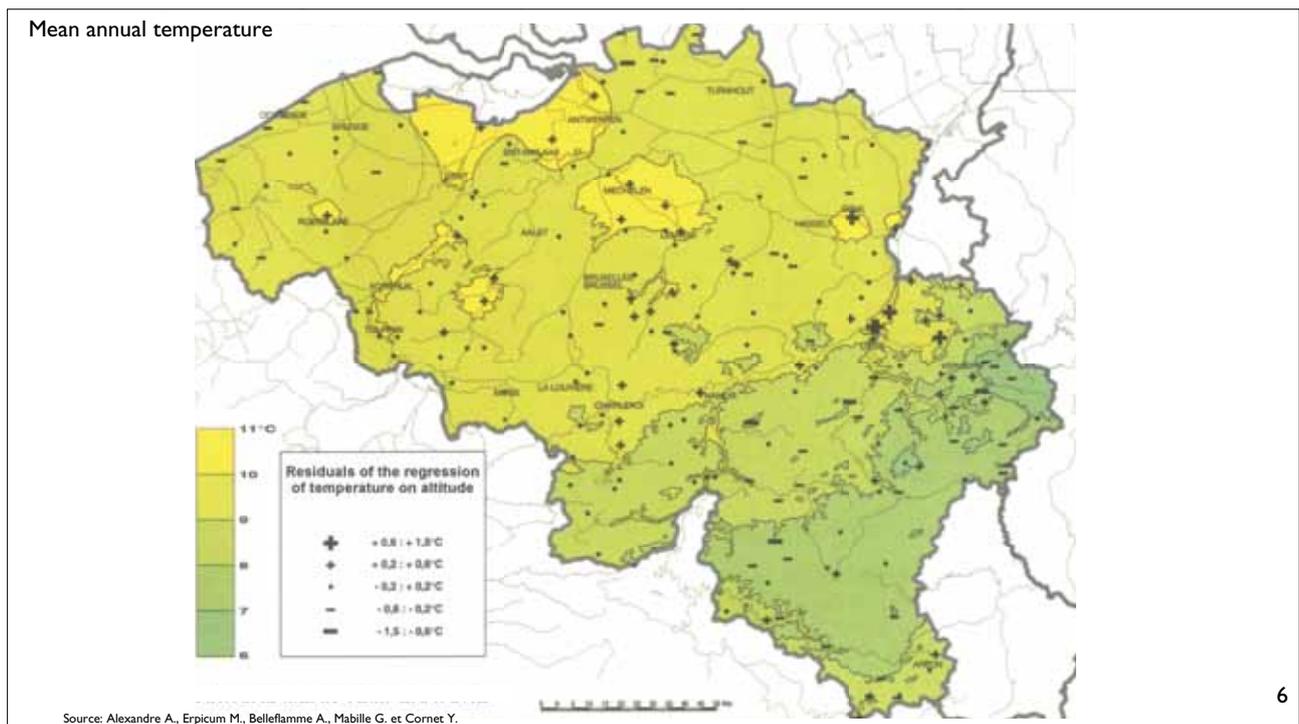
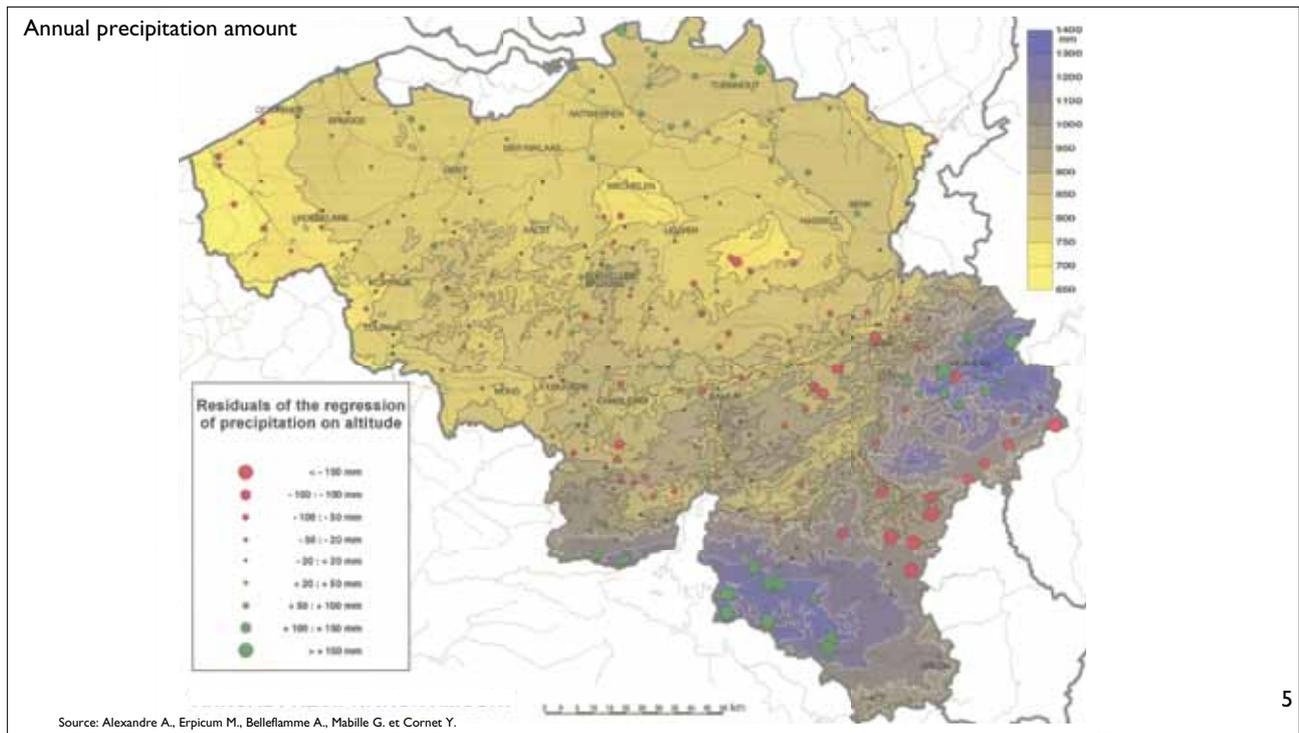
During the first part of the Holocene, a sharp sea level rise in the Southern North Sea took place, known as the Flandrian transgression. The Holocene sediments form mainly the present tidal sandbanks.



CLIMATE

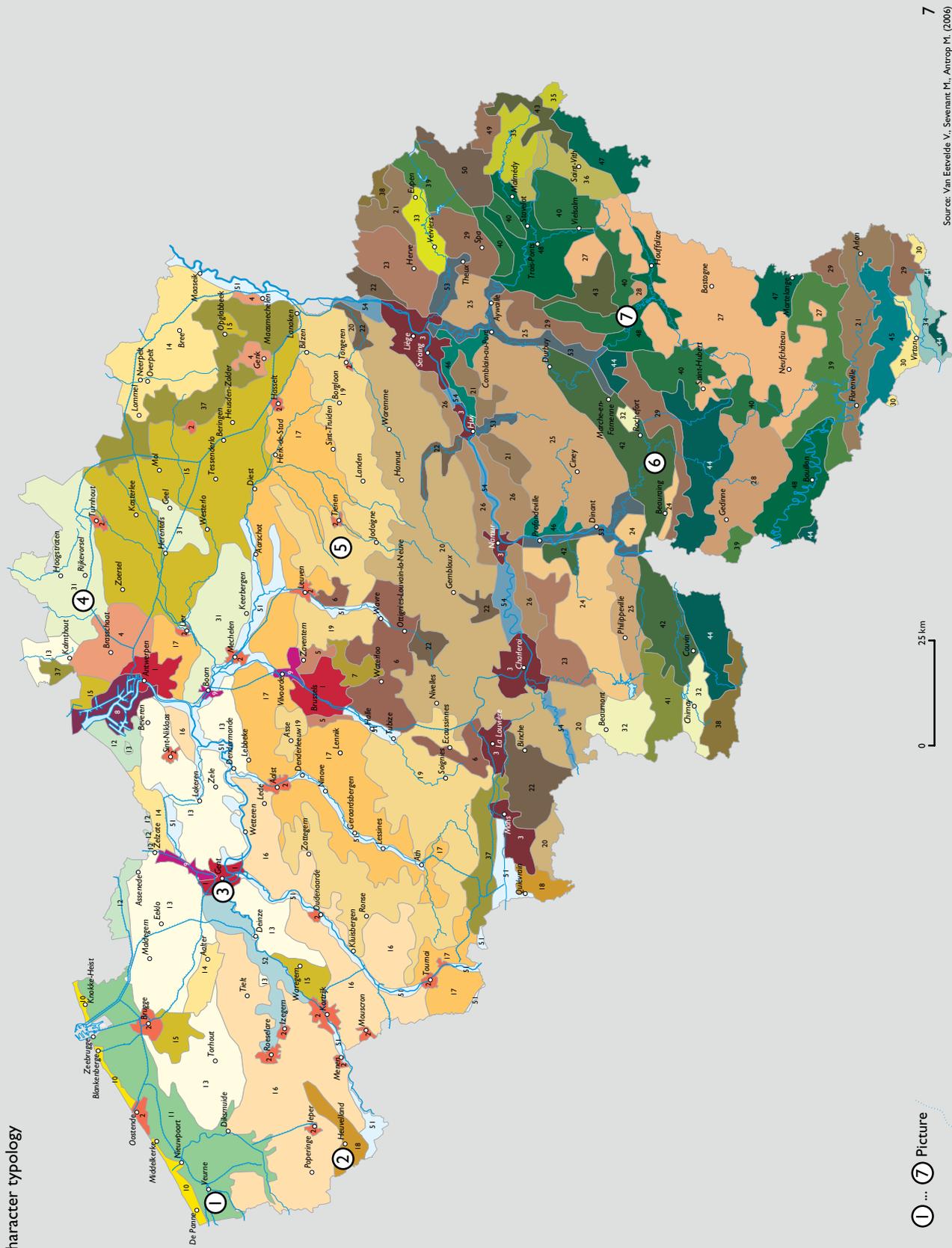
Mean annual precipitation [5]. Isohyets are spaced with an increment of 50 mm up to 1000 mm after which the intervals are doubled. Thus these intervals should be at least equal to the smallest significant statistical difference between adjacent stations, a difference which is more marked in the very rainy areas of the country. Colored circles are drawn with a size proportional to the difference between the observed local value at each station and the expected value obtained by

the linear regression on altitude. These patches are green or red depending on whether if the local residuals are positive or negative. Mean annual temperature [6]. Annual isotherm curves are spaced with an increment of 1°C and mean annual vertical gradient of temperature is -0.53 °C /100m with a sea level temperature of 10°C. Positive or negative signs show warmer or colder areas than the values expected by the regression on altitude.



6 Landscapes

Landscape character typology



1 ... 7 Picture

0 25 km

Legend landscape character typology

Urban Landscapes

- 1** flat, city with industry
- 2** flat, town
- 3** rolling, conurbation with industry

Suburban landscapes

- 4** flat, sandy, forested
- 5** flat, loamy, arable and woods
- 6** rolling, loamy, arable
- 7** rolling, loamy, forest

Industrial and harbour landscapes

- 8** with direct access to the sea
- 9** with sea connection by canal

Dunes

- 10** coastal dunes

Polder landscapes

- 11** coastal polders
- 12** polders of the Scheldt river

Agricultural landscapes

- 13** on sandy soils
flat, lower than 50 m, densely built up
- 14** flat, lower than 50 m with pasture and woods
- 15** flat, lower than 50 m, with pastures and woods and densely built up
on loamy soils
- 16** flat, lower than 50 m,
- 17** flat, lower than 50 m, densely built up
- 18** flat to rolling, lower than 120 m
- 19** rolling between 50 - 120 m
- 20** rolling between 120 - 210 m
- 21** rolling to hilly between 210 - 350 m, with pastures and densely built up
- 22** rolling between 50 - 120 m, densely built up.
- 23** rolling to hilly between 120 - 350 m, some stony-loamy soils, with pastures and woods

on stony-loamy soils (inceptisols)

- 24** hilly between 210 and 350 m
- 25** hilly between 210 and 210 m, with pastures and woods
- 26** hilly between 120 and 210 m with woods and densely built up
- 27** hilly between 350 and 570 m, forested
- 28** hilly between 350 and 450 m, pastures and forests
- 29** hilly between 210 and 350 m, pastures on sandy en clayish soils
- 30** hilly between 210 and 350m, with pastures and forests

Pasture landscapes

- 31** on sandy soils
flat, lower than 50 m, some arable land densely built up.
- 32** on stony-loam soils (inceptisols)
rolling between 210 and 350 m some arable land and densely built up
- 33** rolling to hilly between 210 and 350 m, some arable land and densely built up
- 34** hilly between 210 and 350 m, densely built up, some arable land and woods on alluvial and stony-loamy soils
- 35** hilly above 450 m
- 36** hilly above 450 m with arable land and densely built up

Forest landscapes

- 37** on sandy soils
flat, lower than 50 m, with some arable land and densely built up
- 38** on loamy soils
rolling between 210 and 350 m, with some arable land and densely built up
on stony-loamy soils
- 39** rolling, above 350 m
- 40** rolling to steep hilly, above 350 m
- 41** hilly between 210 and 350 m
- 42** hilly, between 120 and 210 m, some arable land and densely built up
- 43** hilly between >450 m
- 44** rolling to steep hilly, between 210 and 450 m, with some arable land and densely built up
on sandy and clayish soils
- 45** hilly, between 120 and 210 m, with forests and densely built up

on steep slopes and stony-loamy soils (inceptisols)

- 46** rolling to steep hilly, between 120 and 350 m, with some arable land and densely built up
- 47** rolling to steep hilly, above 350 m, with some arable land
- 48** steep hilly, between 210 and 450 m
- on steep slopes
- 49** > 450 m
- on peat soils
- 50** > 450m, plateau with steep borders

Valley landscapes

- 51** alluvial agricultural land with pastures, densely built up
- 52** alluvial agricultural land with pastures and woods, densely built up
- 53** hilly to steep borders, between 120 and 350 m, forested, densely built up, with some arable land on sandy and clayish soils
- 54** hilly, between 50 to 130 m, arable land, densely built up, with woods on loamy and stony-loamy soils

METHOD

The landscape characterisation of Belgium shows the 54 contemporary landscape character areas, defined by 54 landscape character types. The classification is based on land use (CORINE Land Cover 1990), soil associations, topography (Digital Terrain Model NGI/GN) and the landscape heterogeneity derived from SPOT imagery. These data sources are the only ones that cover the federal state Belgium as a whole. The landscape types are defined by dominating characteristics determined by cluster analysis. A distinct colour range represents the main groups.

References: Van Eevelde, Veerle; Antrop, Marc. 2009. A stepwise multi-scaled landscape typology and characterisation or trans-regional integration, applied on the federal state of Belgium. Landscape and Urban Planning (2009) 91, 3, 166-170.

LANDSCAPES

Belgium is characterised by a great diversity of landscapes, which can be explained by its geographical situation and its history [7]. First there is the variation of its physical environment ranging from the Palaeozoic formations in the southeastern uplands to Holocene deposits in the northwestern coastal plain, covering the whole geological history. The lowlands in the west and north of the country were a major corridor, bordered by the North Sea and the uplands of the Ardennes, for cultural exchanges since prehistoric times, which all had their imprint on the landscape. This economical interesting borderline situation also resulted in successive political regimes and conflicts, which ultimately led to the creation of the state Belgium in 1830. Belgium is situated on the border between the Roman and Germanic cultures as well as between catholic and protestant Europe. This borderline situation is still reflected in the Belgian state structure, which consists of autonomous communities and regions. These settings explain the landscape trajectories. Important innovations in land reclamation and agriculture occurred during the medieval period, resulting into a great variety of traditional landscapes, which are characterised by an intimate relationship with the physical environment and regional political and cultural imprints. North of the rivers Sambre-Meuse (more or less the actual Flanders region and northern part of the Walloon region) was characterised by intensive agriculture and vast common heath lands. The settlement density was high as was the density of important towns. South of these rivers the hilly uplands are found dominated by forest cover and smaller agrarian villages. The traditional landscapes are represented in great detail on the historical map from the Austrian period by J.J.F. de Ferraris (1771-1178). It depicts the situation of the landscapes at the end of the Ancien Régime, just before the start of the important changes caused by the early and intensive industrialisation.

The revolution age and the creation of Belgium (19th century)

After the French revolution the country came under French rule. The first impact was a shift in landownership with the privatisation of the properties of the church, a most important landowner until then. Many forests became state owned and were cleared; the forest cover was only 18.4% in 1834. Further important changes occurred during the Napoleonic wars, such as the improvement of the transportation system (harbours canals and roads) and the introduction of industrial crops such as sugar beets. Town walls were removed opening the cities to expansion into the countryside and allowing the development of new manufactures. In 1800 Lieven Bauwens introduced the mechanical 'Spinning Mule' in Ghent (as an industrial spy), modernising the traditional textile industry. This destroyed the traditional cottage industry, which gave farmers in the Flemish countryside a vital extra income, and initiated the migration to the cities.

In 1830 Belgium was created as a buffer state and a parliamentary monarchy. From the beginning it aimed to become a modern, industrial state. The development of the railway

network is a good indicator for the landscape changes caused by the industrialisation. The first railway was opened in 1835 and ten years later the network consisted already of 557 km state owned lines and 196 private owned lines.

In 1847 the first of Development Law was proclaimed, forcing landowners and municipalities to make all wasteland productive. Thus, most of the remaining commons, mainly heath lands, were converted to cropland or were planted with coniferous forest. This also allowed coping with the shortage of wood for a fast growing population. In 1834 76% of the land was used for agriculture, of which 49.1% as cropland, 11.7% as pasture land, 2.1% as orchards, while 12.5% was wasteland.

Industrialisation and urbanisation phase (end 19th-early 20th century)

Between 1844 and 1870 the railway network grew mainly through private initiatives aimed at the disclosure of new mining sites and iron works. Most of the new coalmines were situated in rural areas, while steel industry developed in the cities nearby, mainly along the river Sambre-Meuse in Wallonia. From 1871 to 1900 most of these railway lines were bought the state. Besides the railway also a dense network of small-track railways (tramways) was developed simultaneously. In 1914 it covered already 4095 km and disclosed many rural villages, in particular the ones as close as 30 km from industrialising cities. This disclosure of the countryside caused a massive migration of cheap labour force to the cities, which developed an industrial conurbation belts consisting of a mixture of factories and small labour housing, called cités. To reduce the massive migration from the countryside, new housing programs were set up and new model towns were erected in the rural areas near the mining sites and steel factories.

New rich moved out of the densely populated and polluted cities, colonizing the countryside with new manors enclosed in English style parks. Railways also stimulated development of spa-towns (Spa in the Ardennes) and elite seaside resorts following the British style (Ostend).

From 1870 on, cheap wheat was imported from Eastern Europe, the USA and Australia, to keep the price of bread as low as possible for the growing labour industrial force in order to enhance the competitiveness of the national economy. Around 1880, this 'agricultural invasion' caused a severe agricultural crisis, with famine in the countryside and forced most farmers to stop and move to the industrial centres. The wheat area was reduced from 280,000 ha in 1866 to 180,000 ha in 1895 and forest plantation expanded at a rate of 3,000 ha per year. Remaining farms converted to dairy farming, producing milk and cheese for the growing urban population. Large areas of openfield cropland became enclosed with hedgerows and converted to pasture land.

Breaks (WWI-Interbellum-WWII)

Although the direct impact of both World Wars on the landscape remains limited to narrow front zones, the changes in society

were important and changed indirectly the landscape. The population became more mobile than ever before. Particularly during the First World War, forests decimated, especially in Flanders and were replanted during the 1930s. In the outer urban fringe villa's, garden cities and social housing were erected.

General suburbanization (1950-1970)

After the Second World War, the mobility pattern changed profoundly with the popularisation of the automobile. It caused urban sprawl of housing along the main roads (typical pattern of ribbon building), large commercial and industrial sites looking for space and good accessibility. In the disclosed countryside suburbs were created on fertile cropland of the former openfields. The cadastral maps gave a build-up area of 0.7% in 1834, in 2002 the coverage was already 11.6%, and even 15.5 when industrial zones and transport infrastructure is included. This general suburbanisation goes together with a 'desertification' of the city centres and city renovation only starts slowly from 1970 onwards.

After World War II, recreation and tourism for the masses became popular as well. The 67 km long coastline became almost entirely build-up with villa's and apartments forming an urban front to the sea.

From 1960, the maritimisation of the steel industry shifts the activity from Wallonia to the harbours in Flanders. Industries become located outside the main urban agglomerations. Simultaneously the productivity of the coalmines is dropping

from 1950 on. The last mine in Wallonia closed in 1984, and in the Campine (Kempen in Dutch) in 1992 leaving a lot of derelict land. Diversification of the industrial production became necessary and the tertiary sector grew fast.

Crisis and State reforms (1970-2012)

Despite the economical crisis, most processes of suburbanization, densification of the transport infrastructure, and mechanization of the agriculture, intensification and fragmentation of the land use continued but at a slower pace. The principal roads increased by 33% between 1970 and 1993 to accommodate for the growing automobile traffic. In 1960 the network of motorways had a length of 175km and increased to 1729 km in 2002.

Global drivers, international policy, in particular from the EU and the implementation of international conventions became increasingly more important for the dynamics of landscapes. In addition, successive institutional reforms between 1970 and 1993, gradually transformed Belgium into a federal state. The three regions, Flanders, Wallonia and Brussels, bear authority for all territorial matters, and hence for policy making related to spatial planning, landscape and heritage, and the environment. Accordingly, policy, planning and management gradually became divided and fragmented. The zoning plans of the 1970s are the last plans that cover the whole of Belgium. As legislation, policy and research developed differently, data for a uniform assessment of the Belgian situation became increasingly more difficult to obtain.



1. The coastal polderland was reclaimed on the sea in successive stages and form fertile open farmland today (example of the drained lake of the Moeren)



2. The Tertiary clay of Flanders forms the basement of southwestern Flanders carrying some residuary hills showing a gently rolling agricultural landscape with dense settlement of villages and homesteads (view near Loker)



3. On the wet sandy soils in Flanders fields are bordered by ditches planted with pollard trees creating a typical Flemish 'bocage' landscape (example of the 'bulken' landscape in Drongen)



4. On the sandy soils of the former heath lands of the Kempenland a mosaic landscape formed by compartments of fields, pastures and woodlots connected by (example Oostmalle)



5. On the loamy soils of the central plateau vast openfield agriculture dominates and settlements are clustered in small villages (Opvelp)



6. The folded limestone and shale rocks between the rivers Sambre-Meuse and the uplands of the Ardennes resulted in a hilly landscape with great variation where settlement and land use is mainly dominated by the geology and soils conditions (looking north from the limestone ridge of the Calestienne over the shale depression of the Famenne towards the plateau of the Condroz (Le Roptai)



7. The densely forested uplands of the Ardennes are deeply dissected by meandering rivers (example of the Ourthe valley near La Roche)

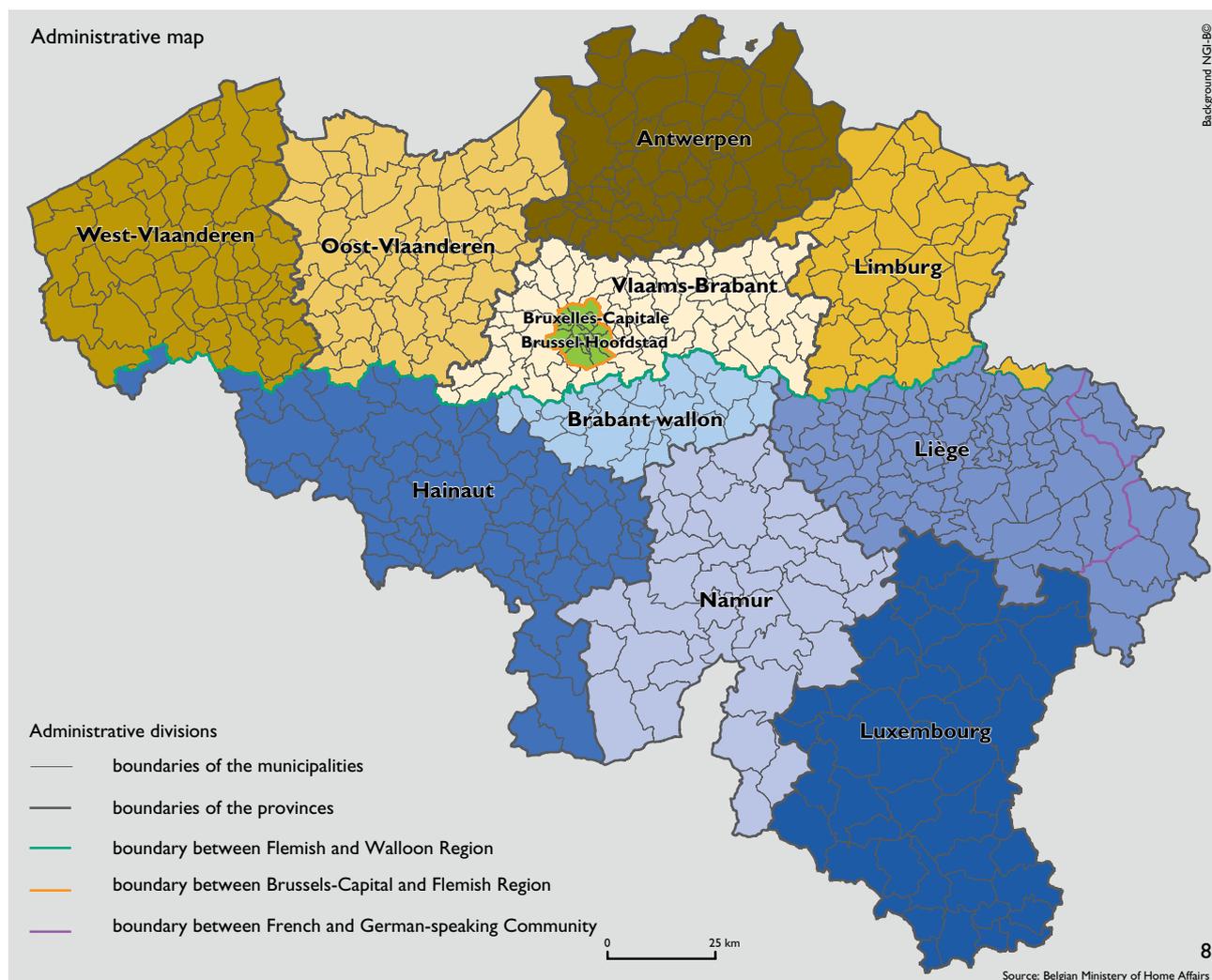
Photographs © Marc Antrop

THE MAKING OF THE BELGIAN SPACE

Belgium has been a federal State since 1993. Its complex structure has been created through a series of constitutional reforms launched in 1970 and currently still ongoing: the sixth round is taking place in 2012. Federal Belgium unites three Regions (Flanders, Wallonia, Brussels-Capital), which have exclusive competence for territorially-based matters (town and country planning, environment, regional economy, infrastructure, etc.) and three Communities (Flemish, French and German speaking), which have competency in matters related to

individuals (education, culture, healthcare, etc.). In the bilingual Brussels-Capital Region, individuals may choose freely between services offered by the French and the Flemish Communities. The German speaking Community has competence in nine municipalities to the east of the Walloon region.

The executives of the Flemish Region and the Flemish Community have been merged. As for the French Community, it has recently begun referring to itself by the unofficial title of the Fédération Wallonie-Bruxelles, the Wallonia-Brussels Federation.



	Area (sq.km)	Population (1 January 2011)	Evolution 2001-2011 (2001=100)	% of the GDP (2010)	GDP/inhab. (2009) λ1 (King- dom = 100)	Fiscal income/ inhab. (2009) λ2 (Kingdom = 100)
Flemish Region	13,522	6,306,638	105.9	57.2	99.4	106.2
Walloon Region	16,844	3,525,540	105.4	23.7	73.2	94.4
of which German Community	854	75,716	106.6			
Brussels-Capital Region	162	1,119,088	116.0	19.1	189.7	82.0
Kingdom (outside North sea)	30,528	10,951,266	106.7	100.0	100.0	100.0
North Sea territorial waters	2,017					

The Flemish and Walloon Regions are each divided into 5 provinces [8]. These provinces were the first level of subdivision in the unitary State. They numbered 9, as the original province of Brabant was divided into Flemish Brabant, Walloon Brabant and the Brussels Capital-Region in 1995.

The basic administrative unit is the municipality, which has a fair degree of autonomy. There are 589 of them, after the mergers that took place in 1977.

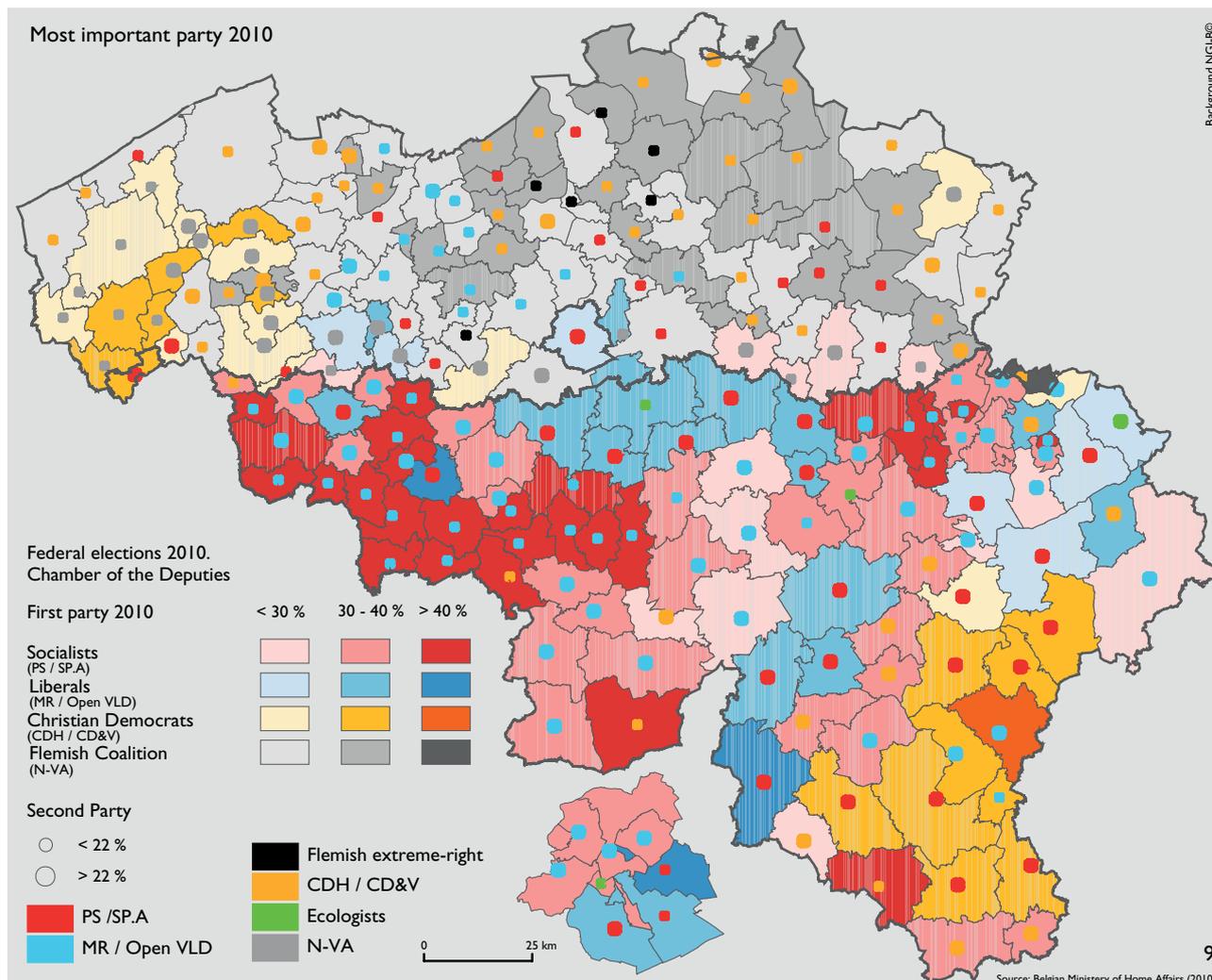
Distribution of votes in the 2010 legislative elections (House of representatives)	French-speaking electoral college		Dutch speaking electoral college		Kingdom	
	%	seats	%	seats	%	seats
Various extreme-left wing	2.4	-	2.2	-	2.3	-
Socialist family (PS and Sp.a)	36.1	26	14.9	13	22.9	39
Ecologists (ECOLO and Groen!	12.6	8	7.0	5	9.2	13
Originally Christian-Democratic family (CDH and CD&V)	14.5	9	17.5	17	16.3	26
Liberal family (MR and Open-VLD) ^(a)	24.4	18	13.9	13	17.9	31
Regionalist, secessionist or reattachment parties ^(b)	3.4	-	31.7	28	21.0	28
Various right-wing ^(c)	4.7	1	0.4	-	2.0	1
Extreme right-wing ^(d)	1.8	-	12.5	12	8.4	12
Total	100.0	62	100.0	88	100.0	150

(a) including the FDF (Front des francophones in Brussels).

(b) especially the N-VA (Nieuw-Vlaamse Alliantie) and the Lijst Dedecker in Flanders. On the Walloon side, the Rassemblement Wallonie France advocates reattachment to France.

(c) among which the populist People's party (Parti populaire) on the French-speaking side.

(d) especially the Vlaams Belang (also secessionist) and the FN and the FN+ on the French-speaking side.



In the 19th century voting system based on tax payments, political life was defined by the opposition between a Catholic camp which defended the interests of the notables of the Ancien Régime and a Liberal camp favouring the side of capitalist development. At the end of the 19th century, the workers party (socialist), which rose out of the working class, entered in Parliament. The interwar period saw the rise of the Communist Party (which vanished as such after reaching a peak at the end of the Second World War) and extreme right-wing parties. The Regionalist parties were created after WWII in Flanders, where the Flemish Movement (militating for an independent Flanders) had gradually gained influence since the late 19th century. Regionalist parties also appeared in Wallonia, in the wake of deindustrialisation, claiming greater autonomy or attachment to France. In the late 1970s, the political spectrum was further broadened by the foundation of French-speaking and Dutch-speaking ecological parties. The gradual separation of the Dutch-speaking and French-speaking political spheres led to a split within the national parties in the course of the 1970s. Currently, Belgian politics is characterised by two profoundly separate worlds and this divorce is emphasised by highly different voting behaviour on the two sides of the linguistic border, which are rooted in the divergent social and economic development within the territory since the Industrial Revolution.

In the Flemish Region, where the Christian Democrats have traditionally been the strongest political force, the N-VA (Nieuw-Vlaamse Alliantie), a centre-right party advocating confederalism and ultimately the creation of an independent Flemish State, became the leading party in a very large majority of the electoral districts in 2010 [9]. It is only in the south of West Flanders, one of their historical bastions, that the Christian Democrats of the CD&V have maintained their supremacy.

In turn, Wallonia remains dominated by the Socialist party, except in Walloon Brabant, the affluent suburban part of greater metropolitan Brussels which is dominated by the Liberals and in the South-East, which is more rural, where Christian Democrats and Liberals have been in competition for the top spot since the latter abandoned their anticlerical positions in the mid-1960s.

In Brussels, where the socialist vote is widespread among the Belgian population of immigrant origin, who have thus taken over the torch from the old working class in the capital city, the most densely populated municipalities of the centre and west contrast with the affluent municipalities in the east and southeast which are predominantly Liberal.

As there is proportional representation in Belgium, the governments are composed of multiple parties; the current government, which was assembled with great difficulty after



the 2010 elections, combines Socialists, Christian Democrats and Liberals. It has a very clear majority on the French-speaking side, but there is no such majority among the Flemish representatives.

Due to the size of its population and the impact of its economy, Flanders carries a lot of weight in political decisions. The Flemish economy has tended to be more dynamic since the end of the Second World War, although the rates of regional growth have been rebalanced in the last decade. The Brussels-Capital Region is certainly a motor for the Belgian economy; it generates 19 % of the national GDP (over 20 % if one counts the activities of the international institutions not factored into this figure), but the benefits of this economic importance are largely diverted to Flanders and Wallonia: nearly 60% of the approximately 700,000 employees working in Brussels are commuters, some two-thirds of whom come from Flanders, the rest from Wallonia. As a result of such transfers, the average income of the Brussels population is, paradoxically, the lowest in the nation: the middle-class and the more affluent populations have largely abandoned the capital and moved to its greater periphery.

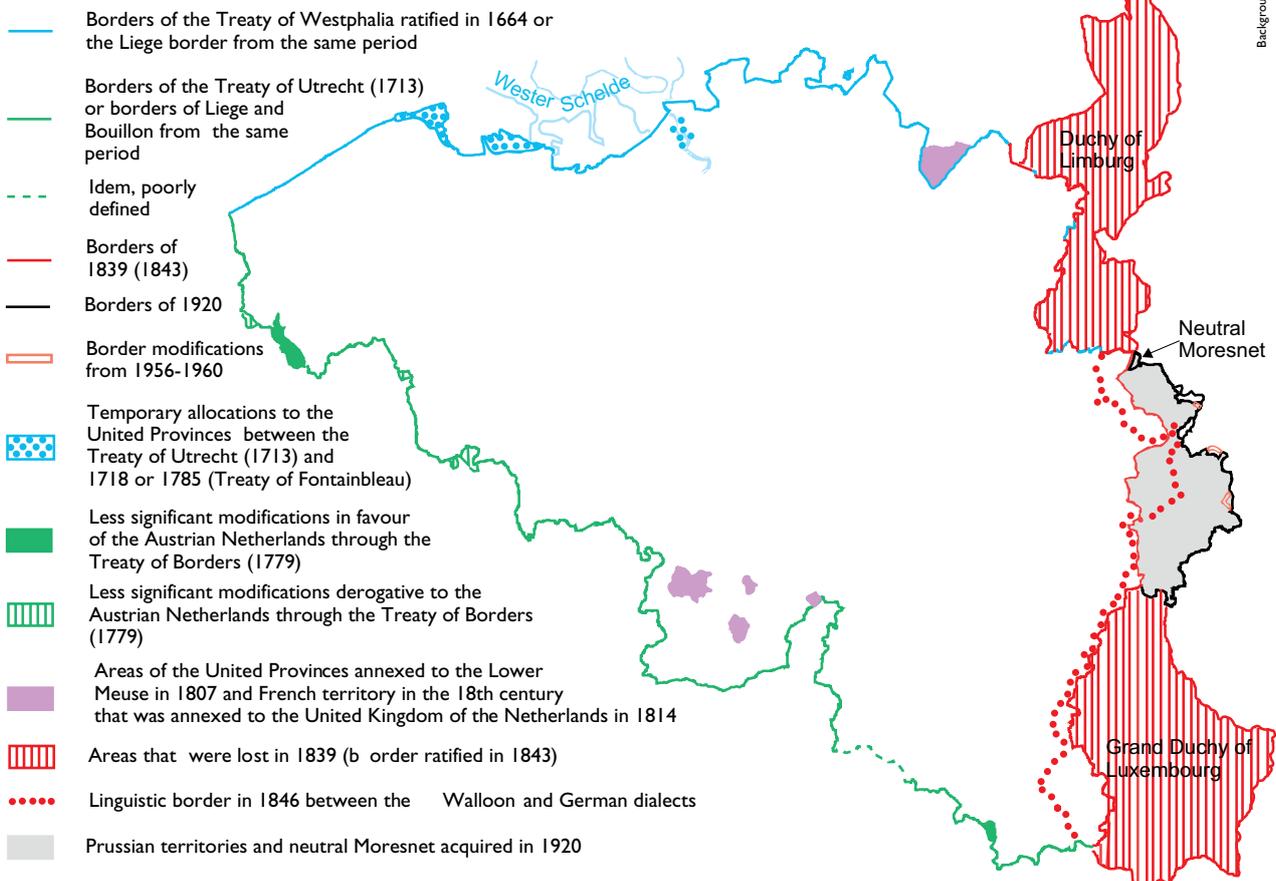
Walloon and Flemish public opinions reveal different sensibilities which are facilitated by their separate media, so that they tend to have little understanding of each other. The

Flemish population leans on average more to the right, and tends to support the organisations of the Christian segment (Mutual health insurance funds, unions, attending Catholic schools, participation in Catholic youth movements, etc.), although here, too, only a very small minority still regularly attends Mass. The causes that mobilise civil society are shaped by movements which are not identically replicated in the north and the south of the country: thus, anti-military and peace activism, solidarity with poor countries (projects such as 11.11.11, the OXFAM shops) receive greater support in the North of the country, whilst the South tends to be mobilised more for freedom of opinion (Amnesty International) and against social injustices.

The weak coherence of the nation-state in Belgium and the north-south dichotomy are the product of being a recently constructed state, onto which has been superimposed an economic landscape that successively favoured the south, and then the north of the country in the course of the 19th and 20th centuries, and which has structured the political and ideological splits along the linguistic border.

Belgium did not exist as such under the Ancien Régime, but has been a collection of principalities under the authority of a single sovereign since the 15th-century, successively the

Origin of the borders of Belgium



N.B. the Dutch enclaves of the 18th century on Liege territory are not shown.

0 25 km

Background NGLB©

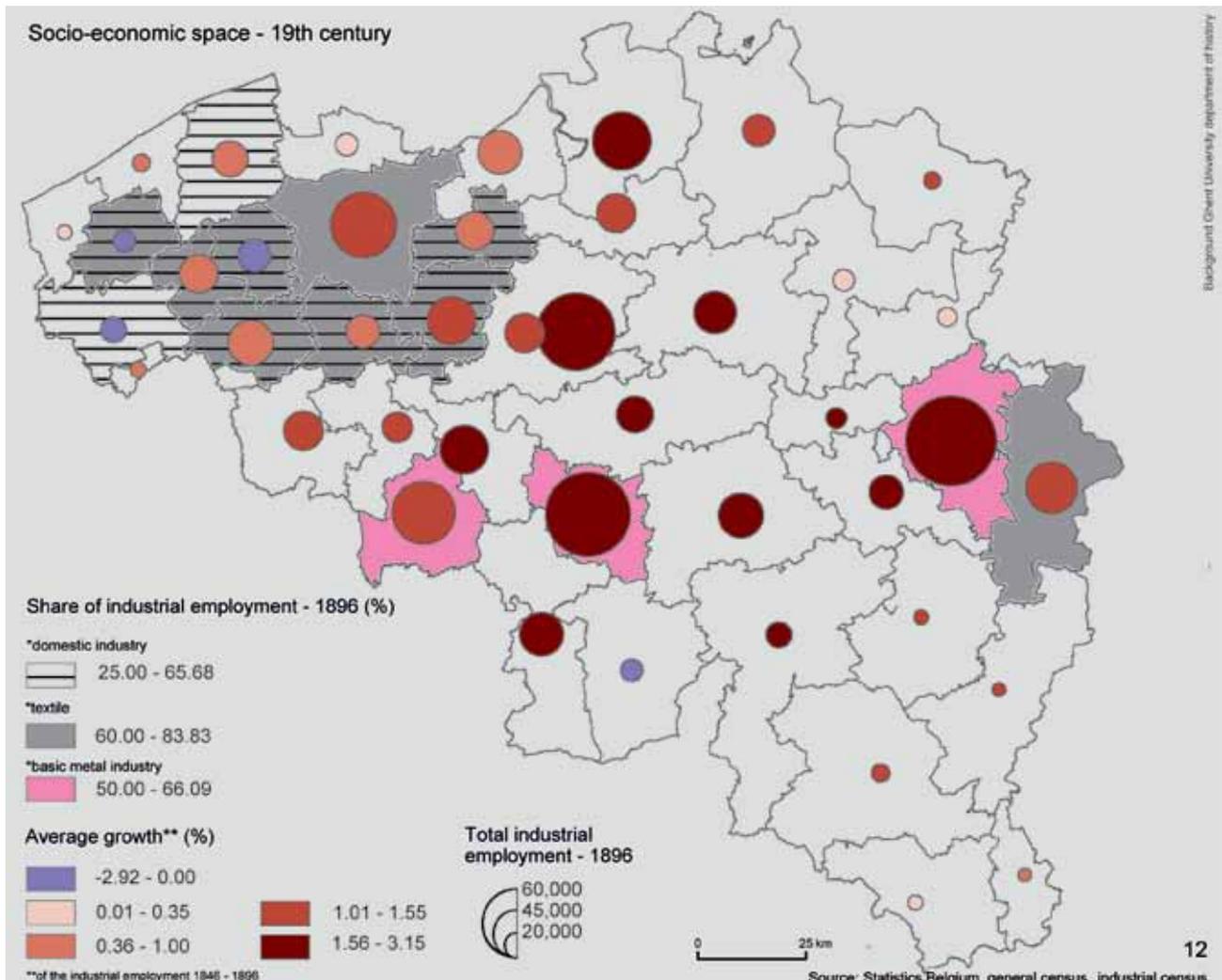
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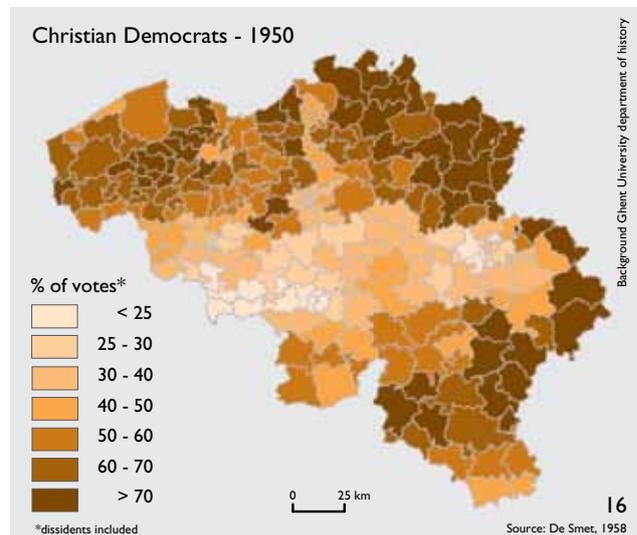
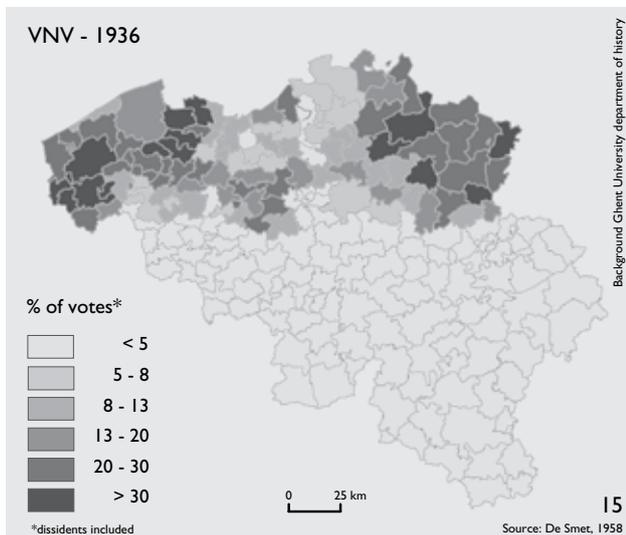
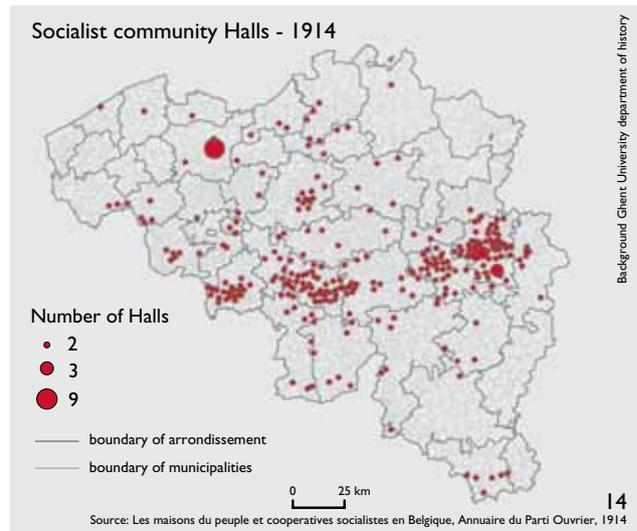
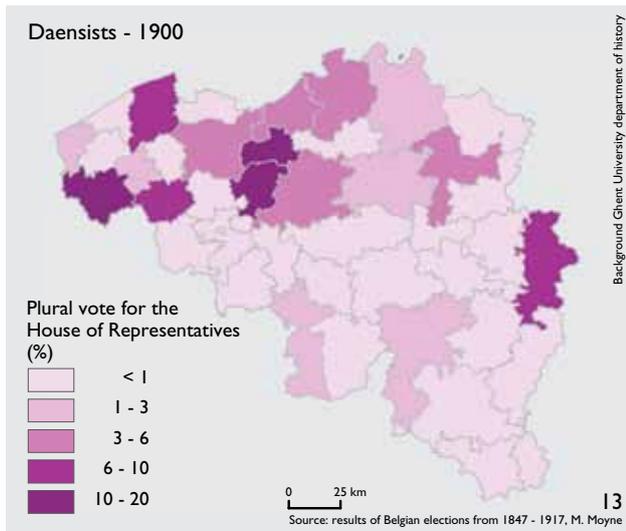
Source: 3rd Atlas of Belgium, part I

Dukes of Burgundy, the Spanish and then Austrian Habsburgs, prior to the reattachment to revolutionary France [10]. The exception is the principality of Liege, which remains fully included in the Holy-Empire. During the Counter-Reformation, which culminated in the fall of Antwerp to the Spanish in 1585, a large part of the bourgeois elite of the cities of Flanders and Brabant fled to Amsterdam, which partially explains the stagnation of the Flemish economy in the following three centuries. The cities were much weakened in this part of the country, which had in fact been one of the most heavily urbanised regions in medieval Europe.

After the dismantling of the Napoleonic Empire, Belgium formed together with the Netherlands a united kingdom for 15 years, before Belgium declared independence in 1830 [11]. The Belgian territory was trimmed in 1839 with the transfer of Maastricht and the part of Limburg situated to the east of the river Meuse to the Netherlands, and the inclusion of the German-speaking part of the province of Luxembourg (except for the Arlon area) in the Grand Duchy. The last modification of the limits of the country would be the annexation, after the First World War at the expense of Prussia, of the cantons of Eupen, Malmedy and Saint-Vith, which had formed part of the duchies of Limburg and Luxembourg or the principality of Stavelot-Malmedy under the Ancien Régime.

The Industrial Revolution, which began early in Belgium, benefited above all the coal mining axis of the valleys of the rivers Haine, Sambre and Meuse, where it was also fed, particularly in the areas around Liege and Charleroi, by a long artisanal metallurgy tradition [12]. On the other hand, the domestic textile industry, which was very widespread in the former County of Flanders, collapsed in the face of English competition in the 1840s. This resulted in an age-old crisis in the densely populated rural areas of Flanders and triggered a significant immigration towards the emerging Walloon industrial basins. Only Ghent benefited from a rise in the mechanised cotton textile industry in the early 19th century. In other Flemish cities, the developments were limited to specialised family concerns, relying on local labour. The local bourgeoisie of the Flemish cities, like the rural notables, distinguished themselves at the time by their francophone culture. All of these elements served to reinforce an anti-urban sentiment in Flanders, as well as the emergence of a communitarian Flemish Movement supported by the lower-clergy, and distrustful of any state dominated by the francophone liberal industrial bourgeoisie. This liberal political domination and the radicalisation of the Liberal party from the 1870s onwards triggered a Catholic reaction in Flanders. The introduction of universal plural male suffrage



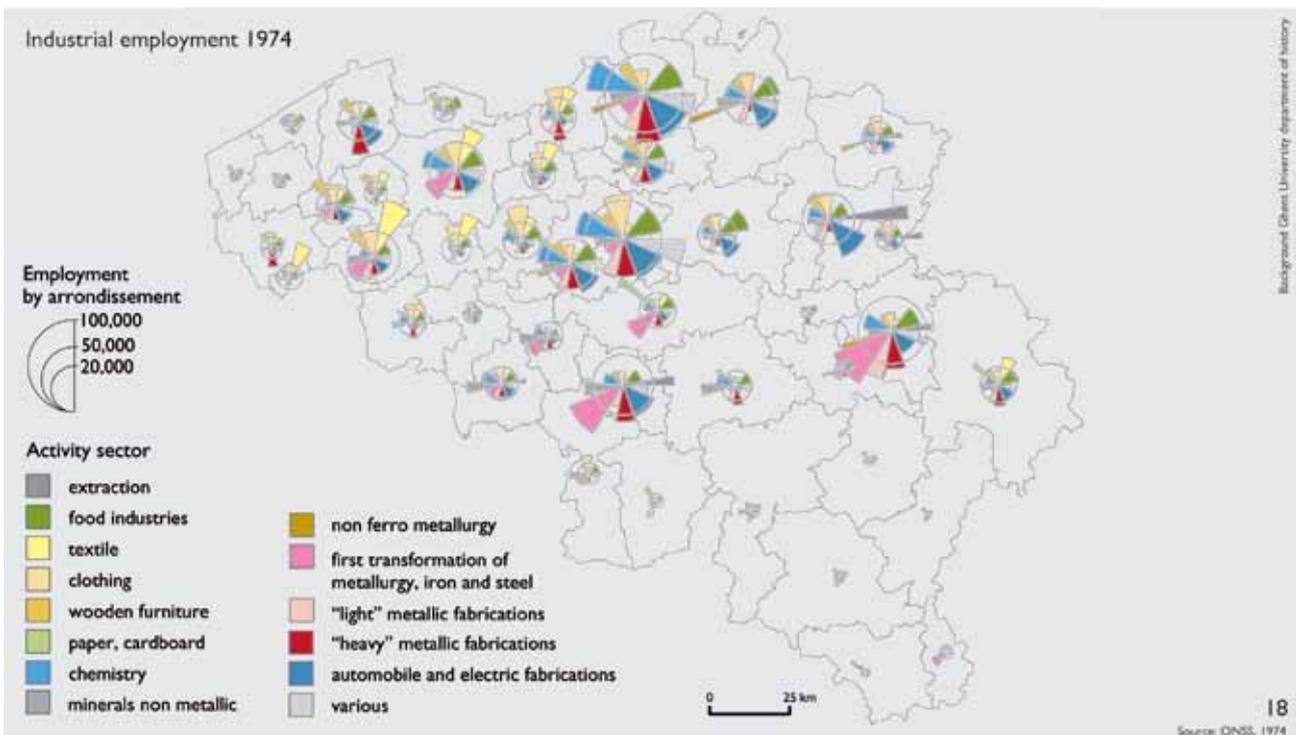
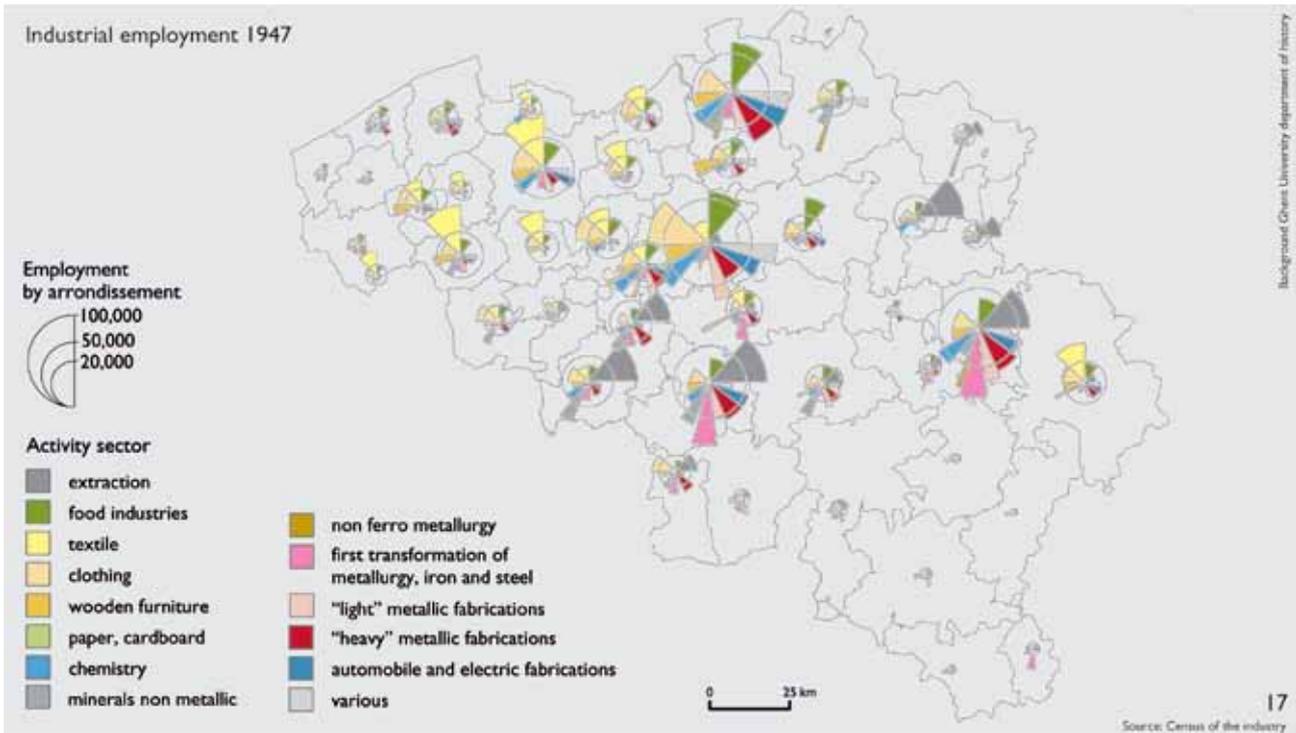


in 1893 reinforced the Catholic supremacy in this region. In fact, the delay in the development of the working class in Flanders made it possible for Christian democracy support to grow there among the working population— an important figurehead of which was father Daens (1839-1907) [13] -, after the Church issued the encyclical De Rerum Novarum (1891). Conversely, the mining and heavy industry generated a large majority support among the Walloon working class for the Socialist Party from the 1880s onward [14].

In the late 19th century and early 20th century, the location of industry was no longer tied to coal and favoured central zones, at the heart of the marketplaces, offering greater and better qualified labour reserves, particularly on the Antwerp-Brussels axis, and extending somewhat less strongly towards Charleroi. It continued to develop under the leadership of the large national holdings with headquarters in Brussels, particularly the Société Générale. Nevertheless, this movement came too late to have sufficient force to fully realise ideological (and linguistic) unification in a Belgian nation-state. "Frenchification" certainly became widespread in Brussels, but this did not occur in other Flemish cities. The remotest countryside to the north of the country remained

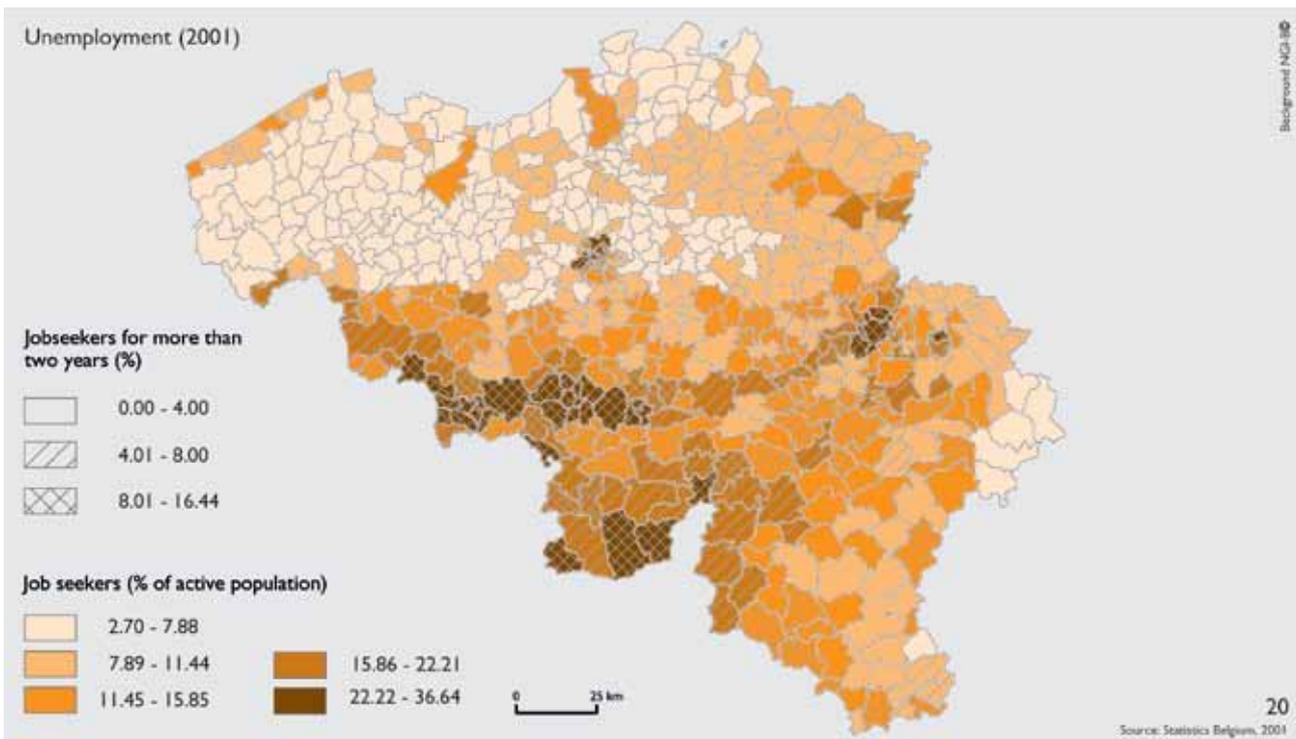
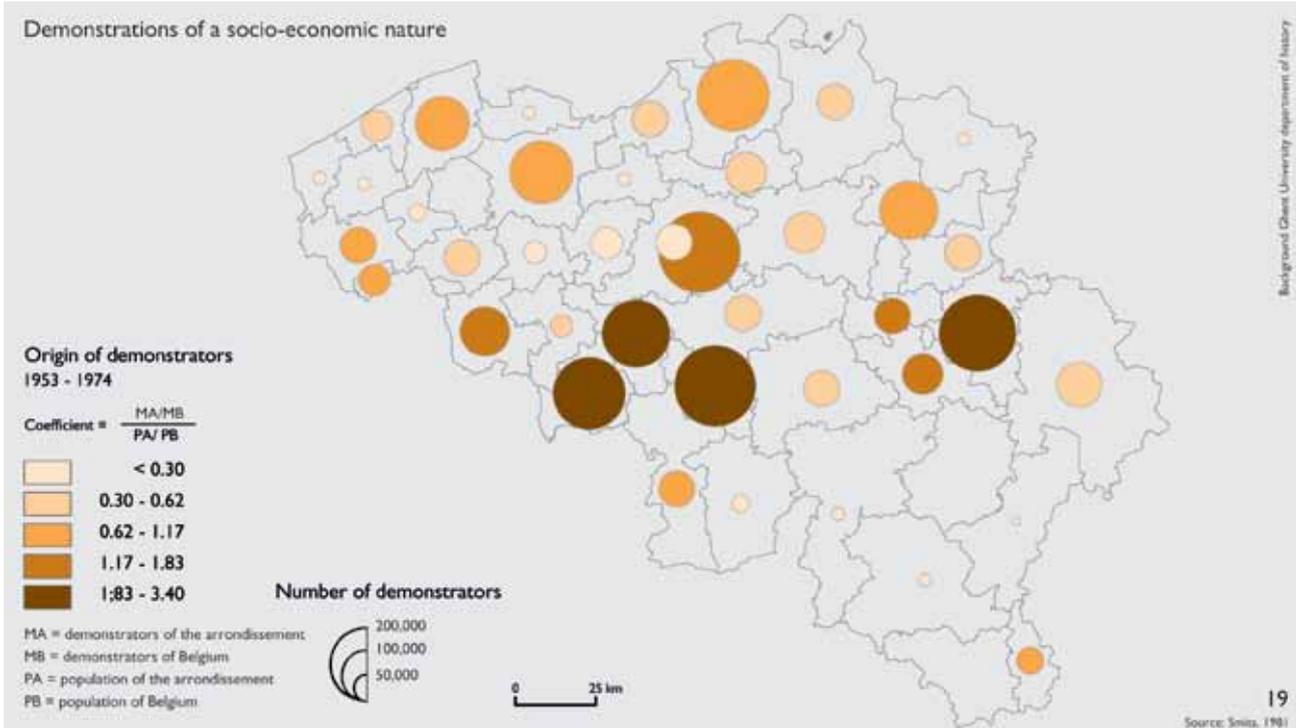
strongly attracted by the most conservative and radical forms of the Flemish Movement, as demonstrated by the electoral results of the extreme-right VNV, the Vlaams Nationaal Verbond (Flemish National Union), in 1936 [15]. During both the First and the Second World War, a significant fraction of public opinion in Flanders saw the German occupation as an opportunity to realize the goals of the Flemish Movement and while the allegedly collaborationist attitude of King Léopold III during the Second World War was condemned in Wallonia and Brussels, it was disparaged in Flanders, that remained under Christian Democrats influence, especially in the less urbanized areas [16].

After the Second World War, the economic recovery of the north of the country was based on both foreign investment and dynamic small and medium local firms, the latter particularly in the south of West Flanders. Conversely, industrial Wallonia collapsed in the coal mining crisis that began in the second half of the 1950s and was followed by the disappearance of large sections of its heavy industry [17] [18]. In these conditions, the strikes of 1960-1961 would unleash a brutal awakening in Wallonia and a growing regional consciousness [19]. This was mostly directed against the Belgian holdings



based in Brussels. These origins of the Walloon federalist claim explain the difficulties in building full solidarity between Wallonia and Brussels. By contrast, Brussels, which was historically Flemish, is considered as a "Frenchified" city by large segments of public opinion in the north of the country. Fuelled by their demographic and economic power, most Flemings have abandoned solidarity with the francophone

world and are calling for greater Flemish autonomy. However, falling back on its anti-urban sentiments and its cultural struggle, this Flemish public opinion often fails to properly understand the multicultural nature of Brussels in which the European and international presence is increasingly the chief economic motor.



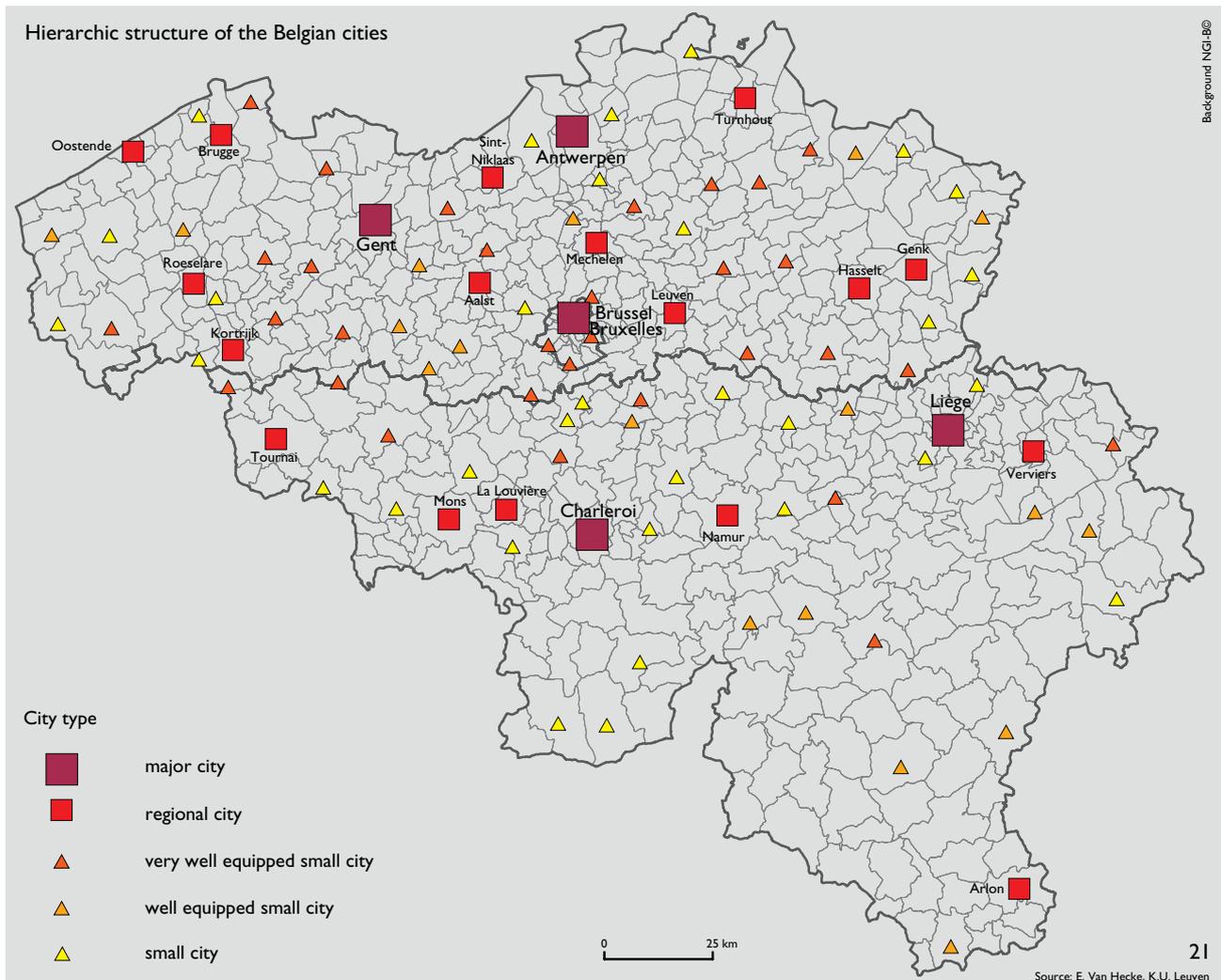
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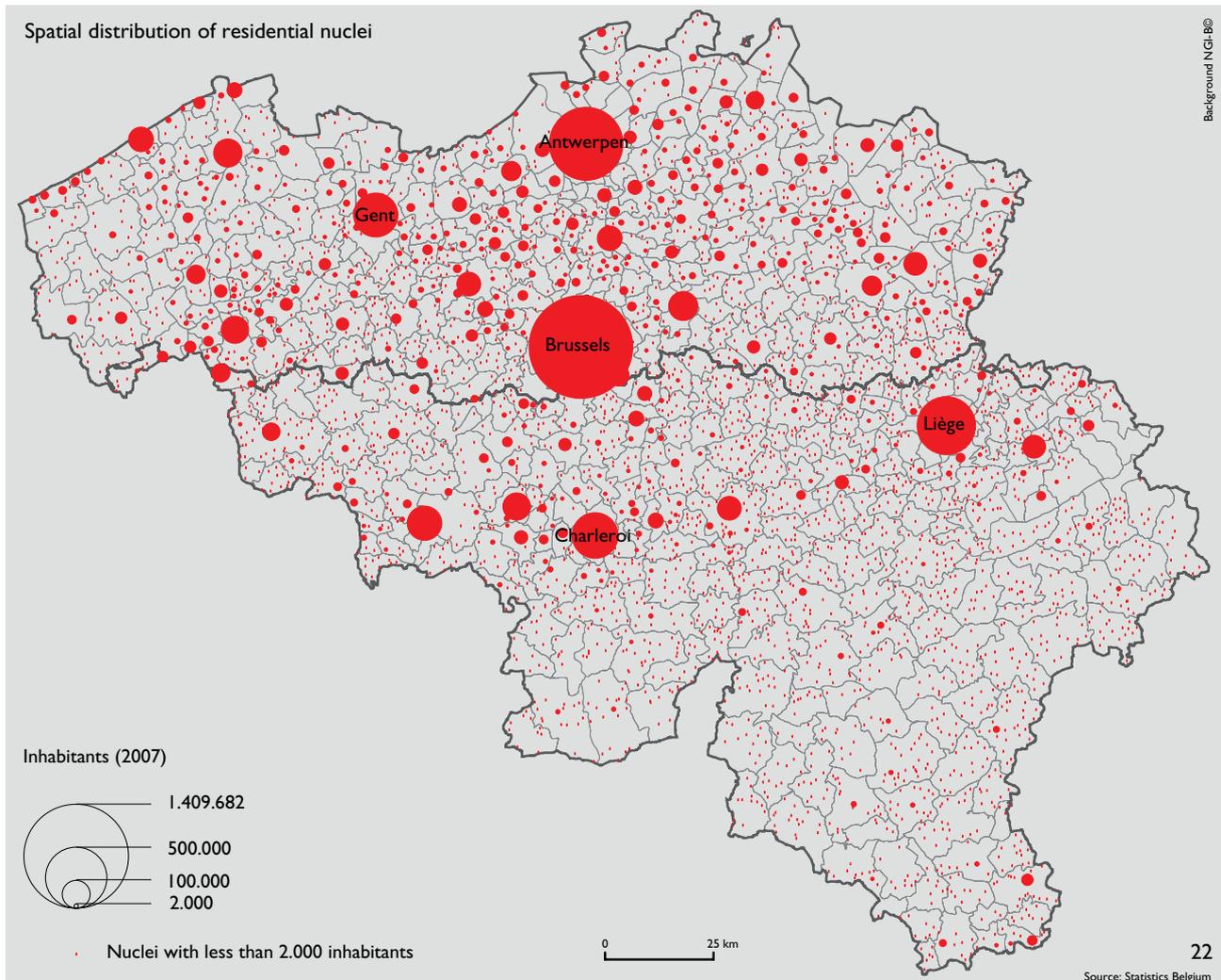
Belgium is a highly urbanized country. Farmers currently account for barely 2% of the working population. A bit over 7 out of 10 Belgians live in a city or in an urbanized area surrounding one of the major or regional cities. The landscape has an urbanized appearance, except in a few areas where agriculture or forestry is still prevalent, specifically in the Polders, Haspengouw and the Ardennes. In early 2010 the population density reached 355 inhabitants per km² and the built-up lots accounted for 20% of the surface area of Belgium. The earliest Belgian cities arose in the Roman age (Tongeren and Tournai). In the early Middle Ages, cities were founded along the River Meuse and later the Scheldt. The coastal cities Veurne and Bruges were also developed as ports at this time. However, the urbanization process only gained momentum in the high Middle Ages when more intensive farming and the clearing of new land, by abbeys for example, made it possible to sustain the population growth and its concentration in the cities. The dominant cities at the time were Bruges, as an international port city, and Ghent as a textile centre and capital of the wealthy County of Flanders. In the early modern age, the role of Bruges was usurped by Antwerp, and the Spanish conquest in 1585 caused its role as an international port

to be transferred to Amsterdam. The Industrial Revolution brought about a new wave of urbanization which would lay the definitive basis for the cities system and the urbanized landscape.

Although a range of municipalities may bear the title of city in Belgium, a city has no official criteria or definition. In the past, the title was primarily based on rights or privileges, but now, at least in the eyes of geographers, a combination of facilities for various functions (education, sport, health, etc.) and acting as a magnet for surrounding areas are considered the hallmarks of a city. Without a sphere of influence on the population of contiguous municipalities, a well-equipped municipality will not be considered a city. Based on the level of facilities and sphere of influence, three types of cities can be distinguished: there are 5 large cities, 17 regional cities and 81 small cities [21].

Just 12% of the population lives in a large city (Brussels, Antwerp, Ghent, Liege or Charleroi) and another 18% in the agglomerations of these large cities; 60% percent live in suburbs or in regional and small cities. Only 15% live in rural municipalities. Thus, the population is not concentrated in





compact cities, but is widely dispersed in the suburban zones, a pattern of dispersal that was already established during the Industrial Revolution: thanks to inexpensive railway passes (1868) labourers were kept in their villages in order to counteract the emerging labour movement. Map [22] shows the spatial distribution of residential nuclei. These centres are determined strictly morphologically and do not correspond to the administrative boundaries of the 589 municipalities in Belgium. The pattern from the map matches that of the map of population density [34].

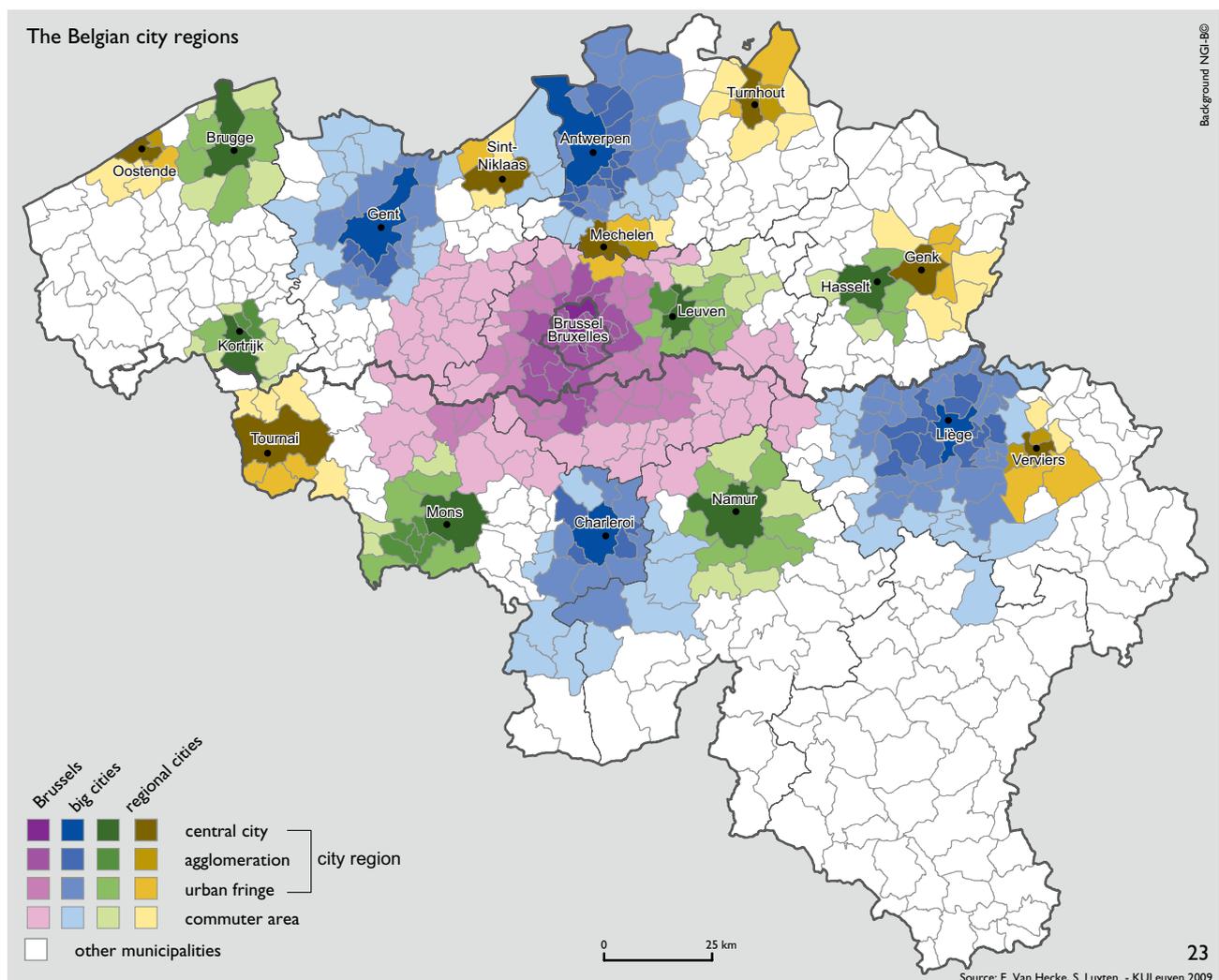
It is chiefly after World War II that the large cities and most of the regional cities expanded beyond their administrative territory leading to the creation of an urban region (metropolitan area) [23], as a result of the economic growth that was driven by a Fordist policy. This process involved distributing the gains from productivity increases between investments and wage increases and the population's growing purchasing power was focused on the mass consumption of durable goods, including the acquisition of property and automobiles. The stimulation of access to home-ownership by the State, the growth of the middle class and the deliberate lack of strict urban planning up until the late 1960s are at the root of the extensive suburbanization in Belgium, with scattered estates and ribbon-housing lining the roads.

Within an urban region, the core city (in practice, the central urban municipality) is surrounded by a fringe made up of row houses, used primarily for residential purposes but interwoven with commerce, public services, traffic infrastructure, green spaces and sometimes industry. Together, the core city and the fringe make up the agglomeration. Beyond this extends the banlieue (suburbs). Morphologically, the habitations as well as the businesses and institutions are characterised by more extensive ground coverage. Well-to-do residents make up the majority as a result of the socially selective nature of property acquisition and suburbanization. The bulk of the job and school commuters flow inwards into the agglomeration. Together, the agglomeration and the suburbs make up the urban region. The commuter residential zone is attached to the urban region. This is associated with the urban region because it is where a significant proportion of its working population lives. The population opts to live in a more bucolic environment and to make the daily commute into the urban agglomeration. Together with the urban region, the commuter residential zone forms the "urban living complex" (daily urban system). Suburbanization or the formation of urban regions has gone hand-in-hand with the social upward mobility of the Belgian population, which in turn led to shortages of unskilled and inexpensive labour in the construction sector, transport,

certain urban industries (e.g., textiles, food) and services, particularly in the larger urban regions. This problem was solved by the migration of workers from the Mediterranean Basin in the 1960s and 70s. These unskilled labourers were, in other words, recruited to fill the gaps in the urban labour market. By settling in the dilapidated working class districts, they also revived the declining market for rental housing. The urban regions therefore display a structural population dynamic: the population growth in the suburbs and the commuter residential zone is primarily driven by suburbanization with inhabitants (especially by young adults) moving out of the centre and its densely built-up fringe. Migrations out of the suburban belt chiefly involve young people who temporarily migrate to the core city, and then at a later stage contribute to the suburbanization process as well. In addition, the core cities and particularly their 19th century workers' districts continue to be populated through international migration.

The urban regions form the country's economic centre of gravity: 65% of employment is concentrated there (as compared to 56% of the population and 27% of the surface area of Belgium) and in terms of company headquarters, the concentration is even more pronounced: they represent some

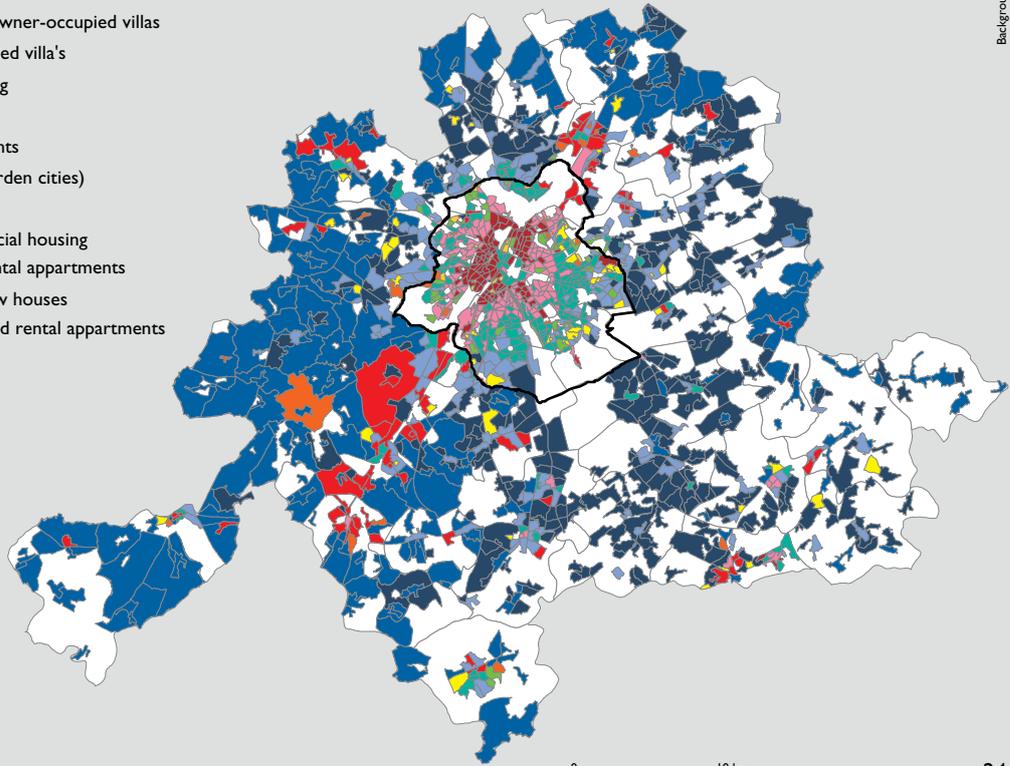
¾ of the total added value of the companies based in Belgium. The various sections of the urban regions each arose in a different phase of historical economic development. The core cities (with the exception of Charleroi) arose in the Middle Ages. During the Industrial Revolution they became more densely populated and, particularly after the abolition of the city taxes on all products going in or out of the city in 1860 they also expanded. The agglomerations are a result of the further growth of the city in the late 19th century and in the first half of the 20th century. As mentioned above, the suburbs are primarily a consequence of the post-war economic growth and the accompanying wave of property acquisition via self promotion outside of the densely built-up agglomeration, where land prices were too high. Since the economic revival after the economic crisis of the 1970s and the early 1980s, a certain degree of re-urbanization has taken place, fuelled by international immigration, gentrification and a systematic state-led renewal of inner-city zones. Between 1986 and 1999 this re-urbanization falters, as it is dependent on the economic climate. However, it resumes full-force after the year 2000, even with a population growth that nearly reaches 2% a year in the Brussels Capital Region.



Brussels city-region housing

Housing characteristics: overrepresentation of:

- roomy very comfortable owner-occupied villas
- comfortable owner-occupied villa's
- roomy comfortable housing
- roomy rental appartments
- private high rise appartments
- low rise social housing (garden cities)
- high rise social housing
- uncomfortable low rise social housing
- moderately comfortable rental appartments
- moderately comfortable row houses
- uncomfortable and cramped rental appartments
- < 200 inhabitants
- Brussels capital



Background NGLB©

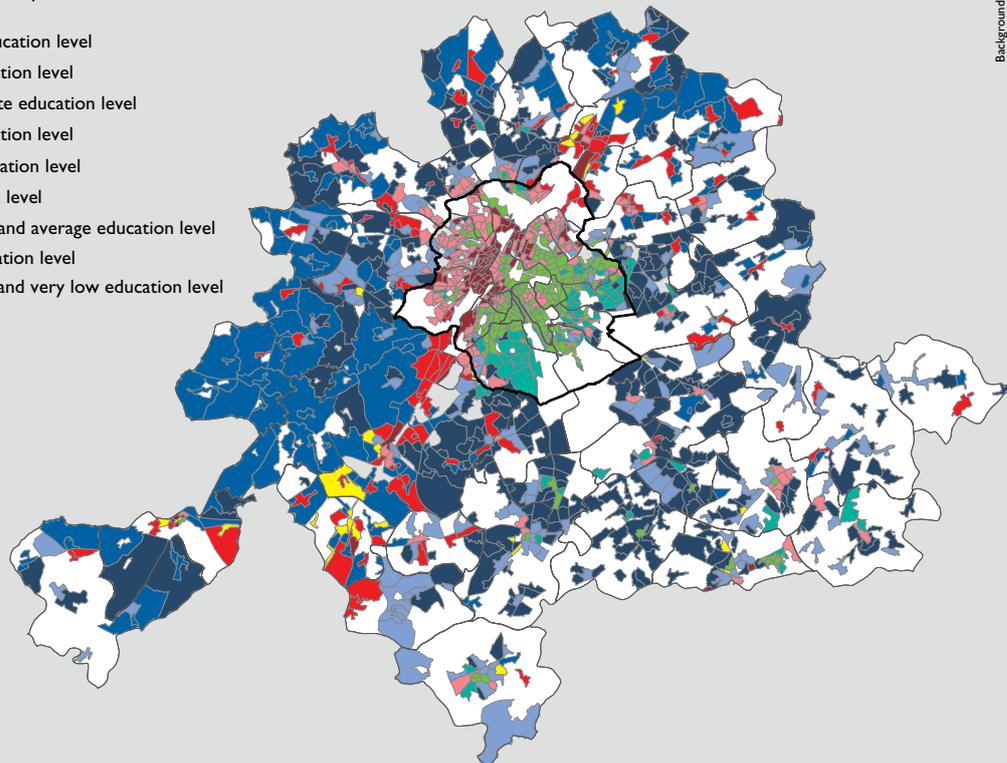
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Source: Statistics Belgium, C. Kesteloot, K. Slegers, 2001

Brussels city-region households

household characteristics: overrepresentation of:

- many married and high education level
- married and average education level
- many married and moderate education level
- singles and very high education level
- many singles and high education level
- married and low education level
- many singles, unemployed and average education level
- unemployed and low education level
- singles, many unemployed and very low education level
- < 200 inhabitants
- Brussels capital



Background NGLB©

25

Source: Statistics Belgium; C. Kesteloot, K. Slegers, 2001

All Belgian urban regions display a typical concentric structure. The centre is shaped by the 19th century industrialization and the rise of working class neighbourhoods, where cramped and uncomfortable rental dwellings still dominate today [24]. The periphery has been produced by the fordist suburbanization after WWII and the housing stock is mainly owner-occupied. The older these residential environments (and the closer to the city), the more housing has shifted into the (better) rental sector. Social housing has been developed from the interwar period on, first with garden cities in the contemporary urban fringe and some apartments and high rise on more expensive urban land after slum clearance operations. Later, some high rise projects have been developed in the periphery as expressions of modernist urbanism. However, social housing construction remained very modest in comparison with self-promoted owner-occupied housing. The private sector also produced some high rise housing for the middle class, usually along prestigious lanes, or at the edge of parks, woodland or open space in order to maximize benefits from location advantages. A further housing type consists of relatively confined row houses lacking modern comfort and build as single family dwelling for workers. They are found in places where industrial labour force needed to be attracted close to the employment place, when the latter could not be located right in the most populated areas. This housing type appears in the northern and southern industrial fringes along the canal in Brussels and is dominant around the former coalmines and steel industries in Wallonia. Today, they are often owner-occupied.

HOUSING

A housing unit in Belgium is inhabited by an average of 2.4 people; 66% of the homes are inhabited by the owner. On average, a home has 4.9 rooms. In 2001, 15% of the homes still dated from before 1919. At the beginning of 2012 a house in Brussels cost 391 thousand euros, in Flanders 239 and in Wallonia 167 thousand euros. For an apartment, these figures were respectively 206, 205 and 148 thousand euros. Since 1975, the average sales price for a house has been multiplied nearly 14 times while the general price level during the same period scarcely increased by a factor of three. The price of apartments was multiplied by six and the price of building plots per m² was 12 times higher in 2010 than in 1975. Per year, twice as many new homes are built than are renovated.

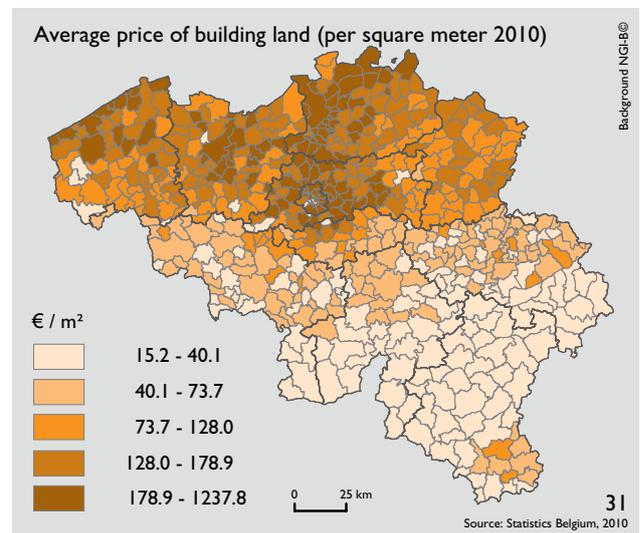
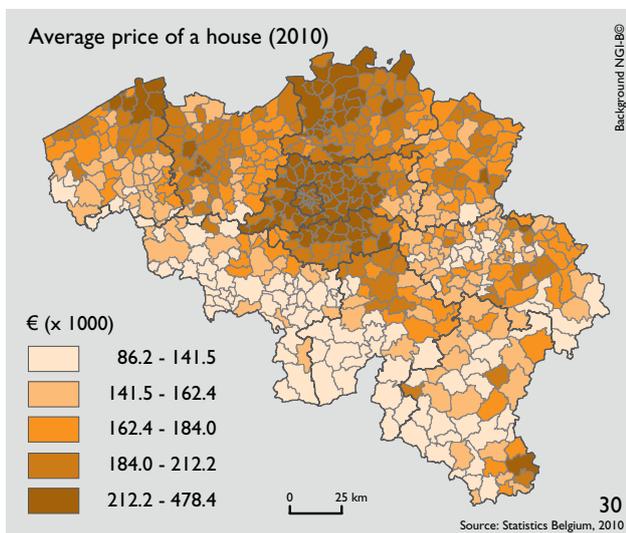
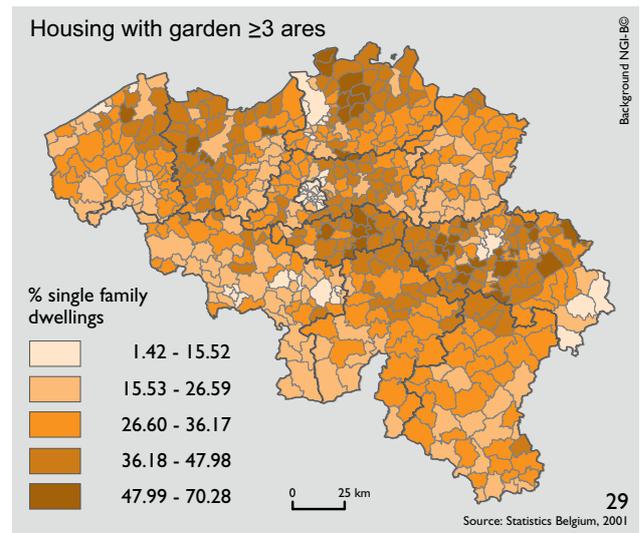
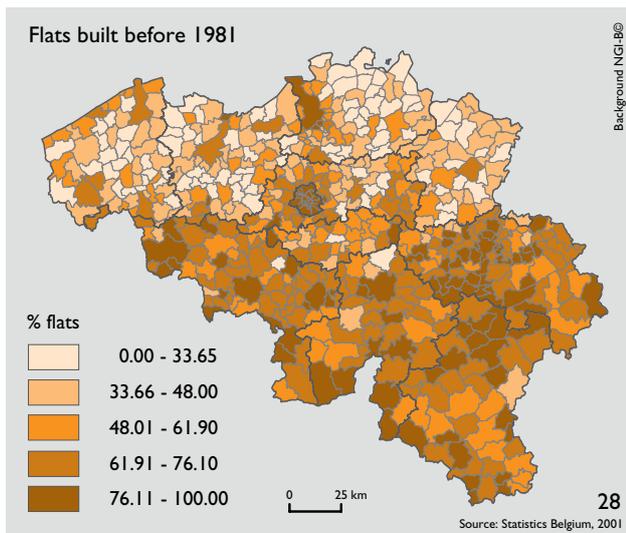
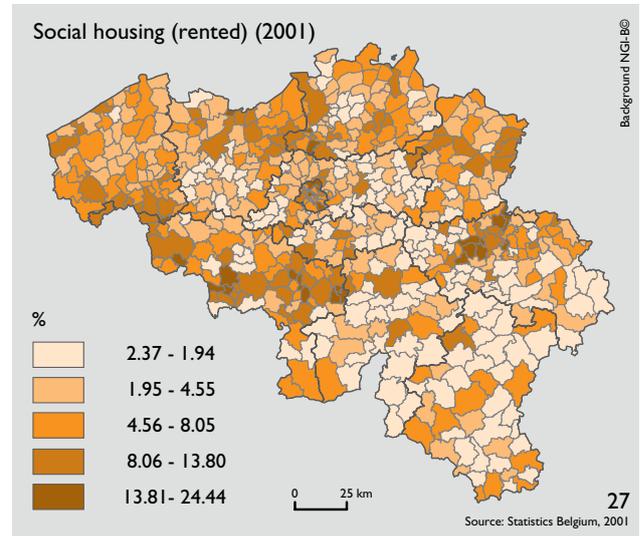
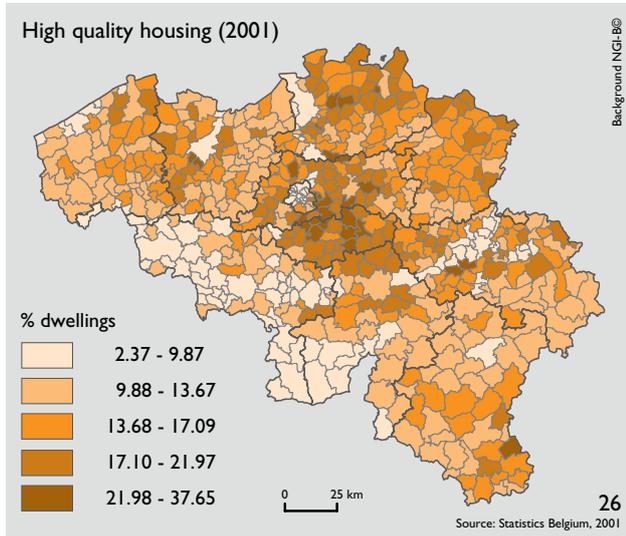
Since the Population and Housing census is no longer being done in Belgium, there is unfortunately very little data available for measuring the housing stock, its quality, its state or the characteristics of the households occupying each housing unit. For this reason, the latest data available are those of the 2001 census, that is to say more than 10 years ago. Hence, we shall mainly refer here to conclusions drawn from the 2001 census data which are generally still valid; they are here completed with recent price indicators that may be considered roughly as proxies of the main characteristics of the housing stock.

Generally, it is well established that spatial differences in the Belgian housing stock go far beyond the overly simplistic north-south regional differences. Of course, regional characteristics are present [see e.g. 26, 27, 28], informed by cultural, historical

and economical differences, and these may become even more important in the future now that the regions have the authority to follow divergent housing policies. However, in general, several processes affect the existing Belgian housing stock: (1) the economic development in the nineteenth and beginning of the twentieth century that still imprints the present built-up landscape, (2) the massive suburbanisation after the Second World War leading to a strong centre-periphery structure whatever the size of the city, (3) the socioeconomic status of the population and (4) recent scarcity of land in general and especially in densely populated areas, and also (5) the sale of rented housing units and the consequent scarcity of rental dwellings at an affordable price. Therefore, the spatial structuring of the Belgian housing market is largely characterized by (sub)regional housing markets that are very much shaped by the level of urbanisation and often results from a long process of past socio-economic influences. In broad terms, we can state that the geography of the country is "dominated" by Brussels, which is located in its centre [30]. The Brussels Capital Region corresponds to the core city of Brussels. It is well known that Brussels sprawls out of its administrative borders; as a consequence, peri-urban areas of Brussels belong to both Flanders and Wallonia. As in many other Belgian cities, the outskirts are – on the average – characterized by better-off households and, hence, there are better equipped housing units and high incomes with an upward pressure from the international community due to the presence of international

agencies [32]. We must here insist on the fact that many spatial patterns could be investigated on a more detailed spatial level, such as the neighbourhoods, but since the suppression of the census no data are available at that scale. We can, however, refer the reader to previous studies that incorporate maps and

analyses at a neighbourhood scale (see bibliography). Map [33] gives an illustration of the urban agglomeration of Brussels, stressing the difference between core and fringe as well as the influence of landscape elements such as the canal (Brussels-Charleroi) or the forest (de Soignes).

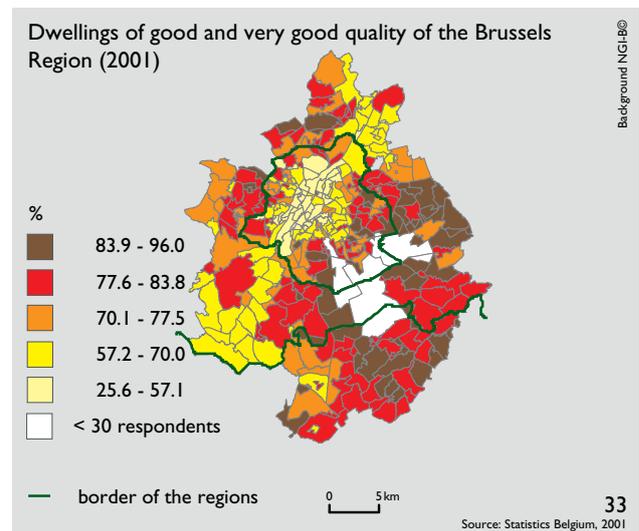
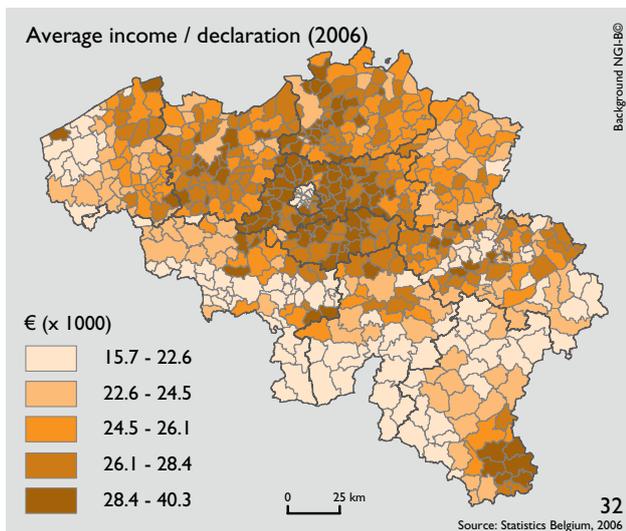


Within Wallonia, several housing patterns can be detected: (1) the former industrial and highly urbanized east-west axis with old and often deteriorated housing, running from Liege, to Charleroi, Mons, and the French border (although discontinuous in the centre, around Namur, with a ribbon of rich suburban communes running parallel to the south); (2) the peri-urban Brussels – Arlon axis undergoing the influence of Brussels in the North and Luxembourg in the South; (3) the high-standard housing stock in the province of Brabant-Wallon as a south-southeasterly tail of the Brussels suburbanisation, with a slight tendency to age without losing its value linked with its central location; (4) the old and often rural housing stock in the rural areas (the Ardennes) that is subject to renovation; (5) the Eastern (German-speaking) Districts and the area around Arlon with cross-border influences; and 6) the problematic housing stock in the western province of Hainaut, especially along the French border.

Flanders shows striking intra-regional differences between west and east, with (1) the eastern part offering a much newer

and more high-grade housing stock, (2) the coast and (3) the Westhoek (area to the extreme west near the French border) both showing a particular housing market due, respectively, to the impact of tourism and the massive destruction by and reconstruction after the First World War, and (4) all this interspersed with urban – non-urban contrasts.

Suburbanization has proven to be a very important structuring factor, but the traditional concentric zoning is partly disrupted by regional differences. Nevertheless the pattern of housing prices reveals the effect of Brussels according to a centre-periphery model. And these patterns are very persistent; they give evidence of the inertia and path dependency of the Belgian housing market. Nevertheless some new processes and segments were later detected, such as the development of the apartment phenomenon in suburban and peri-urban and even rural zones, the growing impact of renovation at the expense of building new houses, and the re-population of the central cities without a spectacular improvement of the physical state or quality of the housing stock or a stop on suburbanization.



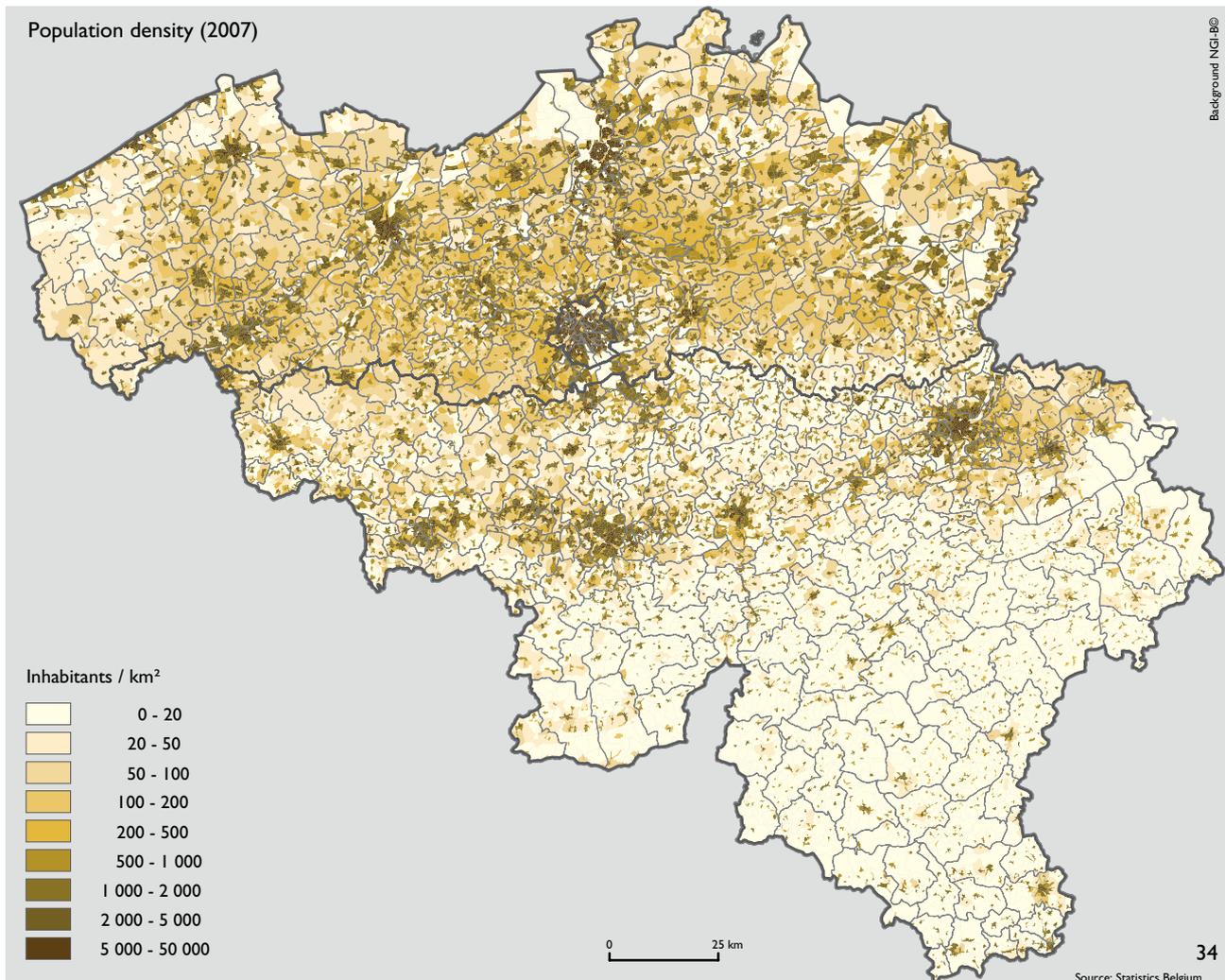
POPULATION

On 1/1/2010, Belgium had 10.8 million inhabitants (9.9 million in 1990) of which 6.2 million living in the Flemish Region, 3.5 in the Walloon Region and 1.1 in the Brussels Capital Region. The natural growth rate is just 2 per thousand (birth rate of 12‰ and death rate of 10‰) so the growth is determined chiefly by the rate of foreign immigration.

Belgium is densely populated, with 355 inhabitants per km². At the level of the statistical neighbourhoods, a refined analysis of the habitation structure becomes possible [34]. The narrow strip of the coast is distinctive for its high population concentration. Inland-Flanders clearly shows much larger centres than the Polders with significant extensions along the roads. Towards the south, the population becomes denser in the large industrial area around Kortrijk. The central densely populated zone of Belgium extends between Oudenaarde-Ghent-Sint-Niklaas-Antwerp-Aarschot-Leuven-Brussels, with a small overflow into Walloon-Brabant. This continues to the east where there is a distribution pattern like in the central density

zone, but with slightly smaller centres. Both to the north and east, one can discern the large, thinly populated parts of the old Campine region ('Kempen') as well as the major residential concentrations, which correspond to the former mining centres and/or local industrial development. The old Walloon industrial axis of the former coal mining basins is clearly visible through its large urbanized concentrations and associated suburbanization. Elsewhere, the distribution pattern is fairly characterised by low densities (<20 inhabitants/km²). The density is somewhat greater in the vicinity of the roads that connect the larger Walloon cities (and Brussels) and to the south and east of Liege (towards Verviers).

The regional evolution of the population is summarised taking into account the average annual rate of growth of the 16 periods of time between censuses 1831-2001, to which a statistical typology has been applied [35]. Types 1 to 3 correspond to the stronger growth in the 19th century. The first contains the oldest



urbanised municipalities around Brussels-city; the growth here is greater than in other groups up until 1880. The population then stagnates starting from 1930 (as a result of the saturation of the area) and declines after 1970. The growth of the second group exceeds the former starting from 1866 and this continues up to 1970; this essentially encompasses the municipalities of the second ring around the city of Brussels. The third group contains the industrial basins in Wallonia and Antwerp; the growth is steady up until 1910, then stagnates until 1970 and subsequently slows, as a result of industrial decline. The next three types display a more continuous, but also a more modest growth. Type 4 displays slower growth since 1910: within this group are cities and industrial areas dating from the second half of the 19th century (the Dender region, the Kortrijk region, the Borinage). Type 5 shows dynamic growth primarily between 1880 and 1980; it contains the Campine (a region which was only later industrialised and where the fertility rate remained high until the 1960s), the coast and the periphery of the major cities. Type 6 shows more growth since 1960: these are basically the areas of peri-urbanisation further out from the cities and the German-speaking Districts. Types 7 and 8 contain rural zones, where the population is highly stable. In type 7, one observes a rebound over the past 30 years: this is the effect of counter-urbanisation. Type 8 corresponds to the frontlines of the First World War.

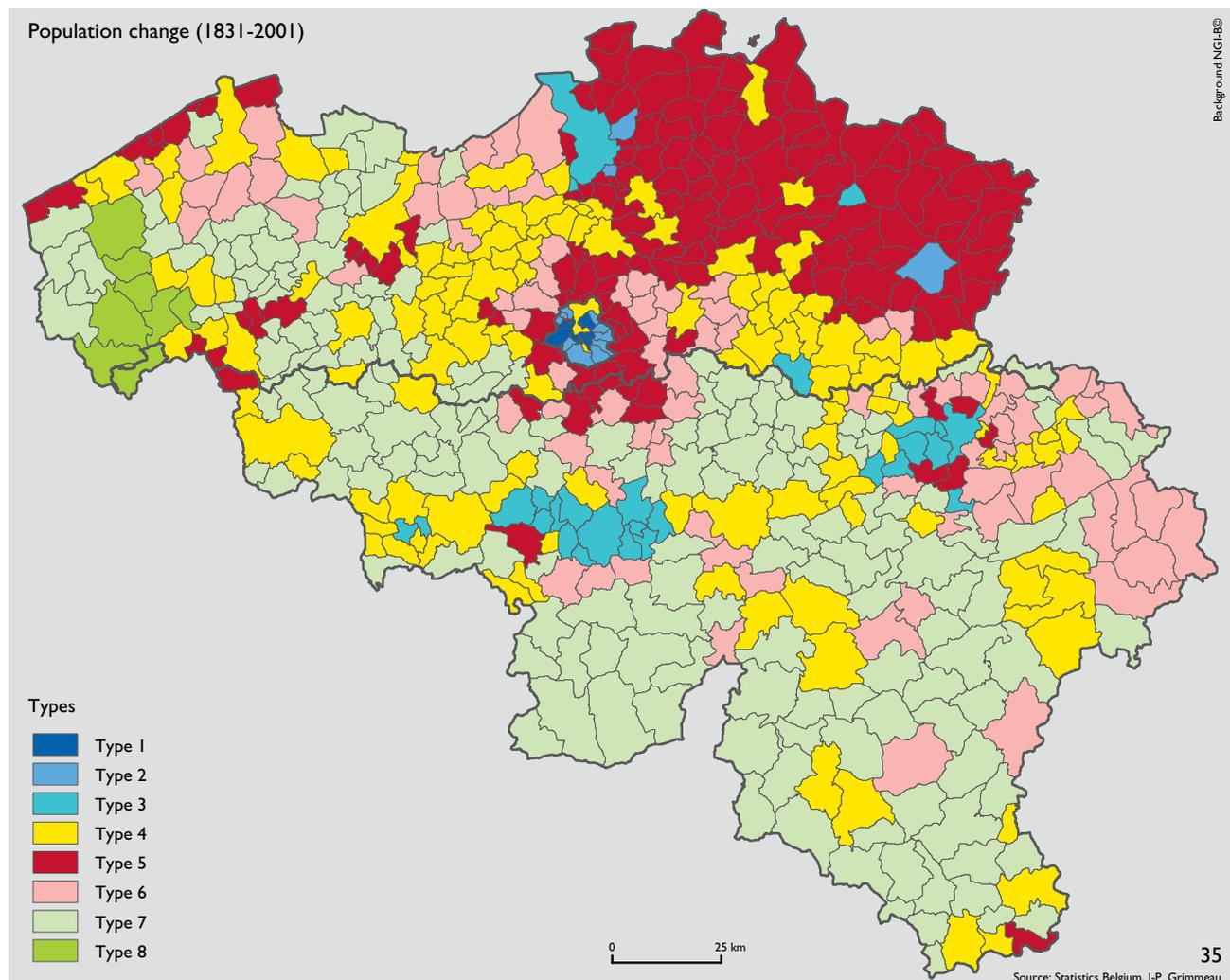
The map of fertility index indicates fertility (1999-2003) per municipality [36] calculated through an index of indirect standardisation. The indices per commune show the deviation from the national norm (=1). An index $I_f=0.70$ corresponds to a fertility rate equivalent to 70% of the national average. The greater fertility in Wallonia and the relatively lower fertility in Flanders are clearly shown. With just one exception, the top 10 communes are made up of Brussels (where there is a large presence of residents of foreign origin) and Luxembourg. In Flanders, Limburg is clearly the province with the lowest fertility rate. Eastern Flanders and Antwerp also contain a group of communes that belong to this category. The Brussels Capital Region is characterised by great diversity. The linguistic border has always acted as a demarcation line with regard to demographic behaviour. This remains the case at the beginning of the 21st century. Whether it is a matter of mortality or fertility, the situation has always been inverted historically. Originally, mortality was greater in Flanders than in Wallonia, but the interwar period changed this situation. A similar progression can be observed for fertility. The map of mortality/life expectancy [37] shows the distribution of mortality identified in two ways: on one hand, the comparative index of mortality, on the other hand, life expectancy per commune, after the application of methods

that allow mortality to be measured on small numbers. The major contrast is the opposition between Flanders and Wallonia. Life expectancy, in unisex terms, is 79.4 years in Flanders as compared to 77.2 in Wallonia in 2001. This difference of 2.2 years has continued and is relatively clear. The explanation must therefore be sought in the differences in behaviour and the impact of socioeconomic status: better life expectancy in Walloon Brabant and a lower life expectancy in the impoverished communes along the canal of Brussels, Anderlecht and Vilvoorde. Within Wallonia, the lowest life expectancies are found in the Hainaut region and on the Liege-Huy axis; the long-term consequences of heavy industry and, currently, greater unemployment. Finally, more generally, cities appear to have a lower life expectancy than the suburbs.

In 2000-2002, the map of natural growth [38] no longer shows an opposition between Flanders and Wallonia. The differences are now explained rather by contrasts in the age structure than in behaviour. The Campine, which retained a high rate of fertility up until the 1960s, displays a particularly young structure. The other regions with remarkable positive growth are those in which young adults have migrated to the suburbs. The Brussels-Arlon axis shows the same phenomenon as do the municipalities near the Grand Duchy of Luxembourg. The axis of the canal stands out in the Brussels region due to impoverished populations as

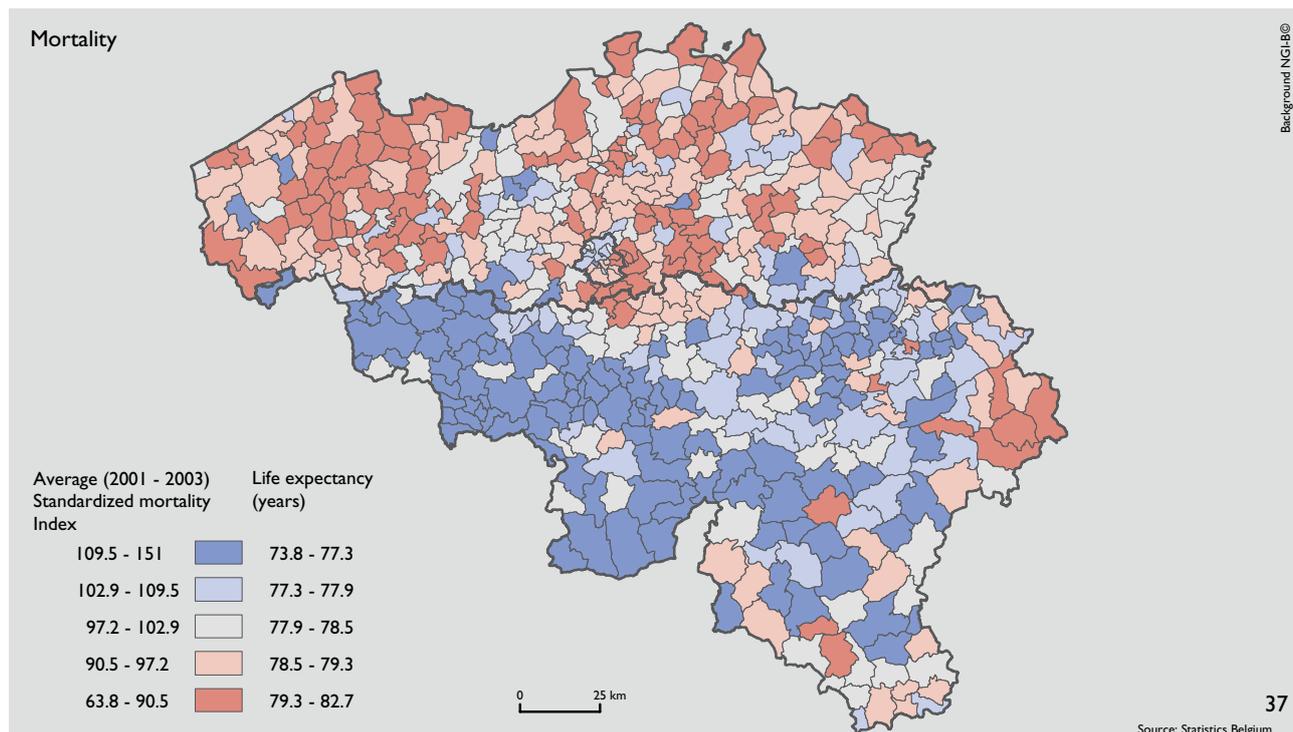
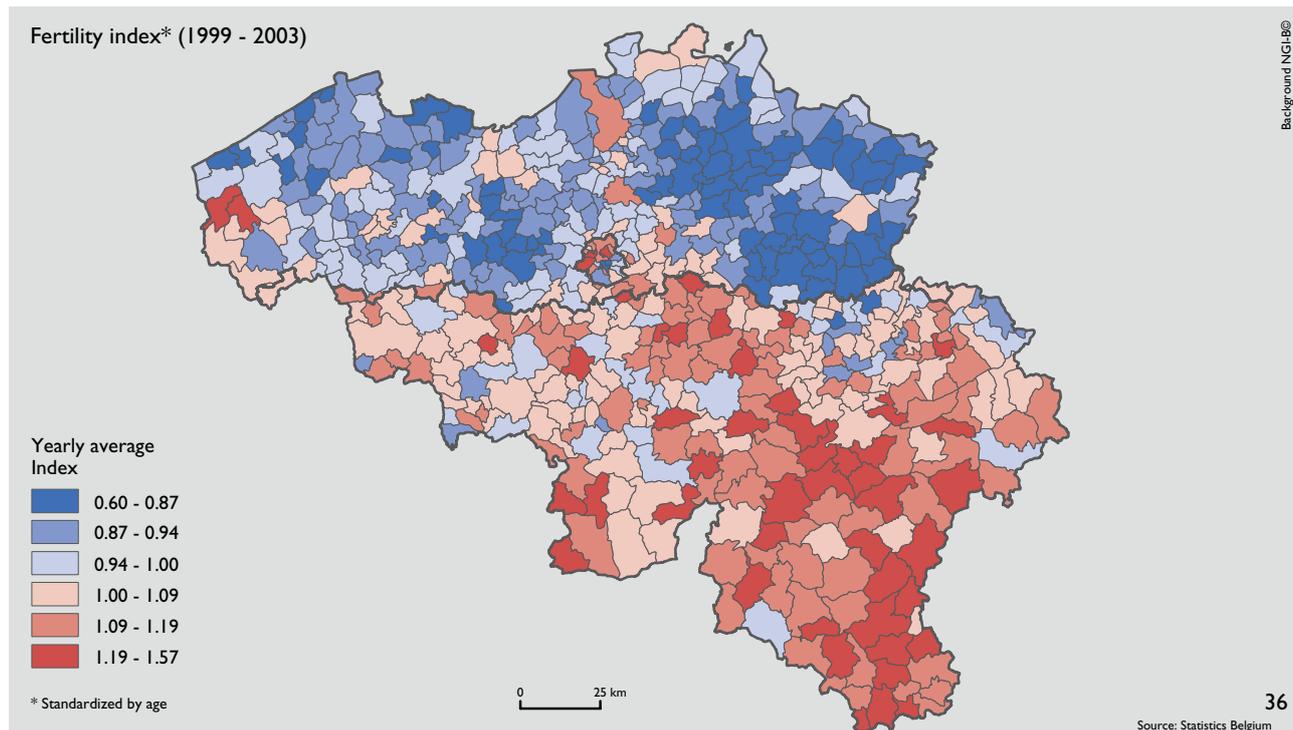
the result of immigration. Finally, there is Louvain-la-Neuve, a university town. The rates of negative natural growth highlight the tourism regions: the coast, the south of the Namur area and the Semois Valley, which attract migrants over the age of 50. Also notable are the region of the Dender, the Tournai region and the south of Limburg.

The migration balance [39]: The positive migration balance in the larger cities and in agglomeration municipalities within the greater cities is largely attributable to the significant external migration which exceeds the suburbanization. Many municipalities of the urban fringe of cities undergo moderate growth while the growth is the highest in the commuting area around the larger cities or even outside of urban living complexes. For Flanders, this can be explained by the high prices for building land within the city regions. The suburbanization around Brussels occurs on the French-speaking side in the north of the Hainaut province, in Walloon Brabant (with the exception of the expensive municipalities within the agglomeration) and in the west of the province of Liege (where the suburbanisation is shared with Liege). In relation to the 'Walloon axis', this growth is occurring to the south, often in naturally attractive areas. Finally, there are several regional zones that exert an attraction, such as some border areas and of course the coast.



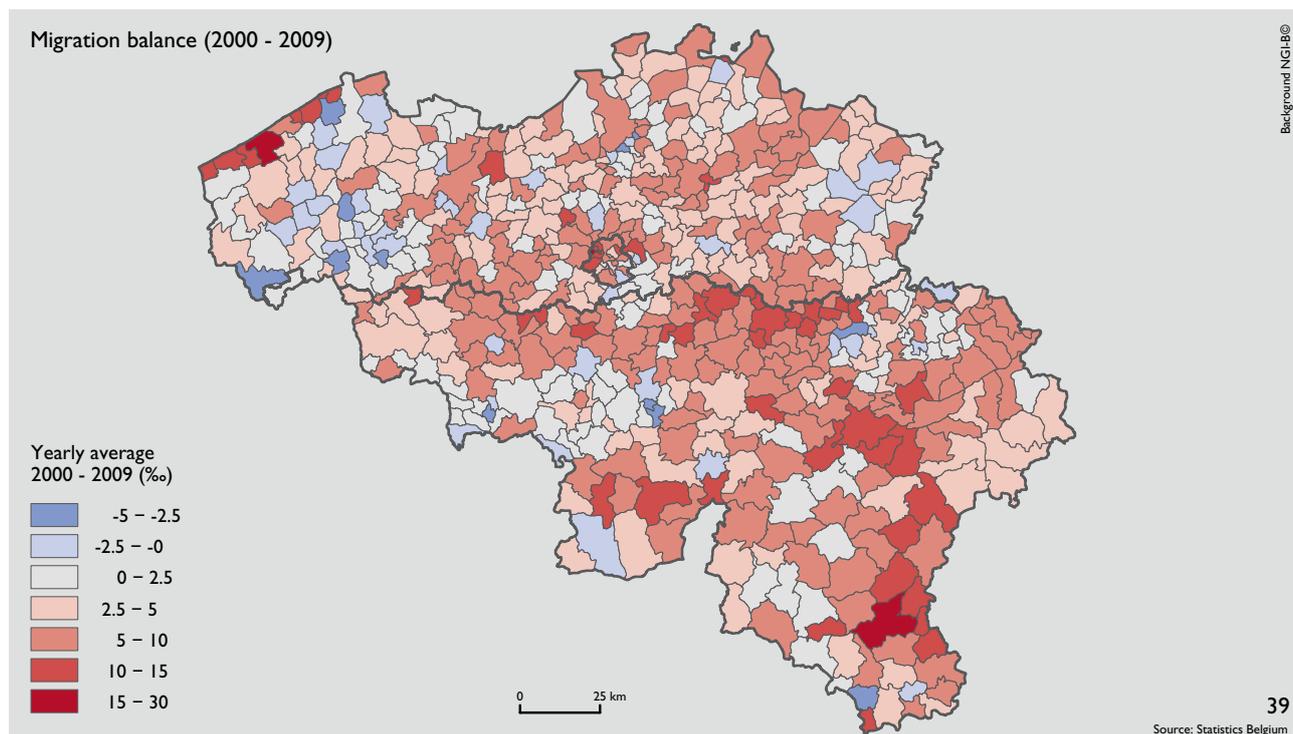
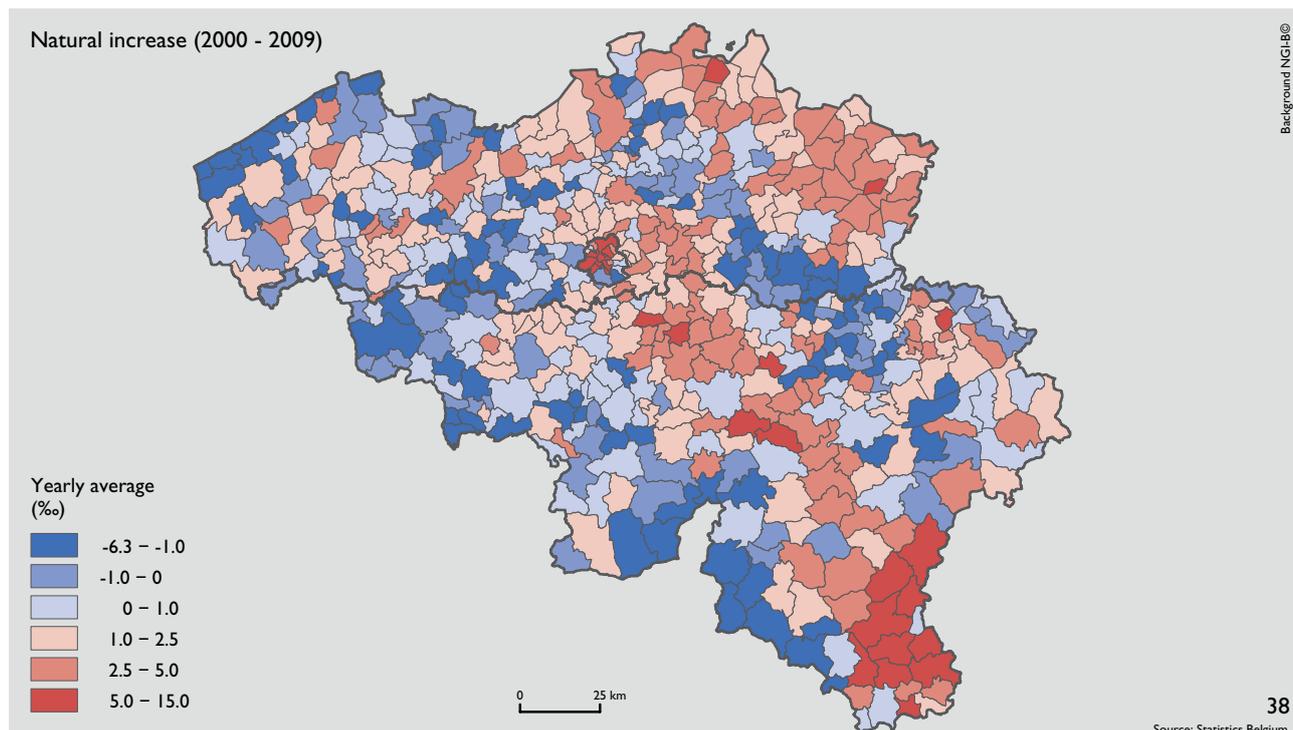
A specific migration balance: the comparison of the status of the same people within households between 1991 and 2001 makes it possible to calculate the migration balances associated with certain changes in status. In this way, the shift from cohabitation with parents to living alone [40] is expressed essentially as a migration from the suburbs towards the large cities and regional cities, as well as to the coast. Couples without children in 1991, who have them, living under the same roof in 2001, make a shift in the opposite direction of the former group: from major cities towards the

suburbs. The internal migration of people whose children moved out between 1991 and 2001 partially incorporates migrations associated with a shift to a retirement lifestyle. One can observe that the departures are above all from large cities and nearby suburbs, where children who were young at the time of the immigration, have had the chance to grow up. And the attractive regions are above all the tourism regions: the coast and the Ardennes. These migrations towards tourism areas can be seen between the ages of 45 (too early for retirement) and 80.



The foreign-born population [41]: considering the foreign-born population makes it possible to work around the changes in nationality, that have taken place since 1985. The spatial distribution reflects the history of immigration in Belgium. In the interwar period and up until the 1960s, immigration especially from Italy was above all concentrated on low-skilled labourers working in the mines and heavy industry along the industrial axis in Wallonia and Limburg. In the late 1960s and 1970s, migrant workers, mainly from Mediterranean countries also joined the labour markets of the large cities and the central

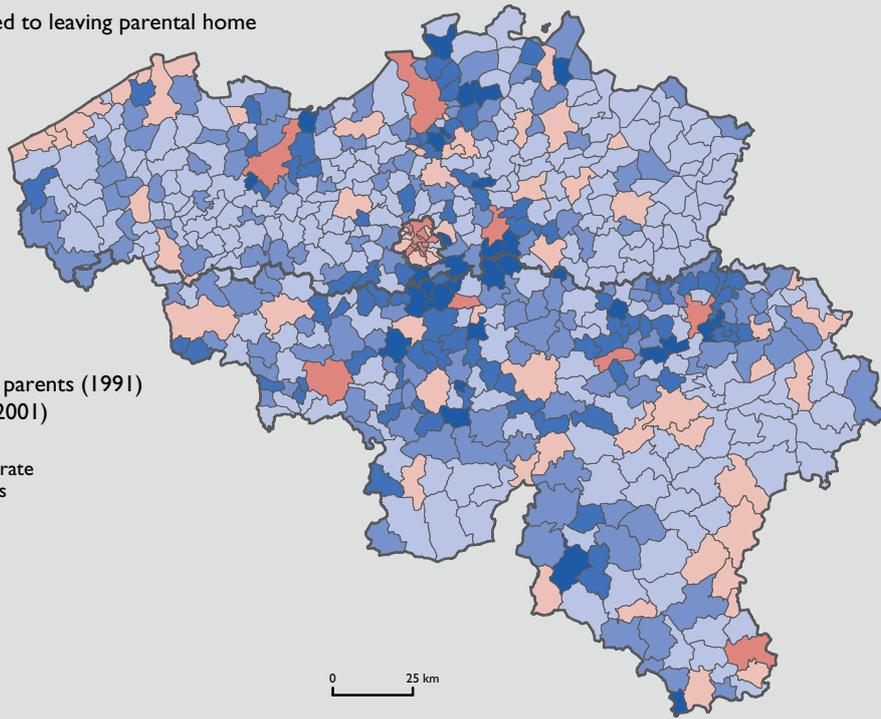
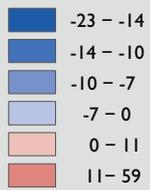
regional cities to take up low skilled and poorly paid jobs. From 1990 to now, new immigrants became concentrated in the large cities, particularly in the triangle Brussels, Antwerp, Ghent. One also observes immigration of foreign executives to the suburbs of the greater Brussels area. Finally, the border zones stand out, in part because people from neighbouring countries are immigrating for fiscal and property-related reasons. One also sees that the populations of the municipalities that do not fall into any of the situations described present lower shares of foreign-born inhabitants in Flanders than in Wallonia.



Migrations related to leaving parental home

From living with parents (1991)
to being single (2001)

Internal migration rate
by 1000 inhabitants



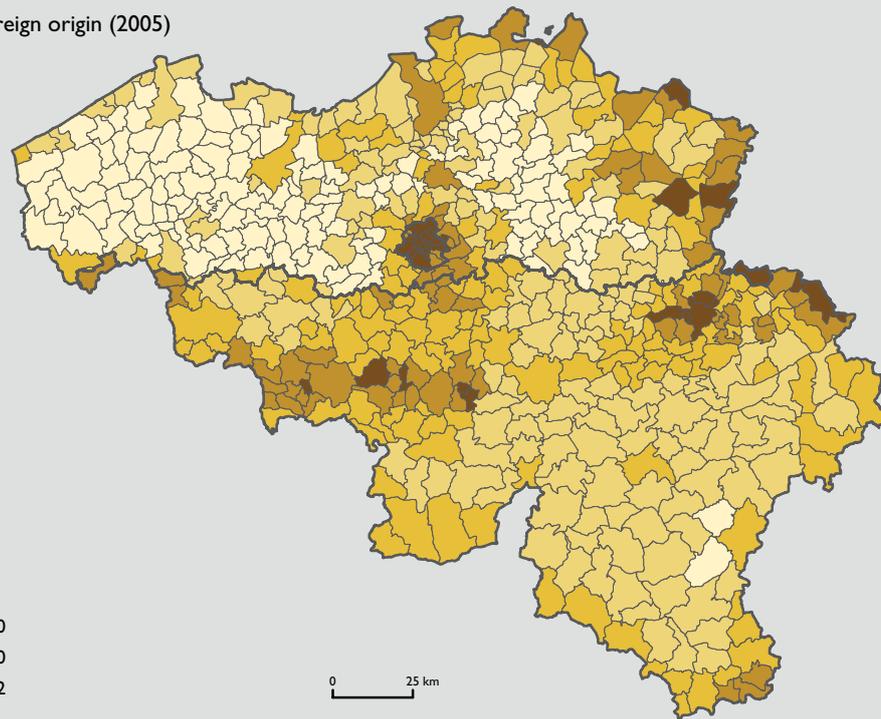
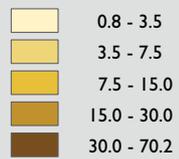
Source: Statistics Belgium

Background NCI-B©

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Population of foreign origin (2005)

%



Source: Statistics Belgium

Background NCI-B©

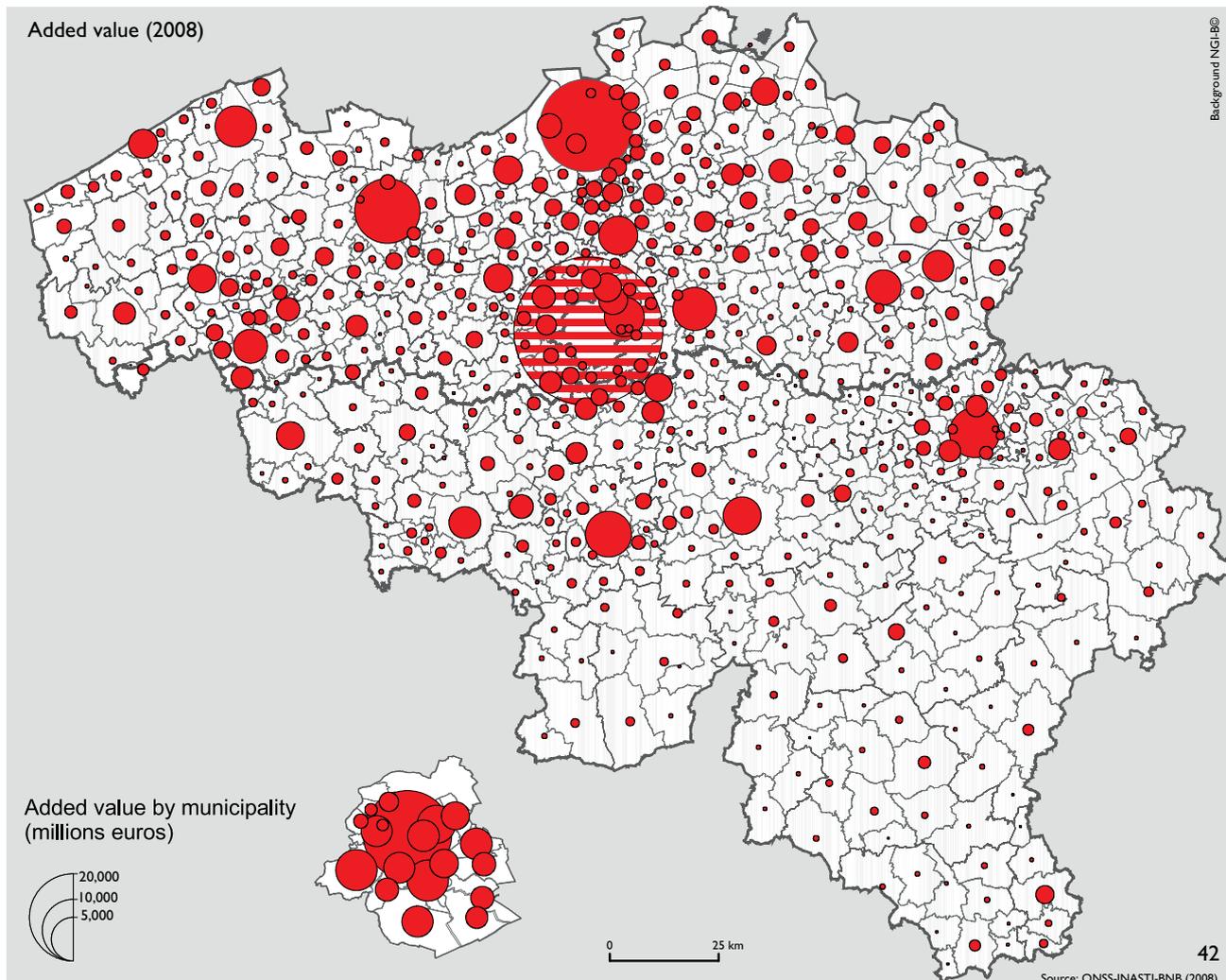
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ECONOMIC ASPECTS

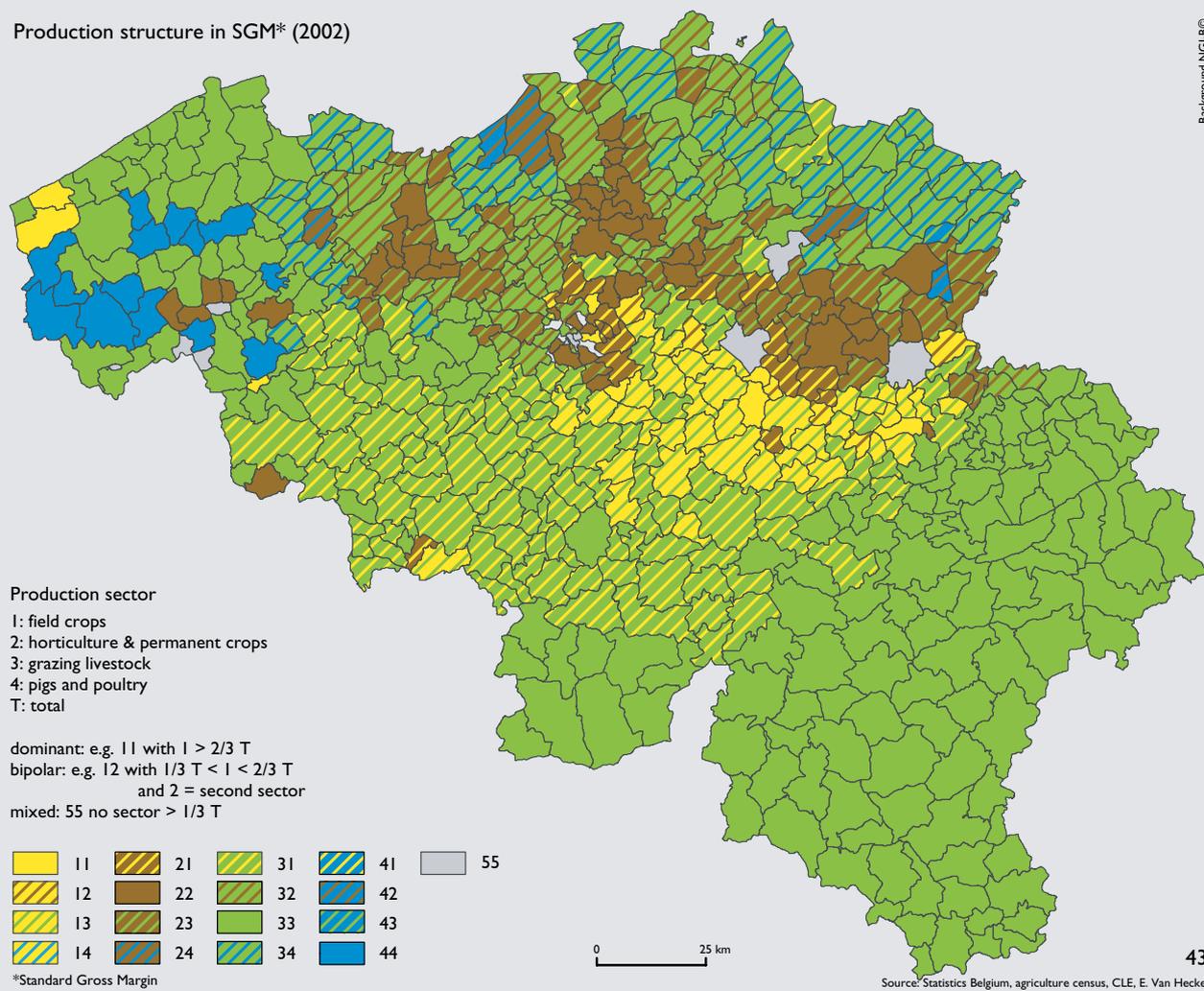
The distribution of the added value generated by the Belgian economy [42] shows a strong asymmetry between Flanders and Wallonia. The highest concentration of economic production can be found in the central metropolitan quadrangle of Brussels – Ghent – Antwerp – Leuven. The Brussels metropolitan area is characterised by the importance of business and financial services. Manufacturing specialisation is strongest in Flanders, especially in the northeast (chemical, metal manufacturing and transport equipment) and to the west, which is dominated by light industry and textiles. In Wallonia, where the corridor Haine – Sambre – Meuse has lost its historical manufacturing specificity based on the coal and metallurgy industry, the non-commercial sector currently plays a significant role. One observes the preponderance of tourism on the coast and in many municipalities in the south of the country.

Employment in agriculture and its contribution to the GDP is ca. 1.5%, while the surface area is 40%. The summary map based on the added value (AV calculated on the basis of the Standard gross margins used in the accountancy network of the EU) shows the pronounced regional differences [43]. It shows the diversity in Flanders and homogeneity throughout Wallonia. In the South, cattle raising (oriented more towards beef cattle

than dairy) is clearly dominant and relates to stony soils in hilly areas. In the loamy region of Liege and Brabant, crop production is the primary sector, with cattle fattening as the second sector. Here the largest agricultural holdings in Belgium are found. In the loam-rich Hainaut region and the Condroz, these two sectors of production are in an inverse proportion. In the municipalities in Flanders (with the exception of municipalities that have larger holdings as in 'the Polders' region) at least 1/3, and sometimes 2/3 of the AV comes from an intensified focus on either horticulture, or pig or poultry farming. Here, the cattle raising is focused on dairy production. As a result of the historically high population pressure, in Flanders relatively small holdings remain predominant: the professional holdings in this region measuring on average 22 ha, as compared to 53 ha in Wallonia. Within the horticulture sector there is again a large geographical diversity: fruit growing in South-Limburg and the Hageland region, ornamental horticulture in the Ghent area, vegetable growing in the region Mechelen-Antwerp and in the centre of Western-Flanders. Due to the intensive agriculture, the AV is greater in Flanders than in Wallonia: ca 4000 as compared to 1700 euros per ha. The majority of the agri-business is located in Flanders (compound feed manufacturers, slaughterhouses, vegetable and fruit auctions).



Production structure in SGM* (2002)



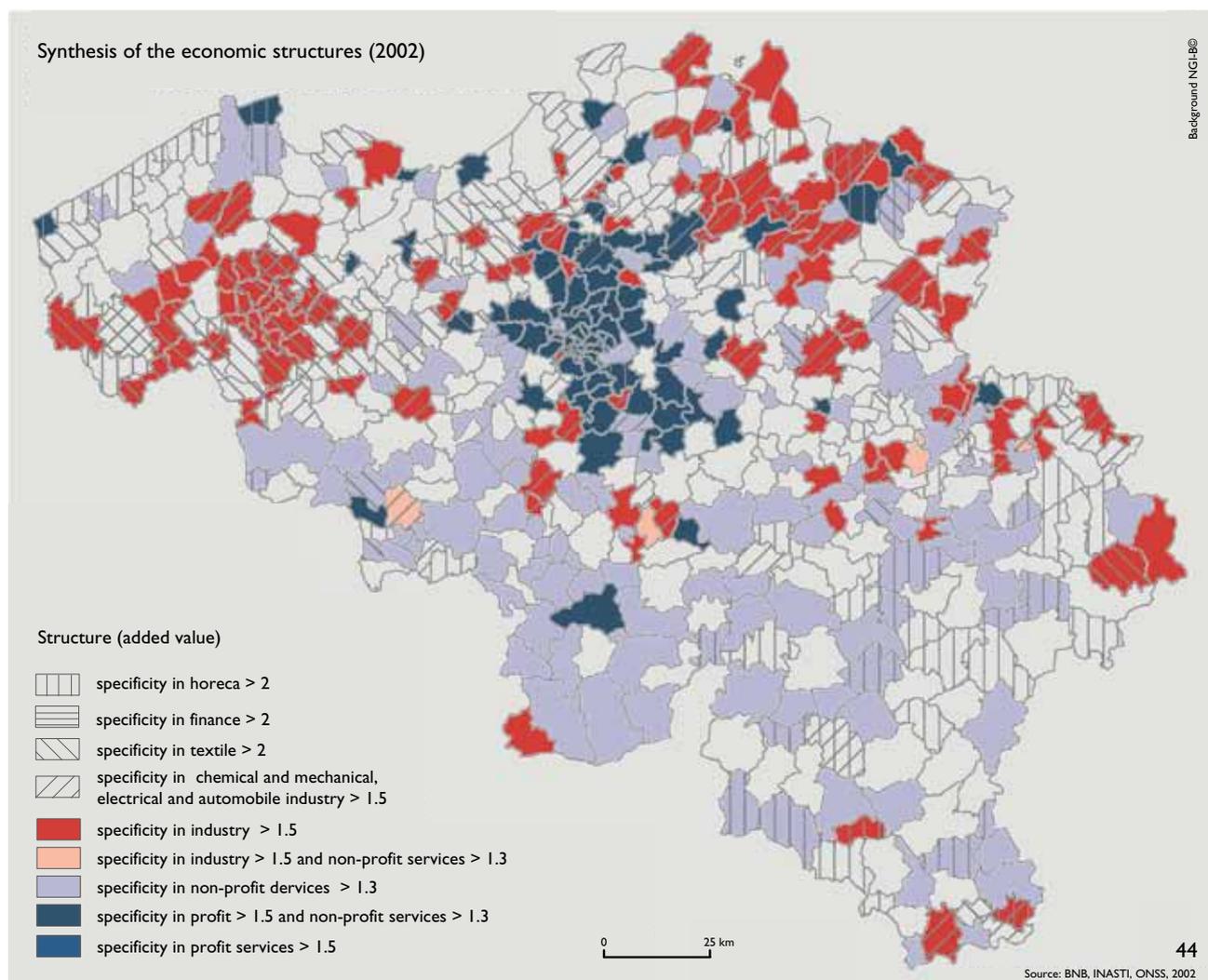
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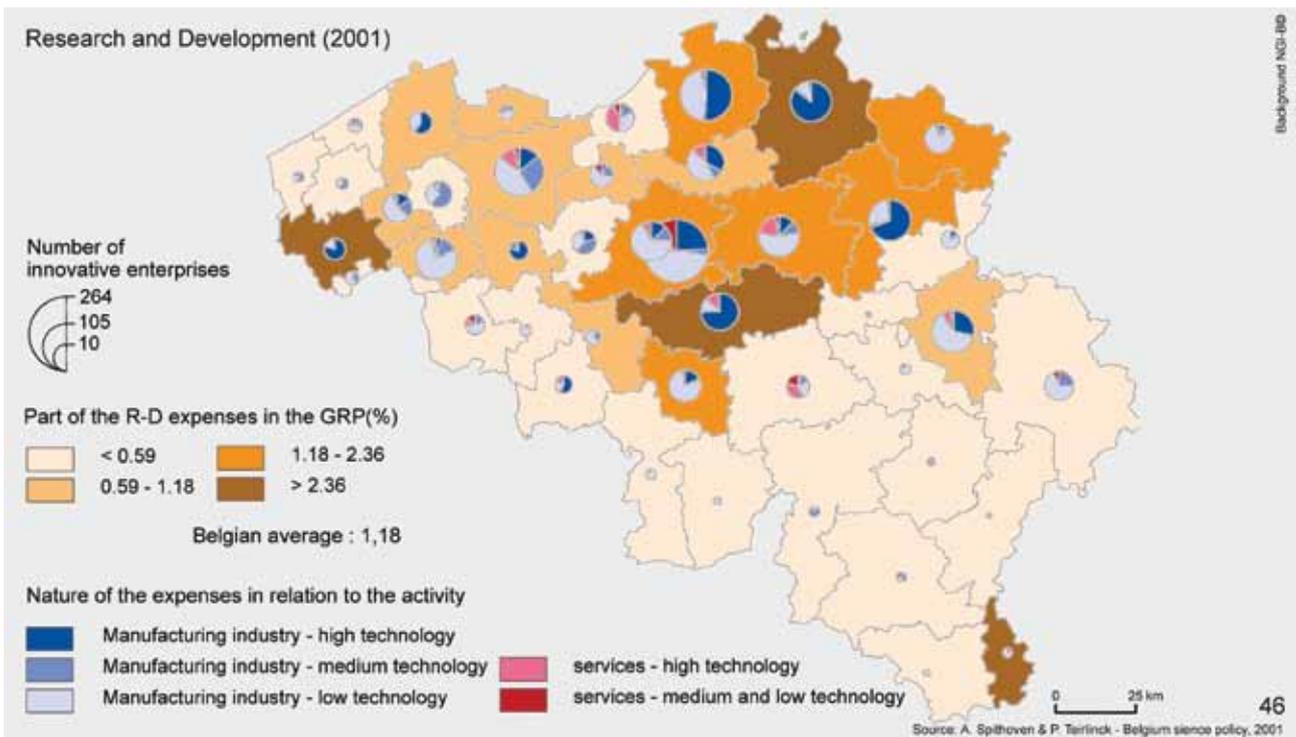
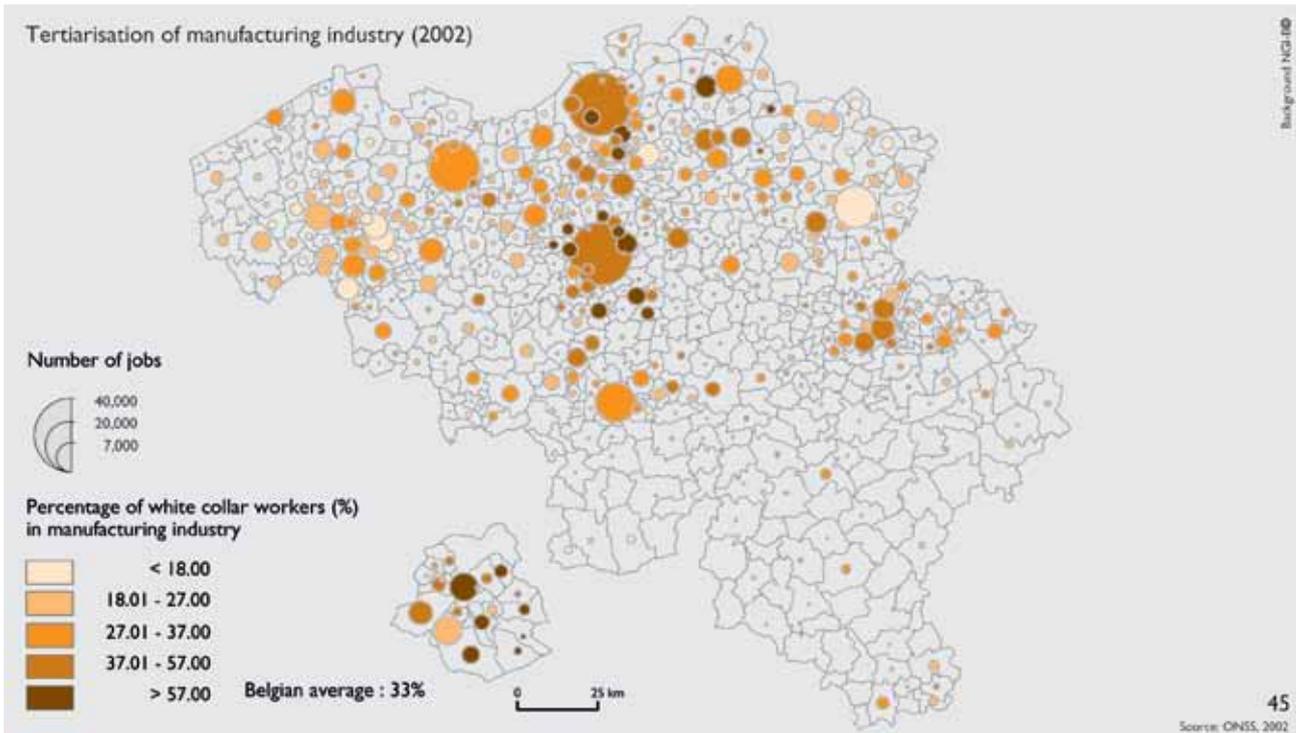
Sector	Wage workers 1992 (in thousands)	Wage workers 2009 (in thousands)	breakdown (%)			Proportion of white collar workers (%)
			Flanders	Wallonia	Brussels-Capital	
Metallurgy and metal-working	98.3	92.6	65	33	2	27
Agro-food industries	89.9	88.3	74	22	4	34
Chemical and pharmaceutical industry	71.5	67.4	63	31	6	61
Rubber, plastics, nonmetallic mineral products	57.0	54.3	68	29	2	38
Manufacturing of transport equipment	70.6	47.3	81	13	6	22
Wood, paper, printing, publishing	57.9	39.1	70	25	6	29
Machinery and equipment	42.0	38.5	67	28	5	35
Electrical, electronic and information technology equipment	49.6	31.8	71	24	5	53
Textiles, garment production and leather	47.5	30.4	86	10	4	23
Other manufacturing industries	26.9	21.0	72	21	7	30
Cokeworks, refinery and nuclear industry	4.0	3.3	96	4	0	82
Total of manufacturing industries including repair and maintenance	615.2	514.0	71	25	4	35

Although this number is constantly shrinking, manufacturing still accounts for over 500,000 jobs nationally [44]. Antwerp, the chief industrial centre, saw considerable development of the industrialisation in the port area, particularly in the petrochemical sector, after the Second World War. Brussels remains the second major industrial centre in Belgium if one considers its extensions into the metropolitan region, but it is far from its former importance. However, the Brussels 'industry' that remains is largely made up of company headquarters, rather than production units: 56% of the staff involved in the manufacturing industry in Brussels are white-collar employees, compared to a national average of 36% [45]. Ghent follows as the third-largest industrial centre.

The economic development and the constant creation of new activities brings with it a need for research and development work [46]. The greater importance of manufacturing in Flanders is accompanied by greater expenditures on R&D, especially in high technology sectors. This R&D is strongly rooted in the central areas of the country, often in peri-urban locations, around Antwerp and Brussels, as well as in Walloon Brabant, a pharmaceutical industry centre. The R&D work appears to be greater in the east than in the west of the Flemish region. This can be explained by the different structure of industry: more

large companies, often controlled by foreign capital, to the east; more SMEs specialised in lighter industries, to the west. The universities in Ghent, Brussels, Leuven, Louvain-la-Neuve and Liege contribute to the R&D activity by creating spin-offs. The concentration of the Belgian economy in the central quadrangle of Brussels-Ghent-Antwerp-Leuven reflects the competing urban planning strategies between Flanders, which has dubbed this central area the 'Flemish diamond', and Wallonia, which seeks to tie its growth to the Brussels centre, without neglecting the reconversion of the former industrial axis, and the Brussels Capital Region itself, where the prosperity, based on highly-skilled activities is accompanied by structural unemployment at around 20%, which especially affects the populations of immigrant origin and the lower skilled workers [20]. In fact, Brussels is particularly strong in management. The location of these activities is revealed by the offices. Brussels is the only Belgian city to have a market in office space of international proportions, with prices that remain moderate in comparison to the major European cities: the region possesses a stock of 13 million m² of office space (9% vacant), to which should be added some 1.5 million m² on the periphery (where the vacancy rates reach 30%). The European institutions alone occupy 1.8 million m².





The small size of the country, the high population densities, a policy which, since the end of the 19th century, has promoted home ownership and rail commuting, and the extent of the peri-urbanisation explain the important role played in Belgium by daily commuting to work: over two thirds of those employed go to work outside of the municipality where they live and the average distance from home to the workplace is 19 km. Obviously the largest cities draw the majority of these commuters [47]. Unsurprisingly, the commuter influx into Brussels is by far the largest, with over 375 000 commuters pouring into the city. The

labour basin is defined as all of the contiguous municipalities that send over 10% of their active population into the reference employment centres. In the capital it covers the bulk of both Brabant provinces, with the exception of the northeast, which is focused on Leuven, as well as the Dender Valley, a former textile zone situated in the east of East-Flanders. This also extends to the north of Hainaut and the province of Namur, where it continues up to the axis of the motorway of Wallonia, leading to an asymmetry towards the south of the labour basins of Mons, La Louvière, Charleroi and Namur. However, it

should be pointed out that the large cities of the rest of the country send numerous commuters into the capital, in greater numbers in fact than many municipalities within the Brussels labour basin.

One observes the significant number of employment centres in Flanders. The small size of the Kortrijk basin, despite the economic importance of this city, reveals the competition of other small employment centres nearby (Oudenaarde, Waregem, Roeselare, Ieper, Mouscron) in a zone characterised by a dense network of SMEs that recruit locally. In contrast, Limburg, which is less densely populated and historically little urbanised, is essentially focused on the employment centre of Hasselt-Genk, in conjunction with the Fordist industrialisation, archetypically represented by the Ford factories in Genk.

The map, showing the spheres of influence of these Belgian employment centres, leaves out the weight of the employment centre of Luxembourg, which involves an increasing number of municipalities in the east of the province of the same name, with the number of border crossings reaching nearly 40,000.

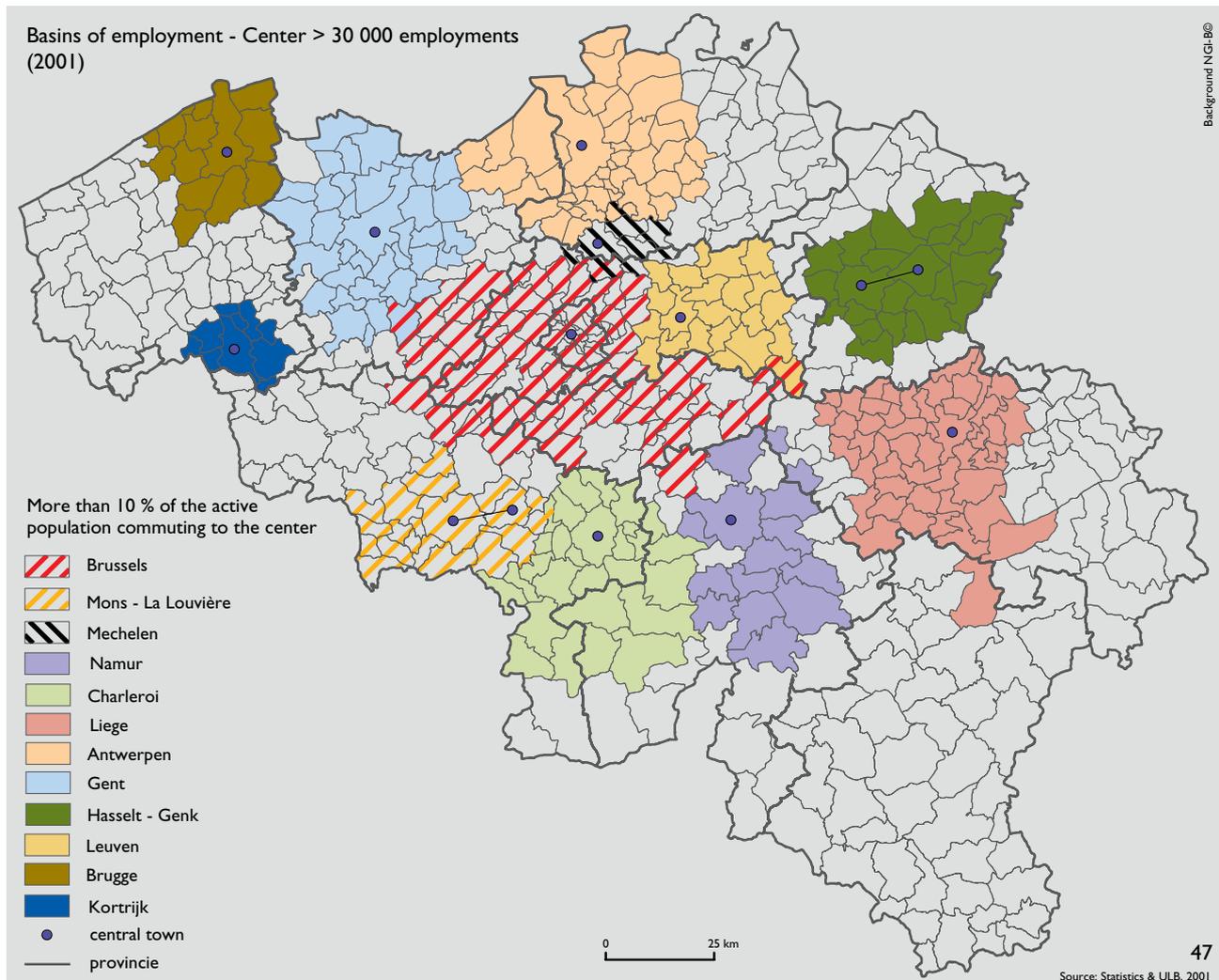
The rate of foreign visits to Belgium remains modest, at around 16 million overnights per year [48] [49].

The cities of art, especially Brussels, are the top destinations, but approximately half of the overnights recorded in the

capital are related to business. The volume of visits to Brussels continues to grow vigorously, whilst the number of overnight stays for tourism purposes has been stagnating elsewhere in Belgium since the beginning of the 1990s.

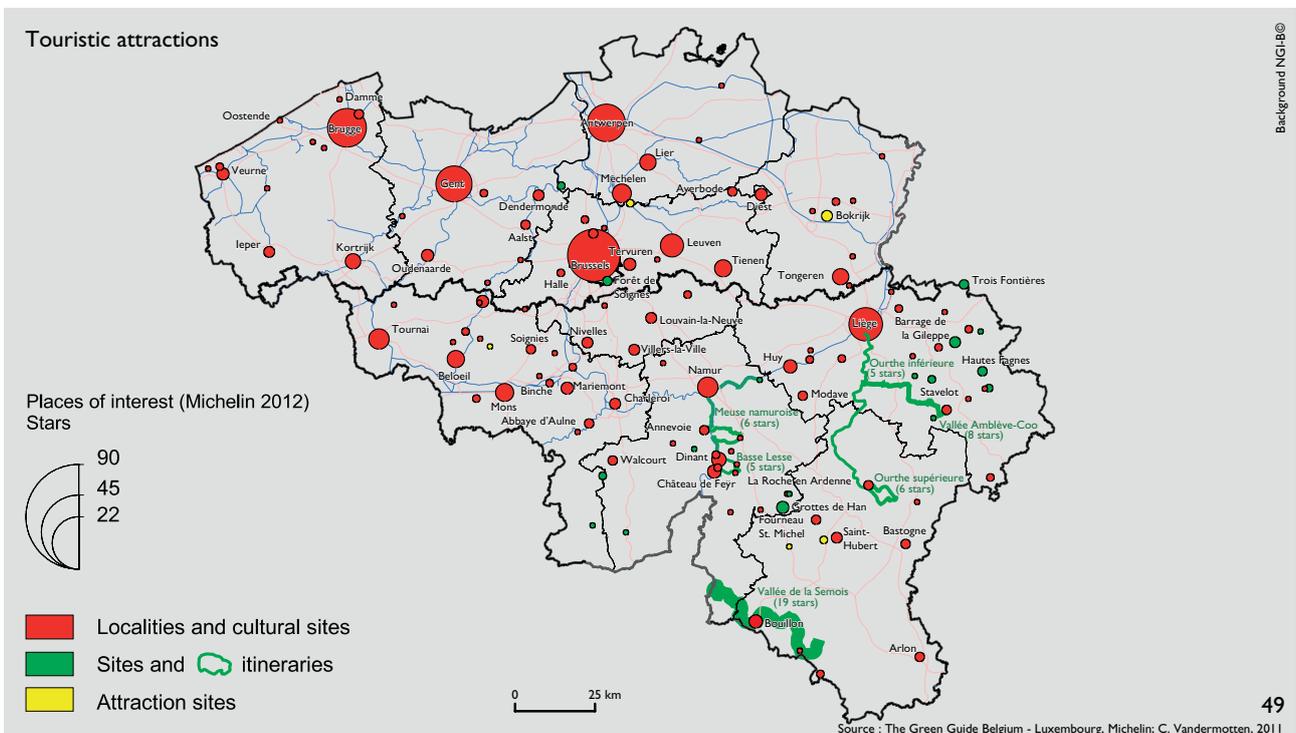
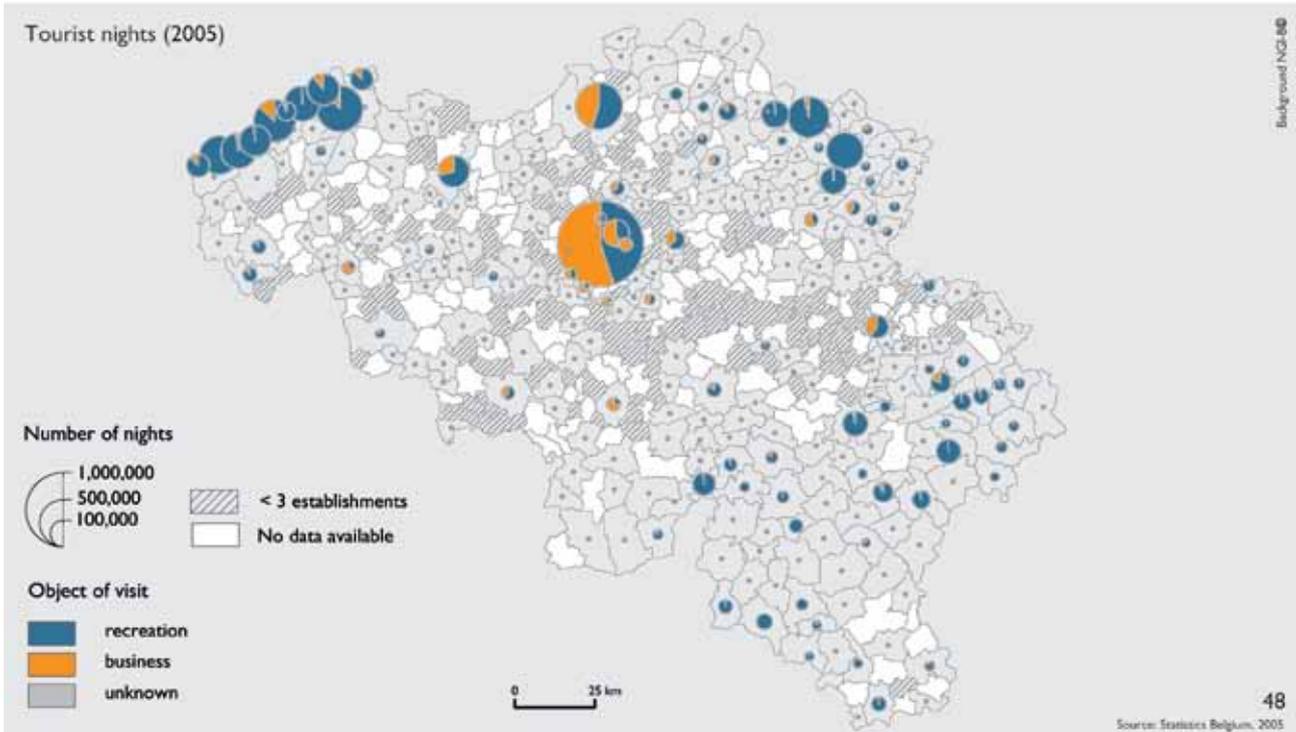
Domestic tourism is directed first and foremost towards the coast (accounting for half of the tourism overnights in the country if one takes into account campsites, and approximately 16% for tourism establishments alone). The rate of visitors stabilised in the mid-1960s, but the numerous second homes should be mentioned. In addition, domestic tourists visit the Haute-Belgique region (referred to in tourism promotion under the name 'the Ardennes') and the Campine ('de Kempen' in Dutch), social tourism and amusement parks which have a strong presence in the latter zone. On the coast as well as in the Campine and the Ardennes, the range of accommodation is dominated by camping (average of 60% for these three zones). The Campine and Ardennes are highly favoured by Dutch visitors.

The economy of Belgium, as a small country at the heart of North-western Europe, is highly open to other countries. Exports represent 80% of the value of the GDP and imports 77%. The bulk of foreign trade takes place with neighbouring countries [50]: 19% with Germany, 17% with France, 12%

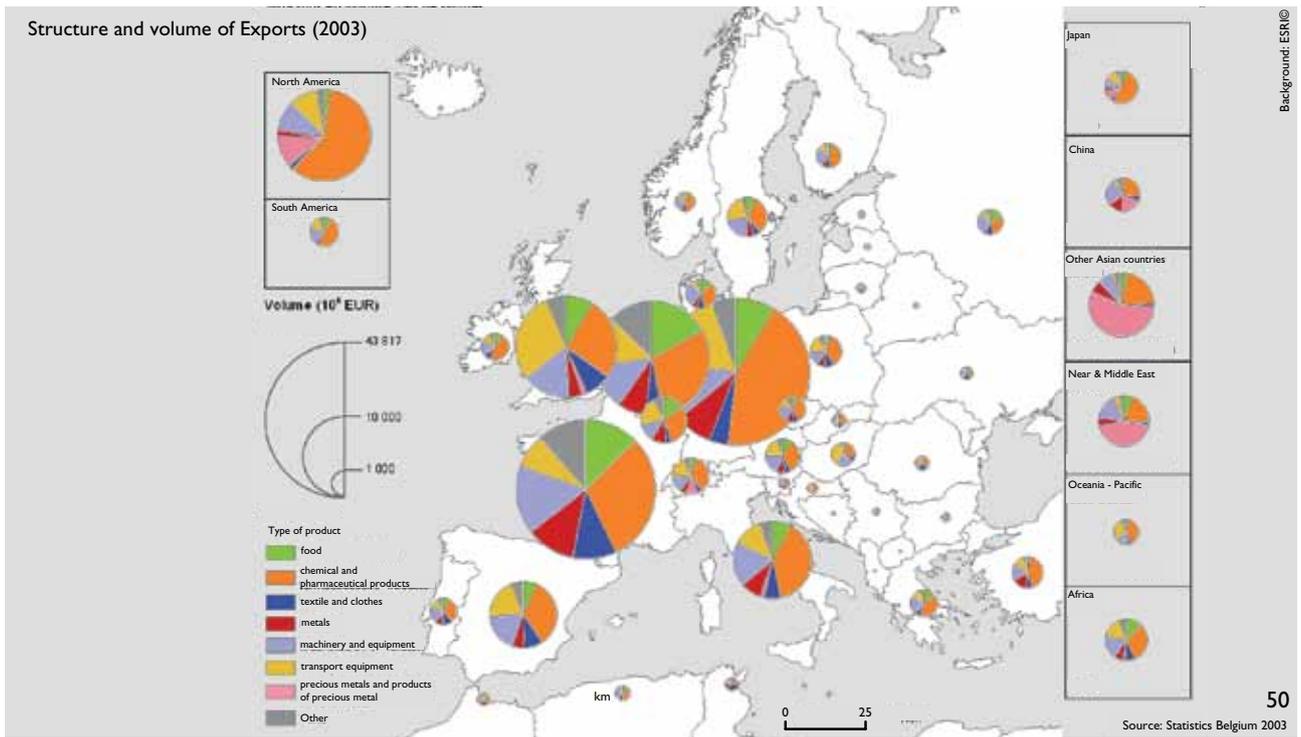


with the Netherlands, 7% with Great-Britain, and in total 73% with the European Union. The Belgian economy is therefore highly integrated into the production system of the European core. Attesting to the high-quality development of the Belgian economy, services are also increasingly contributing to external trade, currently representing a share of 22%.

The openness is also demonstrated by the size of foreign investments, which have contributed significantly to the renewal of the production base from the late 1950s onwards. These investments have been focused particularly on the Brussels-Antwerp axis, and more generally, on the north of the country [51].



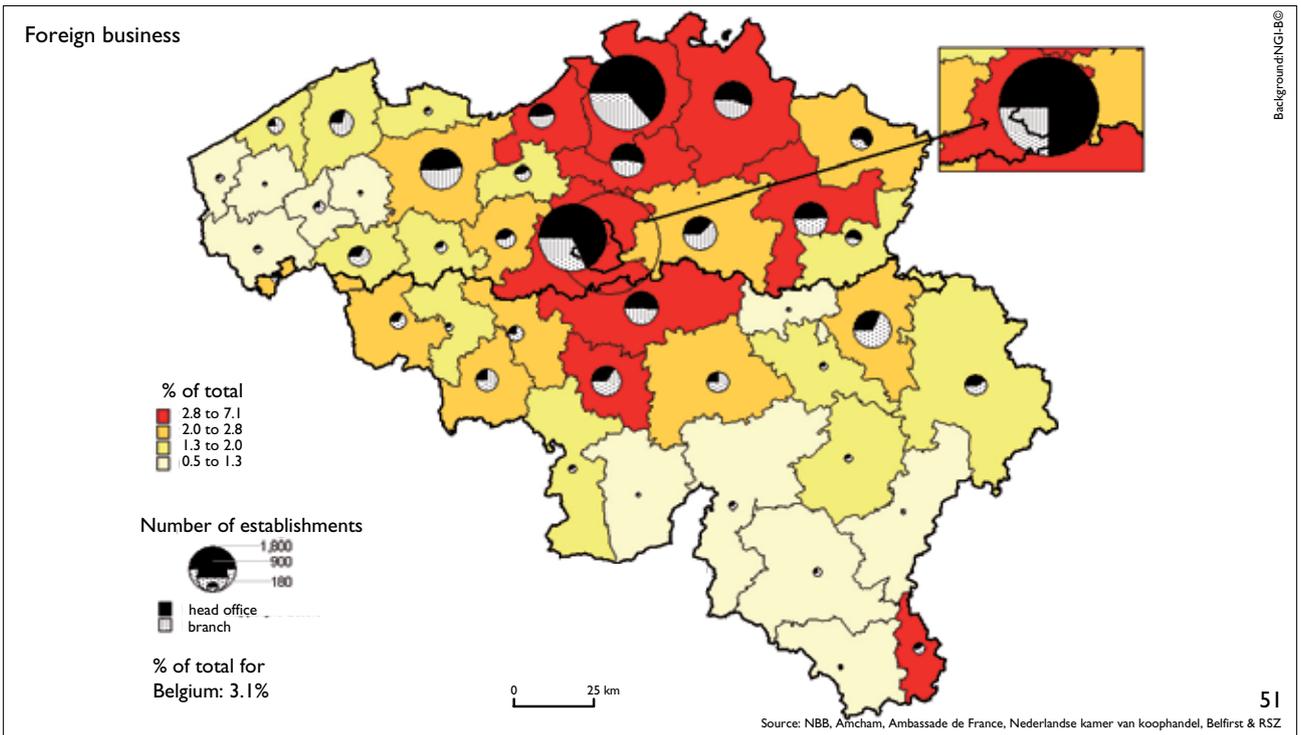
Structure and volume of Exports (2003)



Background: ESR©

Source: Statistics Belgium 2003

Foreign business



Background: NGL-B©

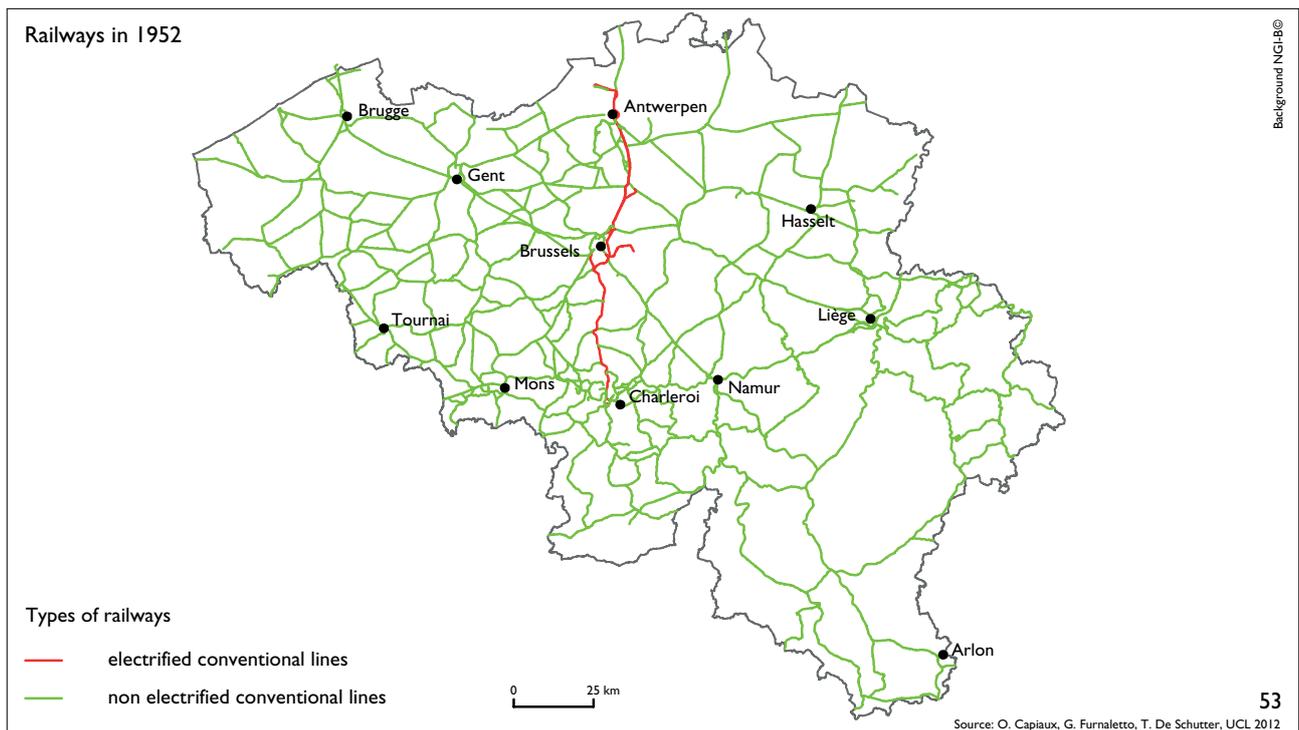
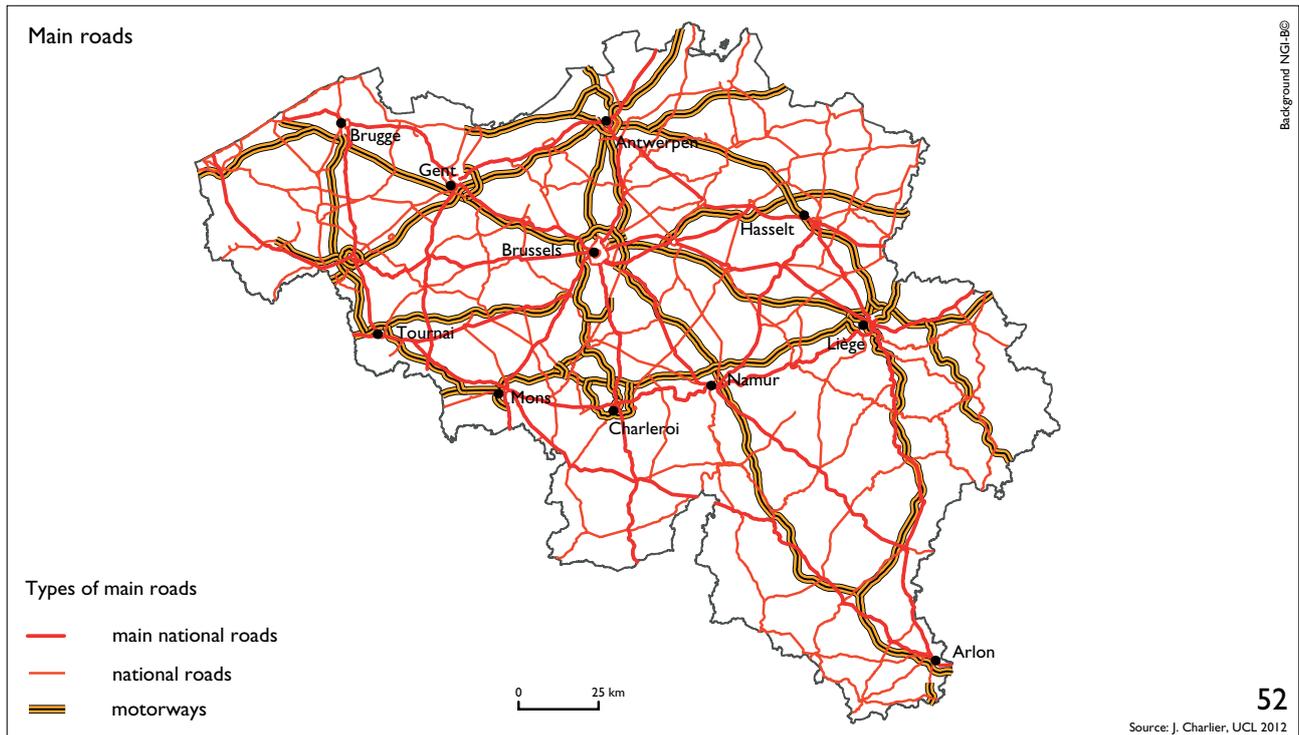
Source: NBB, Amcham, Ambassade de France, Nederlandse kamer van koophandel, Belfirst & RSZ

TRANSPORT INFRASTRUCTURE

Map [52] shows that Belgium features a highly developed road network, be they motorways or main roads, but it is better known, on the transportation front, for its very high railway density. Continental Europe's very first interurban railway connection was built as early as 1835 between Brussels and Antwerp, and many international, national and regional lines were built quickly thereafter. Map [53] shows that, at its peak just after WW2, the network was serving the country very

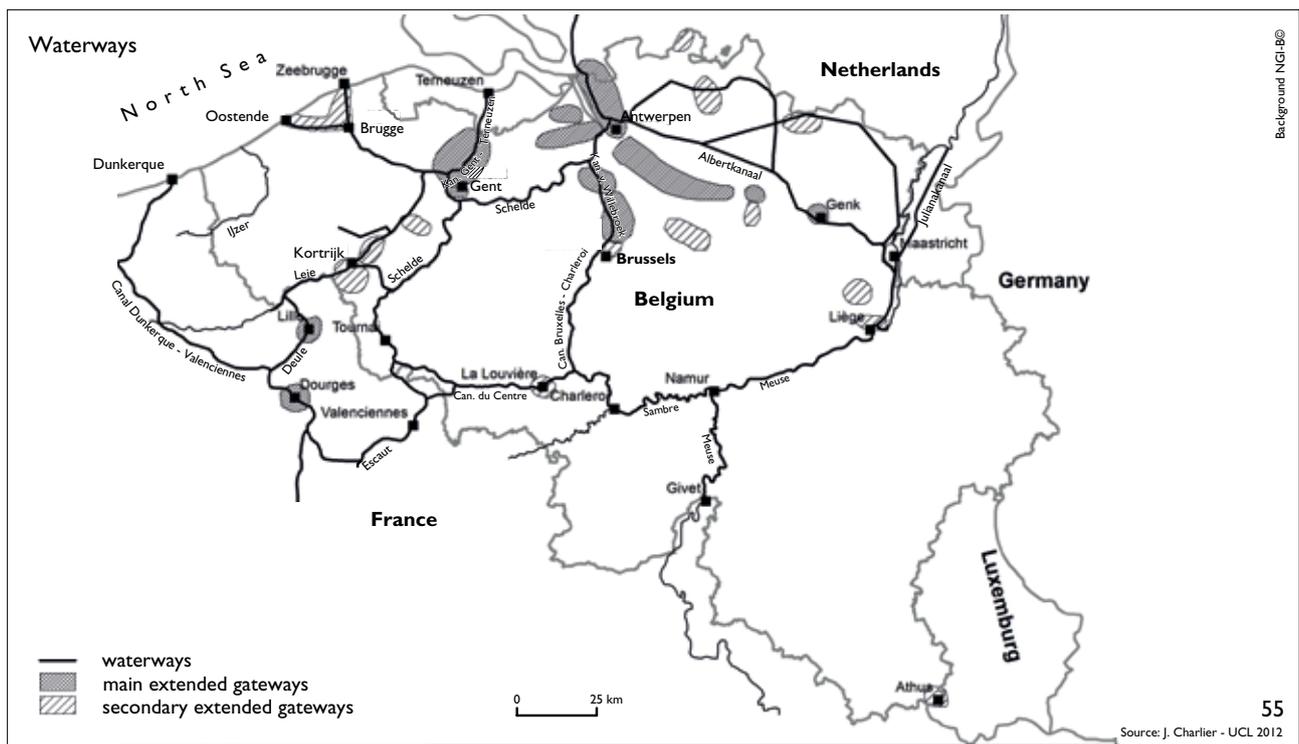
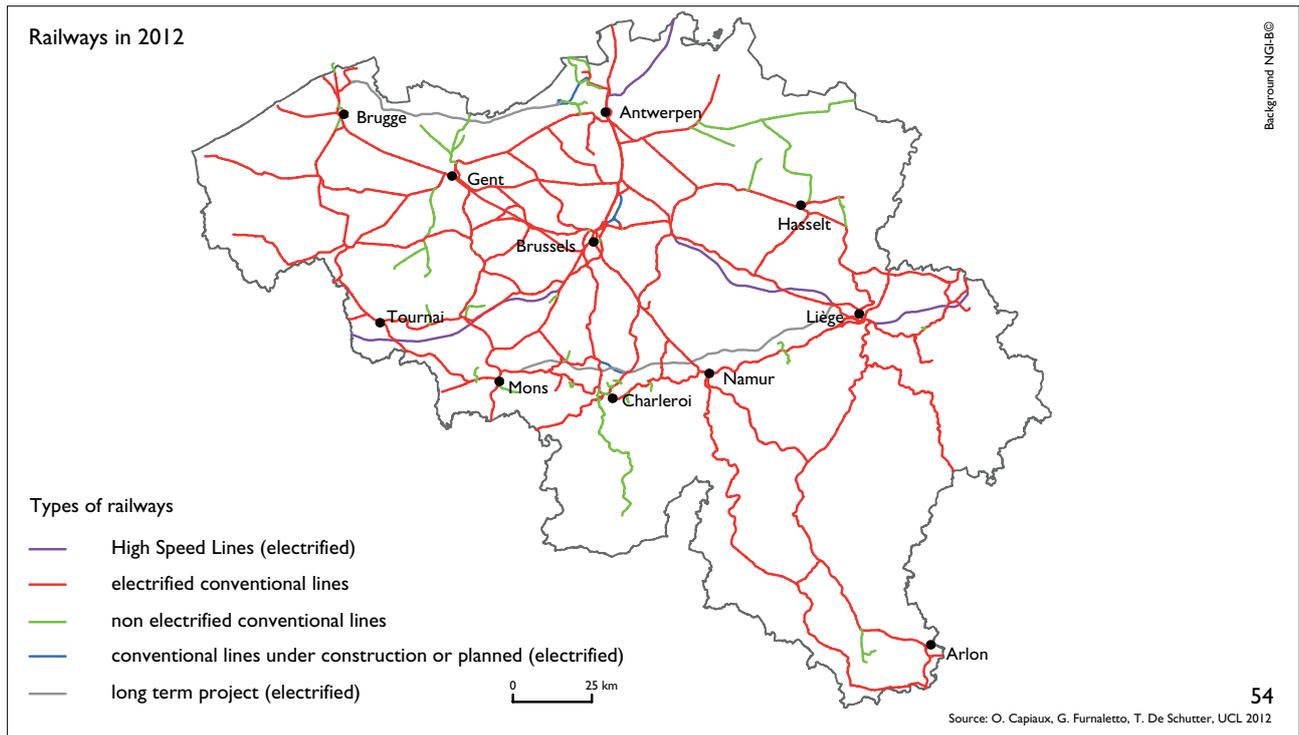
comprehensively. At that time, there was only one electrified axis, whereas Map [54] shows a totally different picture for today's railway network. Its density is much lower but most of the remaining lines have been electrified.

Belgium entered into the high speed era in 1996, when a first new high speed line was opened between Lille and Brussels. Since then, two more high speed connections have been built to the Netherlands and Germany, via Liege and Antwerp



respectively. The redevelopment of the railway network also includes new lines to the airports of Brussels and Charleroi, as well as a major freight line in the port of Antwerp. Several types of passenger trains are operated. On the one hand, there are (very) fast international or intercity trains, and on the other hand, there are the slower local or suburban services. A regional express system is being developed around Brussels, because there is a societal demand for greener commuting. Whereas passenger traffic has increased steadily in the last few years, freight traffic has been experiencing a

downturn, because of the competition of trucks and barges. The development of the above-mentioned impressive motorway system took place in the last fifty years, and road transport nowadays accounts for about 70% of the freight traffic and for more than 90% of the passenger traffic, whereas public transport has only a significant market share in the main urban areas. Like its neighbours, Belgium is entering into a post-automobile era, and there are no major plans to expand the basic network further, except around Brussels and Antwerp where road congestion has reached unacceptable levels.



The least-known network is probably the freight-only inland navigation system, built around a combination of improved rivers (the Scheldt and the Meuse, and their main subsidiaries, the Lys and the Sambre) and artificial canals [55]. The three largest of these connect Antwerp with the Rhine (and therefore Rotterdam), Liege and Brussels. Topography explains that there are no canals to Germany and Luxembourg, and that developing an inland navigation network in the Central part of the country has been difficult and expensive.

Antwerp is, by far, Belgium's largest seaport with 187 Mt of cargo in 2011 (of which 105 Mt for containers). There are advantages and disadvantages for Antwerp's inland location, but the new coastal port of Zeebrugge should be considered as Antwerp's outer port. With 46 million tons in 2011, Zeebrugge is Europe's fastest growing port, with a specialization for RORO traffic and containers. There is a third, smaller (27 Mt in 2011), bulk oriented port, Ghent, that has been suffering for years from its insufficient nautical accessibility.

For air transport, Belgium's position is weaker and the passenger traffic at Brussels airport remains, with 19 million units in 2011, weaker than before Sabena's bankruptcy in 2001. And freight traffic has also gone down at Brussels airport, because of the recent transfer to Leipzig of most of the express freight traffic of DHL. This explains that Brussels is no more Belgium's largest airport for freight, as Liege has recently taken the leading position (with 675,000 tons in 2011, compared to just 475,000 for Brussels). And on the passenger side, Brussels is facing the competition of Charleroi (marketing itself as Brussels South), whose recent growth has been dramatic, to 6 million units in 2011, thanks to its rise as Ryanair's largest base on the Continent.

GEODETIC AND CARTOGRAPHICAL STANDARDS APPLIED IN BELGIUM

BD72 and Belgian Lambert 1972

At the end of the Second World War, Belgium adopted a new geodetic system based on the Hayford ellipsoid (International 1924, see Table 1), the initial point of which is situated at the Brussels Observatory. The projection chosen for creating the cartographic grid for Belgium is the Lambert conformal conic projection with two standard parallels. It is on this basis that new cartographic series were established, at a basic scale of 1:25,000.

Semi-major axis (a)	6,378,388 m
Semi-minor axis (b)	6,356,911.946 m
Flattening coefficient $f = (a-b)/a$	1/297

Table 1. General parameters of the 1909 Hayford ellipsoid (or International 1924).

In use since the early 1950s, the geodetic datum has nevertheless been considerably improved and a new global compensation resulted in the 1972 version, which was called

the Belgium Datum 72 or BD72. This datum still uses the Hayford ellipsoid, but the initial point had shifted since 1950 (Uccle Royal Observatory). It therefore proved necessary to define new projection parameters, constituting the system of rectangular coordinates Belgian Lambert 72 (Table 2). The vast majority of current topographical maps rely on BD72 and the Belgian Lambert 72 coordinates, especially the new cartographic series created, since 1989, starting from the base scale of 1:10,000.

Geodetic system	Belgium Datum 1972
Ellipsoid	International 1924
Latitude origin	90° N
Longitude of initial point (of the central meridian)	4° 22' 02.952" E
1st standard parallel	49° 50' 00,00204" N
2nd standard parallel	51° 10' 00,00204" N
False origin – Easting translation	-150,000.013 m
False origin – Northing translation	-5,400,088.438 m

Table 2. Parameters of the Belgian Lambert projection 1972.

The BD72 datum, and the Belgian Lambert 72 coordinates associated with it, apply strictly locally. In other words, a point situated on the border between Belgium and one of the neighbouring countries presents geodetic coordinates (longitude and latitude) and rectangular plane coordinates (x, y) which are different in each country, depending, respectively, on the geodetic datum and the projection system selected by each country.

Geodetic spatial systems

In the second half of the 20th century, spatial geodesy made it possible to determine and track over time the shape of the geoid and the position of the Earth's centre of mass (which are constantly changing, notably in function of plate tectonics). By choosing the centre of mass as the common origin, a system can be composed of three mutually perpendicular axes, two of the axes forming part of the plane of the equator, whilst the third corresponds to the direction of the poles. A point may therefore be localised by any triplet of Cartesian coordinates (X, Y, Z), regardless of whether it is below, above, or on the surface of the Earth. It is on this principle that the international terrestrial reference systems have been created (for example the ITRS or International Terrestrial Reference System and WGS or World Geodetic System). Measurements are regularly carried out by combining satellite instruments and observations on the ground to determine the coordinates (X, Y, Z) of several hundred points on the surface of the Earth. The framework thus constructed (called the Frame) is identified by the letters of the reference system followed by the year of the observations (after the example of the ITRF2008, the last realization).

Ellipsoids globally adjusted to the shape of the geoid and

centred on the same centre of mass are also established in order to allow the determination of the longitude and latitude of points on the surface of the Earth (such as the GRS80 for Geodetic Reference System 1980, see Table 3).

	GRS80	WGS84
Semi-major axis (a)	6,378,137 m	6,378,137 m
Flattening coefficient (f)	1/298.257222101	1/298.257223563

Table 3. General parameters of two global ellipsoids.

For the sake of avoiding problems caused by separate geodetic systems per country, there is an incentive to apply a single spatial geodetic system and global ellipsoid. This is what the American Department of Defense has done by selecting the geodetic system and the ellipsoid WGS84 (the geodetic datum and ellipsoid bear the same name) as references for the GPS satellite positioning programme.

To meet the current needs, particularly those of cartography, having a reference system whose coordinates are constantly changing is anything but convenient. However, the points situated on a single tectonic plate undergo the same displacement, so that, with the exception of local accidents, one can regard them as maintaining the same relative positions. It is on these considerations that the subcommittee of the International Association of Geodesy responsible for determining the reference system for Europe (EUREF) envisioned the definition of a stable terrestrial reference system applicable in all the countries on the Eurasian tectonic plate. This was attached to the realization of the ITRS in 1989. The system, called ETRS89 (with E for European), is now the system recommended by the European Union for all cartographic and topographical activities, for example within the framework of the INSPIRE directive.

BEREF (Belgian Reference Frame)

As soon as 1989, the Belgian National Geographic Institute (Institut Géographique National/ Nationaal Geografisch Instituut or IGN/NGI) began participating in the EUREF programme. The first GPS campaign conducted in Belgium and in neighbouring countries has established a homogeneous network of tens of points located in precise ETRS89 coordinates. This network now relies on permanent stations of the European Permanent Network (EPN), both located in Belgium (5 stations

now) and in neighbouring countries. A second GPS campaign was used to determine the ETRS89 coordinates of some 4200 geodetic points which form the Belgian geodetic frame, so called BEREf. This has now become the reference system for all national cartographic and topographic works. The GRS80 ellipsoid is associated with BEREf and together they serve as a basis for the new 2008 Belgian Lambert projection.

Lambert 2008

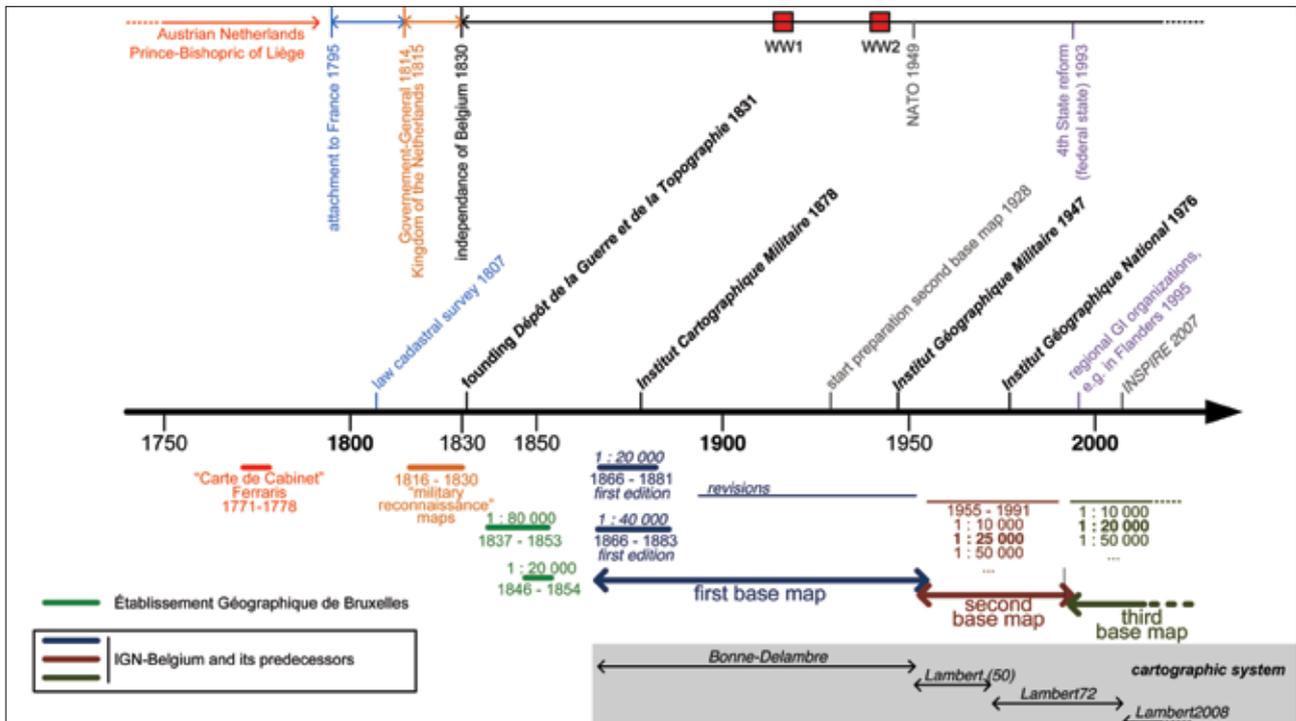
Once the EUREF programme allowed for the construction of the international geodetic network ETRS89, which was accurate and above all compatible with the WGS84 satellite positioning system, it was only natural to take this into account in the framework of national and European cartographical projections.

In Belgium, once the BEREf was completed, the NGI proposed a new version of the Belgian Lambert in which the coordinates of the central meridian (Royal Observatory) and standard parallels (49° 50' N and 51°10' N) have been defined this time on the global ellipsoid GRS80, linked with ETRS89 (Table 4). In order to avoid any confusion with the 1972 version in reading the rectangular plane coordinates, approximately 500 km are added to the two translations of the false origin in the 2008 version of the Belgian Lambert. As this range exceeds the dimensions of the country both in Easting and Northing, there is no longer any potential confusion between the two systems of cartographic coordinates. The new projection is now applied to the NGI's topographical information infrastructure as well as to the production and updating of topographical maps.

Geodetic system	BEREF
Ellipsoid	GRS80
Latitude origin	50° 47' 52.134" N
Longitude origin (central meridian)	4° 21' 33.177" E
1 ^{er} standard parallel	49° 50' N
2 ^e standard parallel	51° 10' N
False origin – Easting translation	-649,328 m
False origin – Northing translation	-665,262 m

Table 4. Parameters of the 2008 Belgian Lambert projection.

BELGIAN CARTOGRAPHIC INSTITUTIONS



The evolution from the 1990s of an analog to a digital cartography, where spatial objects are no longer kept on film or paper but managed digitally through geographical information systems, largely coincided with the development of the new Belgian federal state structures.

The altered state configuration and the new needs for large-scale cartographic information, imply that today, alongside the national mapping agency - the *Institut Géographique National* (IGN) - various governmental institutions on regional level are also charged with the management of the basic cartographic information.

The history of the IGN goes back to the independence of Belgium. In 1831, the *Dépôt de la Guerre et de la Topographie* is founded, but renamed in 1878 to the *Institut Cartographique Militaire* (ICM). It became the *Institut Géographique Militaire* (IGM) in 1947. In 1976, the IGM is transformed into an organism of public utility under the name of *Institut Géographique National*.

The origins of a countrywide scale cartography can be situated in the late 18th century (*Carte de Cabinet*). In the Dutch period, a new topographic countrywide survey was started but never completed. This gap of a large-scale topographic map was filled in by a private initiative (*Établissement Géographique de Bruxelles*) in the middle of the 19th century with a map on both 1:20 000 and 1:80 000.

The first official Belgian topographic map series appears from 1866. This first map series and its numerous revisions are based on the ellipsoid of Delambre and Bonne projection.

As part of the assignment to maintain the topographic database and to realize the derived maps, today the IGN is responsible for keeping the topographic map information at scales of 1:10 000 and smaller. The larger scale information is provided by the regional institutions - in more or less far-reaching partnerships with the IGN (www.ign.be). These regional institutions spend a significant portion of their efforts on these activities and operate largely as a clearing house or data warehouse. This has contributed to a rising demand for services to the private market. The regional institutions are the *AGIV* (*Agency Geographic Information Flanders*) for the Flemish region (www.agiv.be), the *Département de la Géomatique* for the Walloon Region (cartographie.wallonie.be) and *UrbIS* for the Brussels region (www.cirb.irisnet.be/departements/services/urbis?set_language=fr).

For socio-economic information an important contact point is "Statistics Belgium" - the *Directorate-general Statistics and Economic information* - of the Belgian Federal Government (statbel.fgov.be).

GEOGRAPHY AT BELGIAN UNIVERSITIES

Types of training		French	
		Université libre de Bruxelles (ULB)	Université catholique de Louvain (UCL)
Bachelor's degree in Geographic Sciences		yes (with electives, a)	yes
Master's Degree in Geographic Sciences, with a specific major (except for education)	Major in human geography	- Territories, societies, planning	- General geography (with electives, a)
	Major in physical geography	-	- Climatology
	Major in geomatics	-	-
Master's degree in Geographic Sciences, with a major in education		yes	yes
Master's degrees that do not bear the title of geographer, but which are easily accessible to or often followed by holders of bachelor's degrees in geography		- Environmental sciences - Environmental management - Urban studies (European Master i.a. with the VUB) (in English only) - Tourism - Population and development studies - European studies (history and cultures of Europe)	- Environmental sciences and management - Population and development studies
Advanced Master's degrees easily accessible to or frequently followed by holders of an M.A. in geography		- Town planning and regional development	- Town planning and regional development - Development, environment, and communities - Interdisciplinary analysis of European construction
		- Transport management	
		- Water	
Degree of Doctor in Geographic Sciences		yes	yes

(a) Electives: the option for the student to choose courses for a fairly significant number of credits (at least 30), offering an introduction to other sciences (Leuven), a programme that is considerably more oriented towards fundamental geography or towards geomatics and geometrology (in Liege), or towards physical geography or human geography (at the other universities), although the diploma remains polyvalent.

Major: the possibility to choose a Bachelor's degree in geography with a specific title of "geography" or "geodesics", which may potentially involve qualification for differentiated options at the Master's level.

(b) joint Master's degree programme of the KUL and the VUB.

(c) including a specific Doctorate in geomatics and geometrology.

Community		Flemish Community (not including the Master's degree programmes in English which essentially replicate the ones in Dutch)		
Facultés universitaires Notre-Dame de la Paix de Namur (FUNDP)	Université de Liège (ULg)	Katholieke Universiteit Leuven (Catholic University of Leuven, KULeuven) (b)	Vrije Universiteit Brussel (Free University of Brussels, VUB) (b)	Universiteit Gent (University of Ghent, UGent)
yes	yes (with electives, a)	yes (with electives, a)	yes (with electives, a)	yes (with electives and major, a)
-	- General geography (territorial development and geomatics)	- Urban geography - Spatial analysis of the environment - Space and society (in English only) - Environment and development (in English only)		- Social and economic geography - Landscape science and planning
-	- General geography (geomorphology) - Climatology	- Terrestrial ecosystems and global change		- Physical geography
-	- Geomatics and geometrology	-	-	- Geo-information
-	yes	yes	-	yes
-	- Environmental sciences and management - Population and development studies - Oceanography - Spatial sciences	- Town planning and regional development - Sustainable territorial development (Erasmus Mundus) - Tourism - Earth observation studies	- Urbanism studies (European Master i.a. with the ULB) (in English) - European urban cultures (European Master)	- Geomatics and geometrology - Science and management of oceans and lakes - Biodiversity and marine conservation - Urbanism and Spatial Planning
-	- Town planning and regional development - Natural hazard management	- Urbanism and strategic planning - Human settlements - Cultures and development - Spatial sciences (with Gent)	-	- Conflict and development - Weather and climate modeling - Statistical analysis - Spatial sciences (with Leuven) - Hydrography (post-graduate with the Higher school for navigation)
(interuniversity programme)				
resources (interuniversity programme)				
yes	yes	yes	yes	yes (c)

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