CHAPTER 3.

Sustainability in Coastal Urban Environment: Identifying Resources and Users in Belgian Case Study Areas

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1. Introduction

Urban areas are the centres of development characterized by complex elements and processes, often with high population density, varied economic activities and diversified mobility patterns. They are also the centres of many environmental issues such as air pollution, solid waste, wastewater and industrial wastes, and resource consumption. Coastal urban areas have not only all the characteristics of urban areas, but also characterized by their coastal environment, in term of resources and space.

In an attempt to understand the problems that coastal urban areas are facing, especially in term of sustainable resource management and conflict resolution, this chapter aims to look into the specific characteristics of the two Belgian urban areas - Oostende and Brugge - to identify their important resources that affect their development as well as to identify various group of resource users that can take parts in this or other form of resource utilization and conflict over those usages.

The chapter starts with describing the boundaries of the two Belgian case study areas, using the defining criteria such as employment and commuting to differentiate between a core and a ring for each of the case. Then, the chapter describes various natural and socio-cultural resources that the cases possess before moving on to provide an overview of various users and their characteristics. Finally, in the conclusion, main resources and users are identified and an overview of various conflicts over resource uses is presented.

2. Description of the Areas and Their Resources

2.1 Delimitation

The Belgian coast lies central in the European core area, at the southern point of the North Sea. It is a densely populated area with important economic and tourist activities.

The coastline consists of wide sand beaches, usually followed by a small dune belt. Landwards, there is a flat, long and wide polder landscape, excellent for agriculture. Seawards numerous sand banks can be found.

Thanks to its well-established road network, the coast is easily accessible for a broad (European) hinterland, with cities like Brussels, Cologne, Lille, Amsterdam, Paris and London. The densely build-up areas and the linear road infrastructure makes Belgian coast look like one small continuous agglomeration. Small open areas only occasionally interrupt this scenery.

Within the framework of the SECOA project, a spatial framework was defined for the organization of data collection and analysis in the case study areas. This framework comprises of three zones:

- The *metropolitan core* can be seen as the administrative area of the metropolitan area. The largest numbers of jobs are also generated in this area. Minimum employment numbers are used to decide whether or not to allocate a sub-area to the core.

- The surrounding *outer metropolitan ring* is functionally linked to the core. The boundaries for this ring are defined by journey to work flows in the first part. The ring should be constituted of those areas where at least 15% of the workforce travels from the area to the core. Additional information can come from other functional linkages e.g. transport flows, migration flows.

- Given the nature of this project, a *coastal strip* or *shoreline sub unit* should be defined. This can be statutorily defined, or in terms of a fixed buffer.

The study areas in the Belgian cases have been defined taking into consideration the above-mentioned characteristics, as well as other methods of demarcation used in Belgium, especially the works of Van der Haegen (*et al.*, 1979; and 1996). Based on a national census, the status 'Stadsgewest' has been given to regions in Belgium primarily based on employment and commuting data. These regions are made up from several other, cumulative, spatial zones (Van der Haegen *et al.*, 1979, Le *et al.*, 2012).

The first assessment and demarcation of *stadsgewest* was done in 1996 when 15 regions were designated as *stadsgewest*. A revision of that status has been carried out in 2007, using the census of 2001 by Van Hecke (*et al.*, 2007). The result disqualifies one area as a *stadsgewest*, gives the status for a region for the first time, and two new regions are created by dividing an old one. At this point, Belgium has 18 areas that have been given the status *stadsgewest*. Both Belgian case-studies in the project SECOA (Oostende and Brugge) are *stadsgewest*.

For the SECOA case studies in Belgium, we define the metropolitan **core** as being equal to the *stadsgewest (agglomeration + banlieue)*. The *forensen* communes of the stadsgewest make up the metropolitan **ring**.

For Oostende Study Area (SA) includes following communes (Van Hecke *et al.*, 2007):

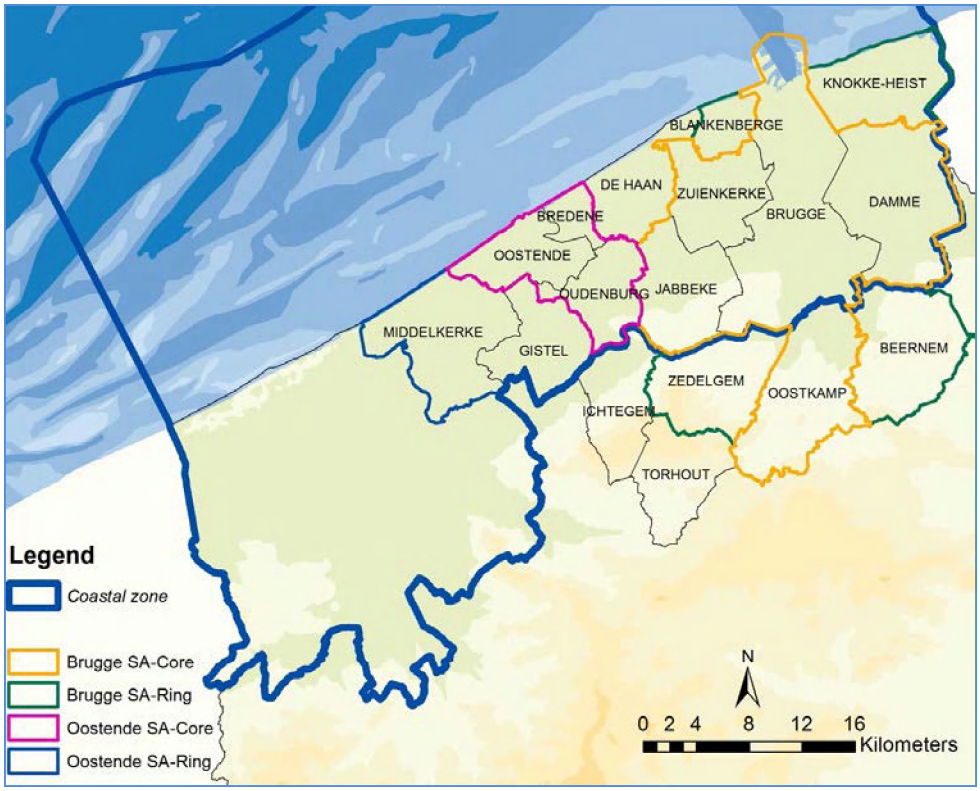
- Agglomeration (Core): Oostende and Bredene
- Banlieue (Core): Oudenburg
- Forensen (Ring): Gistel and Middelkerke

For the Brugge Study Area (SA) these include the following communes (Van Hecke *et al.*, 2007):

- Agglomeration (Core): Brugge
- Banlieue (Core): Damme, Jabbeke, Oostkamp and Zuienkerke
- Forensen (Ring): Beernem, Blankenberge, Knokke-Heist and Zedelgem.

For both case-studies, the coastal zone is defined using the statutory coastal zone definition. The whole of the Oostende SA lies within the coastal zone demarcation. Three communes of the Brugge SA fall outside the coastal zone: Oostkamp, Berneem and Zedelgem (Belpaeme *et al.*, 2004). The situation is visualized in figure 3.1.

Figure 3.1. The study areas: Brugge SA and Oostende SA.



In a Belgian context the coastal cities of our case study in Brugge are known as 'the Eastern coast', the coastal cities of the case study in Oostende as 'the Middle coast'. Oostende is the most important coastal city in Belgium and is situated at the center of the Belgian coastline. Brugge lies more to the North and the heart of the city is found 30 km inwards. It is connected to the sea through Zeebrugge, once a small fishing town but became a part of the city of Brugge once a seaport has been built there, connecting Brugge with the sea.

Because of the fact that the Belgian coast is rather small, a proximally 67 km long, the description of the state of the environment will cover both case studies. Moreover, both cities are of high importance for the Belgian coastal region in the generation of jobs, cultural activities, education etc. So when one takes a look at the description of the boundaries of the case studies, they will rapidly notice that both metropolitan rings are connected to each other.

2.2 Physical environment

The Belgian coastal zone is a highly dynamic environment. The combination of waves, tides and wind influences the loose sediments which make up the soil in the zone that extends up to the edge of the coastal dunes, and results in a constantly moving landscape. Further inland, however, the marine influence is much less apparent.

The coastline is always in motion due to the erosion and deposition of sand under the influence of the waves. Many places in the landscape still show visible traces of the genesis of the coastal plain, and even recent maps, aerial photographs and satellite images reveal certain traces from the past. Historical cartographic material provides important information for the reconstruction of the genesis of the Belgian coast.

A relatively narrow dune belt with a width of only 100 m to 3 km constitutes the transition between sea and land. In most seaside resorts a permanent protective seawall replaced the dune belt. These manmade defenses are continuously checked and improved to guaranty optimal safety for changing situations.

The dune acreage, which still amounted to almost 6,000 ha at the beginning of the twentieth century, has almost been halved and, more particularly, highly fragmented. This is the result of urbanization and growing tourist activity. Only a few locations still feature uninterrupted dune complexes. The origin, morphology and dynamism of the coastal dunes are to a large extent connected with the (wind) climate along the coast, the coastline orientation, the vegetation and the presence of broad sandy beaches.

The coastal dunes are created by an accumulation of sand from the beach. Although the predominant wind direction is in the direction of the sea (southwest as opposed to the west-southwest - east-northeast oriented coastline), the winds transporting sand (>15 km/h) blow in a slightly land-inward to coast-parallel direction, thus blowing sand toward the dunes. A continuous supply of sand ensures that the dunes continue to grow and gradually loose their halophilic character. The halophilic vegetation is replaced by halophobic vegetation, which is able to develop due to a supply of fresh groundwater. The dominating plant on the seaward

side of the coastal dunes is marram grass (*Ammophila*). Inland the dune soil is better fixed and the vegetation displays more variety with thicket, grassland and dune forest.

Behind this small stretch of buildings are the polders, which are the a low-lying tracts of land enclosed by embankments known as dikes, that forms an artificial hydrological entity, meaning it has no connection with outside water other than through manually-operated devices. The polders constitute a very homogenous agrarian area of low building density used for extensive agriculture. Next to pastures and grasslands, which account for 40 % of the total area, the area also comprises fields mainly used to cultivate grain crops.

The polders also feature many areas with a high natural and landscape value. The collaboration between environmental movements and farmers supports the sustained development of the coastal region.

2.2.1 Geography and geology of the study area

Both case-study areas geologically and geographically identical and parts of the larger French-Belgian North Sea Coastal barrier. The French-Belgian North Sea coast is a 120 km long, almost rectilinear sand beach barrier stretching from the Cap Blanc Nez chalk cliffs (France) to the mouth of the Westerschelde (Belgium/Netherlands).

These sandy beaches have been built up through thousands of years by wind, waves and tides on a supply of loose sand grains at the seaward side of a complex coastal barrier, perhaps an island barrier, whose location changed with time. At the same time, in the more sheltered area landward of the coastal barrier, an intertidal flat developed by depositions of mainly fine-grained material and by intermittent peat formation.

The French-Belgian coastal plain extends some 10 to 20 km landward from the beach barrier. Most of the plain's present-day elevation is between mean and high tide sea level. As such, the sea would inundate the plain twice a day, should it not be protected by a continuous system of beaches, dunes and dikes. The area behind these protections is called the polder.

The coastal barrier nowadays is still the sea-defence for the coastal lowlands, and this fact alone with the outstanding economic and touristic significance of the sea front area itself, justifies the French and Belgian governments' efforts for rational management and better understanding of this dynamic environment.

2.2.2 Climate

The proximity of the sea gives the coastal region a unique climate. Moreover, local climatic differences occur along the coast. The annual rainfall at the coast is around 670 mm (as compared to 780 mm in Brussels) (Dehenauw, 2002). The cool, slowly warming seawater keeps temperatures low in the lower air layers. The temperature difference with the colder, higher air layers is smaller, and therefore heavy (thunder-)storms are less frequent compared to inland regions. In the months of October and November, however, the water tends to be warmer, causing the temperature in the lower air layers to be higher.

Along the coast the average annual sunshine hours number 1,700 (1,550 hours in Brussels). The main difference is measured in the summer, when the sun shines up to 20 hours longer along the coast than inland, which is preferable for tourism (Dehenauw, 2002).

Under the influence of the colder water mass, temperatures along the coast are considerably lower than inland, especially during the summer. If there is a sea breeze, the difference in temperature between the coast and the "Kempen" region exceeds 10°C. In winter the situation is reversed due to the relatively warm seawater. Due to the cooler temperature, fewer cumulus clouds form above the sea and along the coast. These clouds only develop inland, a couple of kilometers behind the coastal zone.

There is much more wind at the coast than inland. The predominant wind direction is southwest. The highest wind speeds are measured in winter as storms occur more frequently during this season.

2.2.3 Hydrology

The Belgian coast has semi-diurnal tidal regime, with an average tidal difference of 4 meters. The tide wave moves along the coast from west to east. The tidal difference decreases in the same direction by ± 0.5 m. Spring tides occur twice a month and the tidal variation has reached its maximum (± 5 m); neap tides occur twice a month when the tidal difference has reached its minimum (± 3 m).

The tidal curve has an asymmetric shape because the low tide lasts half an hour longer than the high tide. Meteorological circumstances can significantly influence the curve as well. Long-lasting intense winds may influence the water level, resulting in extremely low or high water levels.

The movement of the water surface causes important tidal currents with the same periodicity as the tide. The flood current moves in the same direction as the tide, while the ebb

current moves in the opposite direction. Close to the coast the flood and ebb currents usually run parallel to the coast. The currents running parallel to the coast are strongest during high and low tides. During spring tide the flood current at the Zeebrugge port entrance can reach a speed of 2 m/s. On the open sea the transition from flood current to ebb current and vice versa, when the current temporarily almost comes to a halt more or less coincide with the half-tide level.

The wave climate along the coast is mainly determined by meteorological circumstances (predominantly westerly winds) and by the shallow depth of the sea. Under normal circumstances the wave height (the difference in height between trough and crest) along the coast is lower than 1 meter. During (heavy) storms wave heights of over 5 meters can occur.

The wave period (the time between two consecutive waves) is 3 to 4 seconds under calm weather conditions, but during storms it can amount to 10 to 15 seconds.

2.2.4 Natural ecosystems

Due to its location on the boundary that exists between sea and land, the coast has a specific ecological value at sea, on land as well as in the transition zone. This awareness started to grow as late as the end of the 20th century, but since then policies and attitudes have changed and nowadays people participate actively in the restoration of the environment.

Compared to the oceans, the North Sea is only a small, shallow pool. But it is precisely this that makes marine life in the North Sea so rich. This is particularly true of the shallow waters and on the bottom of the Belgian part of the North Sea, which features a wide diversity of animals and plants. However, their habitat and the whole ecosystem are under great pressure because of intense human activities, more specifically fishery, sand and gravel extraction, shipping and tourism.

The beach and the dunes constitute the boundary between sea and land. Despite the human activities that use a large part of this area and exert great pressure on the fragile ecosystems, a number of ecologically very valuable areas have been preserved.

The beach reserve "De Baai van Heist" (50 ha) is located on the beach plain created by sand and silt deposits in the lee of the eastern breakwater of the port of Zeebrugge. The bare beach plain has developed into a very diverse and dynamic coastal area. Under the lee of the wet beach en some thin covered beach banks, we now find a 'green beach' with embryonic dunes, silt, salt march and low dunes.

The dunes along the Belgian coast are very vulnerable ecosystems that have only recently been incorporated into a protection plan. The three largest nature reserves along the coast are "De Westhoek", "Het Zwin" and "Ter Yde". "Het Zwin" is located in our study area of Brugge. Het Zwin is one of the most important nature reserves in Belgium. It has a coastal length of a proximally 2.3 km in the Belgian-Holland border region. About 2 km is located in Belgium, in the commune of Knokke-Heist. The total area covers 158 ha, 125ha in Belgium. It is made up by dunes, followed by salinated intertidal sandy planes.

Large parts of the reserve only become flooded during spring tide or during storm surges. The whole area is only under unusual circumstances inundated. The quantity varies depending the height of the tide and the wind direction. The water flows through ditches to the small western lakes. On its retrieval a part of the water is held back by means of artificial valves. This insures a permanent water level in the reserves during periods of low water levels. These (semi) permanent pounds contain several sea fishes. This intertidal play brings forward the irregular deposit of sand and clay and give rise to small differences in height. This, in combination with the tides is the origin of a variety in vegetation; it is like a patchwork of salt loving plants. The soil is the habitat of millions of worms, snails and bivalves, an excellent diet for birds. Numerous birds come here to breed, rest, fly over, etc. Especially during the winter months one can count over tens of thousand birds here.

Areas along the coast where the natural transition between dunes and polders is still intact have become extremely rare. The coastal hinterland mainly consists of polders, land previously reclaimed from the sea by systematic dyke construction and drainage. The flat polder area is mainly used for agriculture, for the purpose of which a draining system with sluices and canals has been constructed. The areas with a higher elevation are largely used as arable land, whereas a number of vast pasturelands featuring a specific pasture bird fauna can be found in the lower areas.

Older forests along the coast can be found in the dunes and in the transition zone between the dunes and the polders. The original aim of the forestation of the coastal dunes was to protect the agricultural lands in the hinterland. They form a wind screen and hold the sands together. The most important dune forests along the western coast of Belgium are the Calmeynbos, the Doornpanne and the forest reserve Hannecartbos. Along the eastern coast are the dune forests of De Haan and the Blinkaertbos and the Zwinbosjes in Knokke.

In the dune forest of De Haan, successive vegetation belts in a dune area can be visible, starts with resistant grasses and herbs (marram, fescue...) at the high-water mark, subsequently

bush species (creeping willow, sea buckthorn, elder...) and eventually timber. In the past conifer species (common pine, Corsican pine...) were planted behind a screen of native deciduous tree species (oak, maple...), but nowadays, they are being replaced by deciduous tree species.

New forests have already been planted near Oostende (Keignaertbos) and Blankenberge (Zeebos). Other forests are planned near Nieuwpoort and Knokke.

In our study area several other, officially recognized, protected areas can be found. Some of them are in private ownership of nature protection groups; the government owns the other ones. In total, 248ha of protected natural areas in 7 reserves can be found in the Oostende SA (in the communes of Middelkerke, Oudenburg and Bredene) and 530ha in 19 reservesin Brugge SA (in the communes of Jabbeke, Brugge, Zedelgem, Oostkamp, Blankenberg, Damme and Knokke).

2.2.5 Marine and coastal resources

2.2.5.1 Biological resources

This Belgian Register of Marine Species (BeRMS) only contains the names of species currently or historically occurring in the Belgian part of the North Sea. As of September 2010, only species occurring in the marine environment up till (but not including) the coastal dune front. In total, 2187 species have been documented. The majority of these species are invertebrates with Nematoda being the most abundant invertebrate species group (472 species). Within the vertebrates, fish and birds are the most abundant (respectively 127 and 75 species). Of those 2187 species, 118 are considered to be vagrant, exotic or drift species, which means they are observed limitedly in the Belgian part of the North Sea without having an established population here (Vandepitte *et al.*, 2010).

Inventories of the species of the coastal zone, including the salt marshes, mud flats, dunes and the adjacent brackish areas are not available at this moment (Vandepitte *et al.*, 2010).

Non biological resources

The most notable non-biological resource in the coastal zone of Belgium is sand and gravel. The extraction of sand and gravel in the Belgian part of the North Sea is an alternative to the scarcity of sand quarries in the country. The sand and gravel mined is mainly used in construction, where it serves the production of concrete and for raising and widening of the beach with sand (sand nourishment) so as to curb coastal erosion (VMM, 2007).

Sand extraction has besides the purely physical effect (interaction between morphology, hydrodynamics and sediment process), also a biological impact. This impact is both direct, e.g.

by the suction of soil animals by a suction dredge, and indirectly through an increase in turbidity and an increased mobilization of pollutants (VMM, 2007).

2.2.5.2 Natural Hazards

Due to its geographical placement, the Belgian coast won't have to worry about earthquakes or tsunamis. The most imminent threat is storm. Much of the coastal area in the southern North Sea is low-lying and therefore vulnerable to the predicted increase in flooding, inundation and erosion. Most damage to coasts is caused by extremely high sea levels and waves during storm surges. There is a need to monitor the frequency of extreme weather in support of risk assessment and management schemes in coastal zones. An indicator for this is keeping track of the number of days of gales per years. On these days the maximum wind speed is equal or higher than 30 knots (15.34m/per second).

Coastal erosion is measured as the gradual loss of sediment and a coastline is described as 'eroding' when this loss of sediment exceeds a certain critical standard or baseline. Methodologies and standards for establishing whether a coastline is accreting, eroding or stable are not uniform among coastal states. The part of the beach profile that is considered for erosion studies also differs from country to country. Monitoring the evolution of accretion and erosion, sea level and the effects of extreme weather is of crucial importance for developing proper local risk assessment and adequate policies in shoreline management.

The IPCC Fourth Assessment report (2007) on climate change predicts a rise of 14-59 cm in global (mean) sea level by 2100, as a result of the thermal expansion of ocean water and melting of the ice sheets. Coastal areas, and in particular low-lying areas and regions where a negative or downward vertical land movement is taking place, are facing greater threats.

In Belgium this parameter is describe as a revised local reference datasets from the Permanent Service for Mean Sea Level (PSMSL) are reduced to a common datum approximately 7,000mm below mean sea level in order to enhance global comparability.

Coastal lowlands are considered the most vulnerable to Sea Level Rise and related inundations. In this respect, Belgium, together with the Netherlands, where more than 85% of the coastal zone is located below 5 meters elevation, is highly vulnerable.

With these parameters, and given the socio-economic characteristics of the Belgian coastal zone, one can see that the area is very vulnerable to flooding due to the increasing numbers of people and economic assets near the coast.

For this, the government has invested great effort in coastal safety. In Belgium coastal protection is a regional responsibility. Up to now, the Flemish government (Flemish region) has defined the minimum safety level of the coastal protection at once in 1000 year. However, this safety standard is not implemented in any law or decree. Every 5 years the safety of the entire coastline is checked and yearly monitoring enables to update the achieved safety level. Every year small beach nourishment activities are carried out. For several years no new sea walls have been built, because these hard safety measures intervene with the natural dynamic of the coastline whereas soft measures, like nourishments work together with the accretion and erosion processes.

A lot of coastal communities however do not achieve the safety standard. So far, a minimum safety level of once in 100 year is guaranteed along the entire coastline. The yearly budget does not add up to meet the standard. There is a need for long-term planning. Hence, for the first time, the Coastal Division of the Flemish region started up a study to work out an 'integrated master plan for Flanders future coastal safety'. The aim of this study is to protect the Flemish coast against erosion and flooding on a short and long term basis, looking ahead at the year 2050, based on the principles of ICZM. Therefore the time aspects of investments, sea level rise, beach erosion, etc. are also taken into account. This integrated master plan must in particular define the measures needed to develop and guarantee a safe coastline (Mertens *et al.*, 2008). This master plan was approved by the Flemish parliament in 2011 and made public. Based upon their proposals, the necessary measurements will be taken to guarantee coastal safety for natural hazards caused by storms and flooding.

2.3 Socio-economic conditions

There is already al lot of socio-economic information available and processed in Belgium for the SECOA case studies. However, there is a small problem in the overlap of the proposed case-study area. Given the small areas covered by the communes and cities in Belgium, most analyses have been carried out on a larger statistical unit than the commune or city level. All studies look almost exclusive at the level of the arrondissement (if we look at legal boundaries) or at the level of RESOC areas (for socio-economic analyses). Both areas cover the same spatial boundaries for our case studies.

Within one RESOC region, a consultation committee is established comprising members of the local authorities (communes, cities and provinces involved), members of the employer

organizations and members of the employees (syndicate) organization. They work together to stimulate regional social economic development and propose pacts and leverages to promote this. These become active once ratified in the different councils.

The problem here is that these areas are larger than our case study area. The reason for this is partly caused by the fact that both case-studies are in close proximity to each other. Taking the definition of the metropolitan ring, and our own definition of 'stadsgewest', some communes between Brugge and Oostende fall out of the scope. The workforce, and other parameters that stipulate their mean attraction pole, are divided between the two cities, so none of them can act as the core city, based upon the minimal percentage to be acquired.

Nonetheless we will use some of their analyses, because they provide a good view on the region under investigation. If possible we will deduce the result to our study area. Also numbers and maps will be provided at a smaller statistical level and within the scope of the study area.

2.3.1 Overview

In 2008 a socio-economic analysis was made for the RESOC regions (SVR, 2008). We will present their findings here and afterward update them with the latest numbers possible.

Concerning welfare, it is hard to say that Oostende is a top region. The GNP per inhabitant (€ 21,735) was ranked second lowest of all RESOC areas in Flanders in 2007; 76% of the average in Flanders. The available income averaged at € 14,978 in 2004, this was 92% of the Flemish average and was relatively lower than in 1995.

However, the average tax return (€13,122) was higher than in 1995, but still only reaches 93,3% of the Flemish average, but in line with the average of the province of West Flanders.

As in the rest of the province, the number of people who benefit from a special treatment in health insurance (102.3 per 1000 inh.) is higher than in the rest of Flanders, even up to 22% in the timeframe 1998-2006. There are also a higher number of people who receive the minimum unemployment benefit.

The number of births in underprivileged families (7.6 per 100 births) is also much higher than in Flanders and even in the province of West-Flanders.

The situation in the area of Brugge is better; it is the most thriving RESOC area of the province of West-Flanders (West-Vlaanderen). The GNP reaches 96.6% of the Flemish average, but is still almost 3% better than the average of the province. The available income is more or

less the same than in Flanders, but with € 16,715 per person it is again higher than in the province (5%). Tax returns, people who benefit from health insurance and those counting on minimum paychecks from the unemployment service follow the same trend.

The number of births in underprivileged families is even lower than in the rest of Flanders, up to 6.9% lower.

Table 3.1. Tax return, unemployment rate and GDP data.[*]

Parameter		**2001**	**2004**	**2007**
Tax Return (€)	Arr. Oostende	11,301	13,086	14,555
	Arr. Brugge	12,408	13,992	15,928
Unemployment		**2003**	**2006**	**2009**
	Arr. Oostende	7,883 (9.5%)	7,646 (8.7%)	7,203 (8%)
	Arr. Brugge	11,551 (7.2%)	10,901 (6.5%)	9,372 (5.5%)
Gross Value Added (€)		**1998**	**2003**	**2007**
	Arr. Oostende	2,557 M	2,411 M	3,091 M
	Arr. Brugge	5,973M	5,888 M	7,195 M

The labour productivity for the Oostende region showed in the period of 1995-2005 a higher increase than in the whole Flemish region, but is was still only 92% of the overall average. Significant for this region is that the added value of the secondary sector is rather small, with 13.1% it ranks second last of all regions. Yet this is a slight improvement compared to 1995. The contribution of the tertiary and quarterly sector on the other hand is ranked at the top.

In absolute numbers, there were 3,070 jobs created in the period of 1995-2006 within the Oostende region, the total created employments amount to 55.8% of the total available working force (15-64 years), is the third lowest number (Flanders region 61.3%). The employment rate also didn't increased as much as in the rest of the Flemish region and the province. These bad numbers are also reflected in the number of self-employed persons. In 2006 they were numbering 10,888, almost 4% lower than 10 years before. The same trend was visible in the whole province, but for Flanders it increased with 0.5%. As practically for the whole Flemish

[*] Source: GOM West-Vlaanderen, 2001-2010.

region, the still available area for industry is very low, only 7.6 ha wasn't yet occupied in 2006. So changes in their employment rate aren't expected.

The economic activity in the primary sector is slightly higher than in the rest of Flanders, mainly due to the good agricultural grounds in the polders. The secondary sector, mainly industry, is poorly represented (16.1%) compared to the average. The segment of tertiary activities is comparable with the overall numbers, but what is notable is the great increase of the quarterly sector in this region, mainly financial and business activities.

The region was responsible for 8,385 newly generated jobs between 1996 and 2006 and employment numbers rose with 9.2%, in-between those of the province and those of Flanders. Both numbers for employed and self-employed people rose. By the end of 2007, 93.3% of the available land for industry was occupied, which only leaves 7.6 ha open for new projects.

Table 3.2. Socio-economic parameters.[*]

Parameter		**2002**	**2005**	**2008**
Number of Businesses	Arr. Oostende	/	10,147	12,789
	Arr. Brugge	/	22,899	24,019
Number of Self-employed people	Arr. Oostende	9,845	10,967	11,113
	Arr. Brugge	22,331	24,937	25,268
Area occupied by Ter. sector (ha)	Arr. Oostende	422.3	444.0	502.7
	Arr. Brugge	1,008.3	1,041.9	1,106.6

A more economic insight is given when we look at the number of businesses and their employment numbers, and the land-use parameters of the different sectors.

Compared to 2001, there were 7% more new businesses in 2008 at the core area. This augmentation was mainly generated in the 3rd and 4th sector. The secondary sector had a significant loss and the primary sector remained relatively stable. Overall employment numbers rose, but they show the shift of activities in the area more clearly than the number of businesses. In only seven years time, there are almost 50% less people active in the agricultural sector, the secondary sector had to experience a 16,8% drop.

[*] Source: GOM West-Vlaanderen, 2001-2010.

Table 3.3. Overview of the evolution of the sectors in stadsgewest Brugge 2001-2008.[*]

Sector	Number of Businesses								Employment							
	Primary	Secondary			Commerces and services			Total	Primary	Secondary			Commerces and services			Total
		Industry	Construction	Total	Tertiary	Quarternary	Total			Industry	Constru c-tion	Total	Tertiary	Quarternary	Total	
2001																
CORE	120	421	428	849	2975	777	3752	4722	546	10498	3068	13566	23208	29928	53136	67302
RING	106	221	323	544	2039	319	2358	3008	461	4162	1158	5320	8420	6787	15207	20988
2008																
CORE	123	374	412	786	3265	878	4143	5052	285	8902	2472	11374	27412	33199	60611	72270
RING	90	196	313	509	2164	324	2488	3087	147	4631	1585	6216	9351	6965	16316	22679
EVOLUTION 2001-2008 in BRUGGE SA																
CORE	2.5	-11.2	-3.7	-7.4	9.7	13.0	10.4	7.0	-47.8	-15.2	-19.4	-16.2	18.1	10.9	14.1	7.4
RING	-15.1	-11.3	-3.1	-6.4	6.1	1.6	5.5	2.6	-68.1	11.3	36.9	16.8	11.1	2.6	7.3	8.1

The ring experienced the same plunge in its primary sector, employment went 68.1% down, and there were even 15% less active employers. The secondary sector had a slight setback of 6.4%, but employment rose with 17%, mainly due to more operations in the construction sector, which caused an employment rise of more than one third. Also here we see a rise in the 3rd and 4th sector, but less severe than in the core.

In the 8-year period under investigation, the activity pattern in the core of Oostende remained relatively stable. Only the number of businesses in the secondary sector dropped roughly 8%, but employment ciphers remained the same. Noteworthy is the steep decline in employment in the agriculture, it dropped 3 quarters, but there is only one business less. There are not that many new players in the commerce and service sector, yet employment here also rose with 10%.

[*] Source: GOM West-Vlaanderen, 2001-2010.

Table 3.4. Overview of the evolution of the sectors in stadsgewest Oostende 2001-2008.[*]

Sector	Number of Businesses								Employment							
	Primary	Secondary			Commerces and services			Total	Primary	Secondary			Commerces and services			Total
		Industry	Construction	Total	Tertiary	Quarternary	Total			Industry	Construction	Total	Tertiary	Quarternary	Total	
2001																
CORE	48	172	162	334	1771	390	2161	2544	220	3907	1033	4940	11895	11191	23086	28305
RING	28	48	87	135	580	103	683	846	70	520	423	943	1912	789	3581	4594
2008																
CORE	47	159	147	306	1,778	425	2,203	2,556	59	3,710	1,245	4,955	13,768	12,289	26,057	31,071
RING	26	63	78	141	575	107	682	849	55	535	439	974	2117	1844	3961	4990
EVOLUTION 2001-2008 in Oostende SA																
CORE	-2.1	-7.6	-9.3	-8.4	0.4	9.0	1.9	0.5	-73.2	-5.0	20.5	0.3	15.7	9.8	12.9	9.8
RING	-7.1	31.3	-10.3	4.4	-0.9	3.9	-0.1	0.4	-21.4	2.9	3.8	3.3	10.7	133.7	10.6	8.6

The surrounding area of Oostende shows the same trends, but the loss in jobs in the agricultural sector is less severe, with only 20%.

2.3.2 Agriculture and Aquaculture production

The livestock numbers are well documented in the communes of Belgium due to strict regulations concerning manure production. Data on the production of crops is only available at the provincial level (West-Flanders) due to the fact that most of the farmland of a farming household spreads across several communes.

Table 3.5. Overview of the livestock in the area of Brugge.

Category	Ring			Core		
	1997	2007	Evolution	1997	2007	Evolution
Number of pigs	169,048	143,936	-14.9	183,492	141,866	-22.7
Number of poultry	644,762	477,616	-25.9	623,560	504,832	-19.0
Number of bovine animals	40,353	32,166	-20.3	71,790	57,487	-19.9
Total of animals	854,163	653,718	-23.5	878,842	704,185	-19.9

[*] Source: GOM West-Vlaanderen, 2001-2010.

In Brugge, as was notable in the employment numbers, the total production in farm animals has dropped, both within the core, as within the ring. Moreover, there is no significant aquaculture present at our case study area.

Table 3.6. Overview of the livestock in the area of Oostende.

Category	Ring			Core		
	1997	2007	Evolution	1997	2007	Evolution
Number of pigs	80,682	74,227	-8.0	25,636	20,900	-18.5
Number of poultry	77,356	83,256	7.6	37,148	47,515	27.9
Number of bovine animals	17,512	14,513	-17.1	8,882	6,329	-28.7
Total of animals	175,550	171,996	-2.0	71,666	74,744	4.3

2.3.3 Industrial actitivies

The industrial sector declines in the metropolitan core of Brugge. Not only the number of businesses drops, also the workforce sees a decline. There are also no significant changes in the request for environmental permits of class I – in Belgium these are necessary to conduct activities that can have a significant impact on the environment. This can signifies that not a lot of new activities were started in this timeframe or prolonged.

The ring also has to deal with a setback in employers, but not in employees. The workforce not only rises in the industry, but also in the construction business. This evolution is also visible in the number of permit requests. The steep rise in request, but the decline in businesses can signify that the existing ones expended their activities. To do this they needed new permits, and an addition to their human resources

Table 3.7. Evolution of Class I permit request in 1999-2010 in Brugge.[*]

	1999-2004	2005-2010	Evolution (%)
CORE	154	150	-2.6
RING	228	299	31.1

[*] Source: Provincie West-Vlaanderen.

In the Oostende area we also see a slight decline in permit request in the core and a rise in the ring. This signifies that the core is shifting to an economy more and more base on the 3rd en 4th sector, activities that do not need a class I permit.

The number of industrial corporations declines slightly in the core, but augments by a third in the ring. Yet the number of jobs remains more or less the same in both areas.

Table 3.8. Evolution of Class I permit request in 1999-2010 in Oostende.[*]

	1999-2004	2005-2010	Evolution (%)
CORE	80	75	-6.3
RING	75	97	29.3

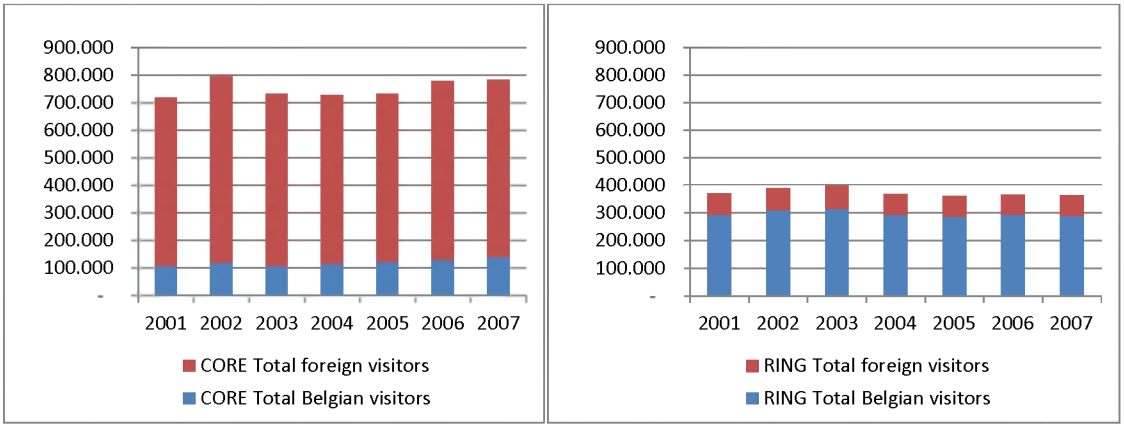
2.3.4 Commercials, services and tourism

In both areas we see that the economy becomes a post-industrial one, with a heavy focus on services. In both cores and rings we see a rise in the activities in these sectors, and a sharp rise in employment. In the Brugge area it is more significant in the core than in the ring, in Oostende it is more or less the same. This is probably due to the morphology of both areas. The ring of Brugge is bigger and a bit more rural than the one of Oostende.

Brugge city is considered one of the most attractive historic-cultural cities in Europe. In 2007, Brugge SA attracted a total of approximately 1,150,000 visitors, and 69% of these had visited the core area (mainly Brugge Municipality). There is an exceptionally high proportion of foreigners – 62.5% of the total: of these, 90% visited the core. 67% of the Belgian visitors were more likely to visit the ring area, mainly Blankenberge (over 40%) and Knokke-Heist (over 20%). The pressures generated by tourism, particularly in context of the historic urban structures of Brugge represent major challenges.

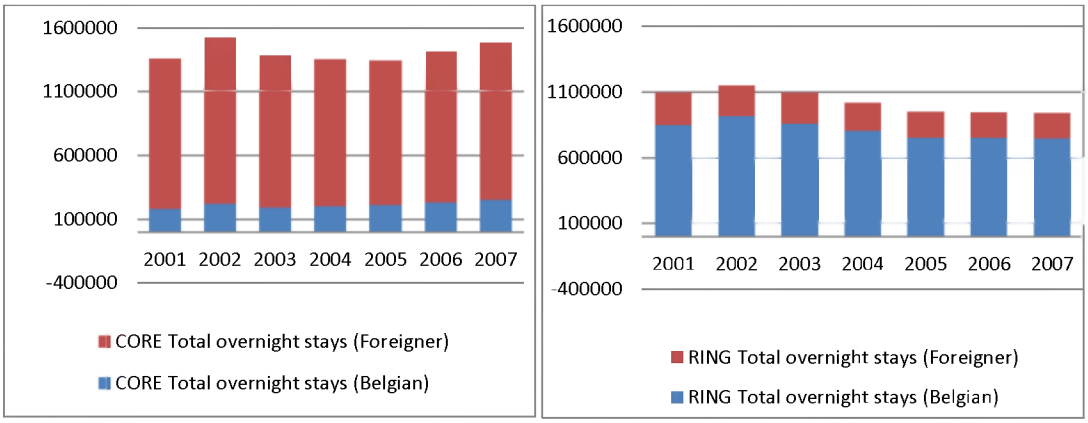
[*] Source: Provincie West-Vlaanderen.

Figure 3.2. Evolution of visitors to the Brugge SA.[*]



Overnights stays in Brugge SA is dominated by stays in the core area (over 60% of the total). The core and the ring attract different groups of tourists. While the core (with the dominant of Brugge Municipality) attracts mostly foreign tourists, Belgian tourists tend to opt for the ring locations.

Figure 3.3. Number of overnight stays in the core and the ring of Brugge SA.[*]



A large number of visitors comes to Brugge for business purposes, especially in recent years, while Brugge is strongly promoted as a congress centre. In 2009, Brugge hosted 165 registered events, including 12 major conferences (with more than 200 participants). In total, 15,000 people have visited Brugge in 2009 for meetings/conferences.

Visitors to Brugge come year round, with the lowest number in January and highest in August: there is some seasonality, but it is relatively modest compared to the seasonality that is

[*] Source: Data from Lokale Statistieken, 2010.

[*] Source: Data from Lokale Statistieken, 2010.

experienced, for example, by coastal resorts in Northern Europe. On average, Brugge alone hosts around 1.4 million visitors annually.

Table 3.9. Number of overnight stays during the period 2005-2009.

	2005-2006	2006-2007	2007-2008	2008-2009
November	80,922	84,937	92,254	102079
December	104,846	112,073	113,711	121,432
January	47,867	53,852	55,913	57,384
February	73,978	74,993	83,903	75,435
March	84,843	96,567	105,403	87,240
April	130,561	136,815	125,819	140,608
May	132,345	135,574	147,106	138,498
June	116,790	113,702	126,925	114,930
July	143,447	147,199	166,583	159,583
August	155,939	164,553	179,853	172,062
September	126,813	129,530	125,566	125,155
October	123,742	121,873	127,825	132,101
Total year	1,322,093	1,371,668	1,450,861	1,426,507
Total winter (Nov-March)	392,456	422,422	451,184	443,570

While Brugge municipality is the best known tourism destination internationally, there are also significant flows (from within the metropolitan area, as well as from elsewhere, to the coast. Brugge SA, Knokke-Heist, Blankenberge and Zeebrugge are the three coastal communes that are in the "most-popular" list for day-tourists. Knokke-Heist is in second place, right behind Oostende, with 3.2 million day visitors in 2009. Blankenberge is in fourth place with 1.9 million day visitors and Zeebrugge also attracted 0.2 million the same year.

Oostende SA is one of the most popular tourist destinations in Belgium. The total number of visitors to the region has been relatively stable during the last decade. The core area has seen a decreasing trend in the number of foreign visitors while the number of Belgian visitors has increased, resulting in a small increase in the total number of visitors. Meanwhile, the ring has experienced a slight decrease in the number visitors.

The core attracts most of the visitors (around 80%), especially foreign visitors. While the core is popular with foreigners, Belgian tourists tend to go to the ring area. Amongst the communes in the region, Oostende Municipality single-handedly accounts for around 88% of the visitors to the core areas and 70% of the visitors to the whole region.

Oostende Municipality is the most popular destination for overnight stays. It accounts for nearly 60% of the total number of overnight stays in the SA and more than 80% of the total number of overnight stays in the core. This is higher than its share of total population in both cases. In 2001, around 60% of Belgian overnight-stays were spent in the core. By 2007, this figure was around 70%. Amongst foreigners, most of the overnight stays were spent in the core (around 80%).

Table 3.10. Total number of overnight-stays in the Oostende SA.[*]

		2001	2002	2003	2004	2005	2006	2007
Gistel	(1)				2,543	3,933	2,543	
	(2)				1,020	1,147	2,198	
	(3)				3,563	5,080	4,741	
Middelkerke	(1)	475,446	516,716	465,374	446,721	421,683	446,143	385,920
	(2)	156,790	162,000	161,396	161,333	138,081	132,486	101,948
	(3)	632,236	678,716	626,770	608,054	559,764	578,629	487,868
Bredene	(1)	139,240	132,158	160,199	139,610	139,313	153,473	166,724
	(2)	80,063	83,868	82,220	75,607	65,398	69,657	80,039
	(3)	219,303	216,026	242,419	215,217	204,711	223,130	246,763
Oostende	(1)	606,971	646,146	676,518	648,890	698,168	691,190	681,332
	(2)	462,596	461,060	459,204	421,245	414,139	373,989	361,816
	(3)	1,069,567	1,107,206	1,135,722	1,070,135	1,112,307	1,065,179	1,043,148
Oudenburg	(1)	9,263	9,185	7,526	6,544	8,005		8,167
	(2)	6,451	6,195	6,053	3,474	4,555		5,080
	(3)	15,714	15,380	13,579	10,018	12,560		13,247
CORE	(1)	755,474	787,489	844,243	795,044	845,486	844,663	856,223
	(2)	549,110	551,123	547,477	500,326	484,092	443,646	446,935
	(3)	1,304,584	1,338,612	1,391,720	1,295,370	1,329,578	1,288,309	1,303,158
RING	(1)	475,446	516,716	465,374	449,264	425,616	448,686	385,920
	(2)	156,790	162,000	161,396	162,353	139,228	134,684	101,948
	(3)	632,236	678,716	626,770	611,617	564,844	583,370	487,868
(1) Total Belgian visitors; (2) Total foreign visitors; (3) Total visitors								

[*] Source: Data from Lokale Statistieken, 2010.

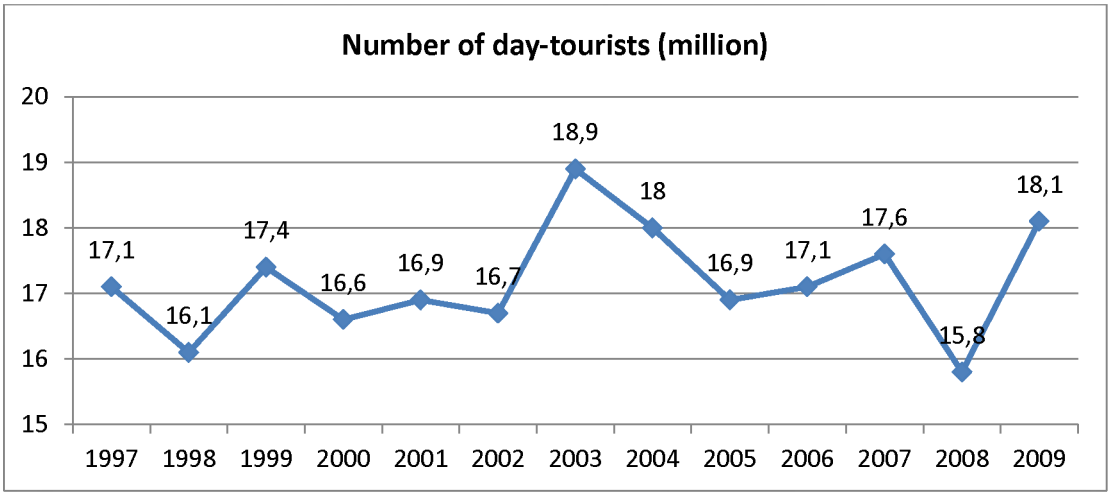
Overall, the number of overnight stays in the ring has decreased during the period 2001-2007 while the figure for the core remain stable – indicating a tendency to greater centralization of tourism flows.

Oostende is also a popular destination for day tourism to the coast. During the summer, extended train services are operated with larger train capacities. In this season, there are 6 more direct trains from Brussels to Oostende in the morning during the weekends and three more during the weekdays. Returning from Oostende to Brussels, there are 5 extra direct trains in the late afternoon during the weekends and three extra trains during the weekdays.

According to a survey in 2007, Oostende is the most popular destination for day-tourism amongst Belgians, being a chosen destination of 24% of Belgian day-tourists (Vanden Brouck, 2008) both in the summer and in the winter. Middelkerke and Bredene in the Oostende SA are also amongst the most popular sites. Middelkerker attracts 5% of day-tourists during summer and 6% of day-tourists during the winter. Bredene attracts around 5% of day-tourists during the summer but around 1% during the winter. In total, Oostende SA accounts for 35% of total day-tourists to the Belgian coast during summer and approximately 30% of the total to the Belgian coast during the winter. These represent significant flows of people into the coastal regions.

It is estimated that around a third of the Flemish population goes at least once to the coast during the summer. This number in winter time is one fifth. The coast is less popular area for the population of Brussels and Wallonie regions, with 10.5% and 15.9% respectively in summer and 7.2% and 8.9% respectively in winter (Vanden Brouck, 2008). It is estimated that around 18,1 million day-tourists visited the coast in 2009. The peak estimate was in 2003 with 18,9 million visitors (Vandaele and Callens, 2010).

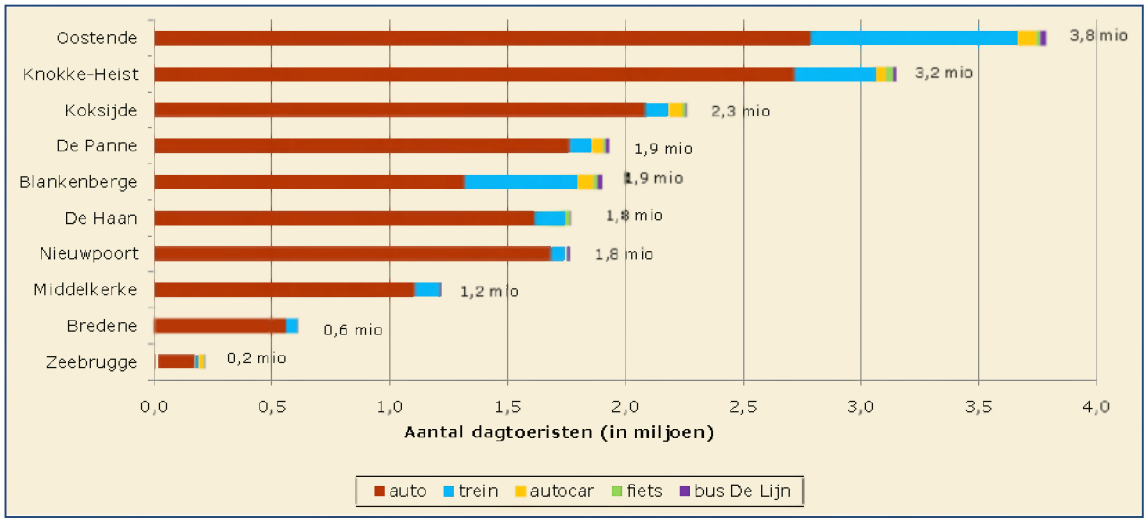
Figure 3.4. Evolution of day-tourists 1997-2009.[*]



[*] Source: Vandaele and Callens, 2010.

On the busiest day at the coast there were around 250,000 day-visitors and around 350,000 visitors that stayed overnight (Vandaele and Callens, 2010). Around one third of the total day-tourists visit the coast during the summer (July-August). The rest are spreads throughout the year. Most of the day-tourists come to the coast in private cars. Only 12% of the visitors come with the trains (Vandaele and Callens, 2010). They generate considerable congestion on particular routes to and within the coastal region, especially in summer.

Figure 3.5. Number of day-tourists to the coastal communes in 2008, divided by mode of transport.[*]



[*] Source: Westtoer, 2010.

3. Resource Users Overview

3.1 Inhabitants

3.1.1 Brugge SA

The Brugge Study Area (SA) accommodates in total 255,875 people, and has a total area of around 61,600 ha. Table 3.11 gives detail on the population by each commune in the study area, divided by age group (West-Vlanderen Ontcijferd, 2001-2010).

Table 3.11. Population of the Brugge SA at the end of 2008.

Commune	0-17 y	18-64 y	65+ y	Total	Density
Berneem	2,924	9,313	2,660	14,897	208
Blankenberge	2,675	11,183	4,789	18,647	1071
Knokke-Heist	4,697	19,543	9,644	33,884	600
Zedelgem	4,552	13,812	3,677	22,041	365
Sub-total Ring zone	*14,848*	*53,851*	*20,77*	*89,469*	*435*
Brugge	20,823	71,589	24,274	116,686	843
Damme	2,062	6,749	2,021	10,832	121
Jabbeke	2,876	8,543	2,335	13,754	256
Oostkamp	4,562	13,928	3,848	22,338	280
Zuienkerke	560	1,8	436	2,796	57
Sub-total Core zone	*30,323*	*100,809*	*32,478*	*163,61*	*406*
Brugge SA	45,171	154,660	53,248	253,079	415

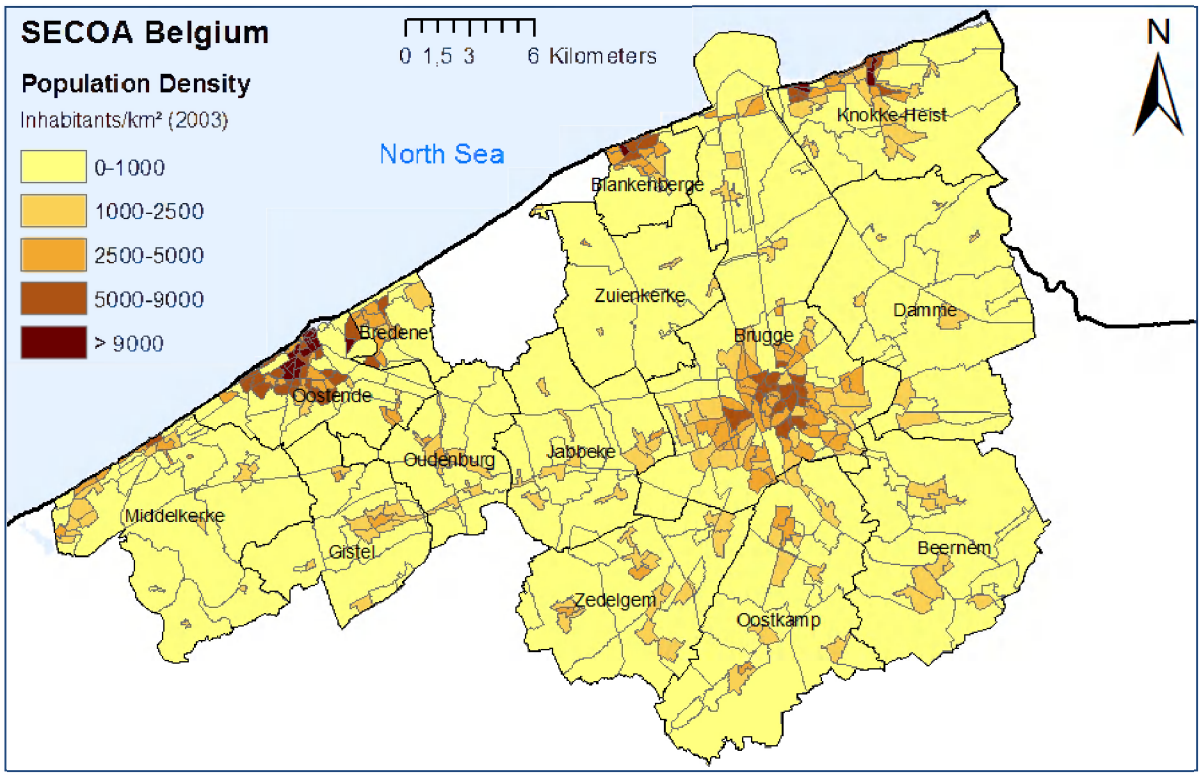
Population has increased slowly in both the core and the ring of the Brugge SA with the growth in the ring a little higher than in the core – in other words, there is modest relative decentralization. Population growth has been faster during the period 2000-2008 (0.95%) than during the period 1991-1999 (0.86%).

The core area of Brugge SA accommodates two-third of the total population of the Study Area. Brugge Municipality (the central core) accounts for 70% of the total population of the core and 45% of the total population of the Study Area.

The ring has a relatively older population with 23% of the total ring population being over 65 year-old. Blankenberge and Knokke-Heist have the highest proportions of aged population (26% and 28% respectively). In comparison, 20% of the core population is over 65 year-old, with Brugge having the highest proportion of 21%. In the ring, the proportion of young population (under 17 year-old) is lower than the proportion of older population (over 65) while in the core the situation is reversed.

The average density of the whole study area is 415 persons per square kilometer, with the ring and the core having somewhat similar densities. Brugge Municipality is the most populous area with a density two times higher than the regional average. Brugge Municipality is one of the most populous areas in the Province of West-Flanders (West-Vlaanderen Ontcijferd 2010). Blankenberge (in the ring and at the coastline) is the third most populous commune. Some sections within Brugge have a density of between 5000-9000 people/km^2. In Blankenberge and Knokke-Heist, there are some sections with densities over 9000 people/km^2 (see Population Density map below).

Figure 3.6. Population density of the two Belgian case studies in 2003.



In the ring, private household size has decreased steadily from 2.43 in 1992 to 2.2 in 2008. The core has experienced a brief increase in private household size in the period 1992-1993 but subsequently there has been a steady decrease. Nevertheless, private household size in the core is still higher than in the ring. This phenomenon might be linked to the higher proportion of migrants in the core, those often live in larger household units.

Data on in-migration for each commune within the Brugge SA and the core and ring of the study area shows that Brugge Municipality is the commune with the highest in-migration flux during the period 1997-2007, accounting for 80% of the total in-migrants in the core. Within the core, Zuienkerke has the fastest growth in in-migration. In the ring, Knokke-Hesit is the most popular destination for in-migrants, followed by Blankenberge. However, in relative term, Blankenberge has the highest proportion of in-migrants as a proportion of the total population.

Around two third of the people moving in the Brugge SA go to the core. However, the figures show that the growth due to in-migration is becoming slower in the core compared to the ring. It increased 11.85% in the core compared to 16.08% in the ring, 1997-2007, even though the former remains the main focus in absolute terms.

Out-migration in Brugge SA is as fast as in-migration, and sometimes out-paced it. Most of the people moving out of Brugge SA are from Brugge Municipality. In the ring, Knokke-Hesit and Blankenberge also have high rate of out-migration. Out-migration seems to mirror in-migration in most communes, with Zuienkerke and Blnakenberge experiencing the fastest out-migration in the ring.

Internal migration shows the movement within the country. Internal migration data for the communes in the Brugge SA show a diverse picture. In the Brugge Municipality, a generally high in-migration Figure 3.was seen between 1997 – 2002 when there was always a positive influx of internal migrant (from other communes in Belgium). There was a dip in 2002 when there was a small negative influx but internal picked up during the period 2003-2005. During the period 2005-2007, there was a steady negative influx of internal migrants to Brugge, indicating that less people from other Belgian communes came to settle in Brugge compared to the number of people moved out of Brugge. During the same period 1997-2007, there was a positive influx into most of the communes surrounding Brugge. Blankenberge and Knokke-Heist were the two communes with positive high influxes throughout, both in term of absolute numbers and in term of the proportion of migrants in relation to the population. Oostkamp is

the third commune which has experienced an increasing trend in in-migration internally. For other communes, internal migration was variable. In relative term, Zuienkerke saw the most of its population moved to other Belgian communes.

In 2000, most of the residential relocations within the Brugge SA occurred within the core. Migration from ring to core or from core to ring is very limited in absolute terms in comparison to migration between the communes in the core. In 2000, core mobility was 59.35% of the total mobility while it was 27.05% in ring mobility. Movement from ring to core is similar to the rate from core to ring.

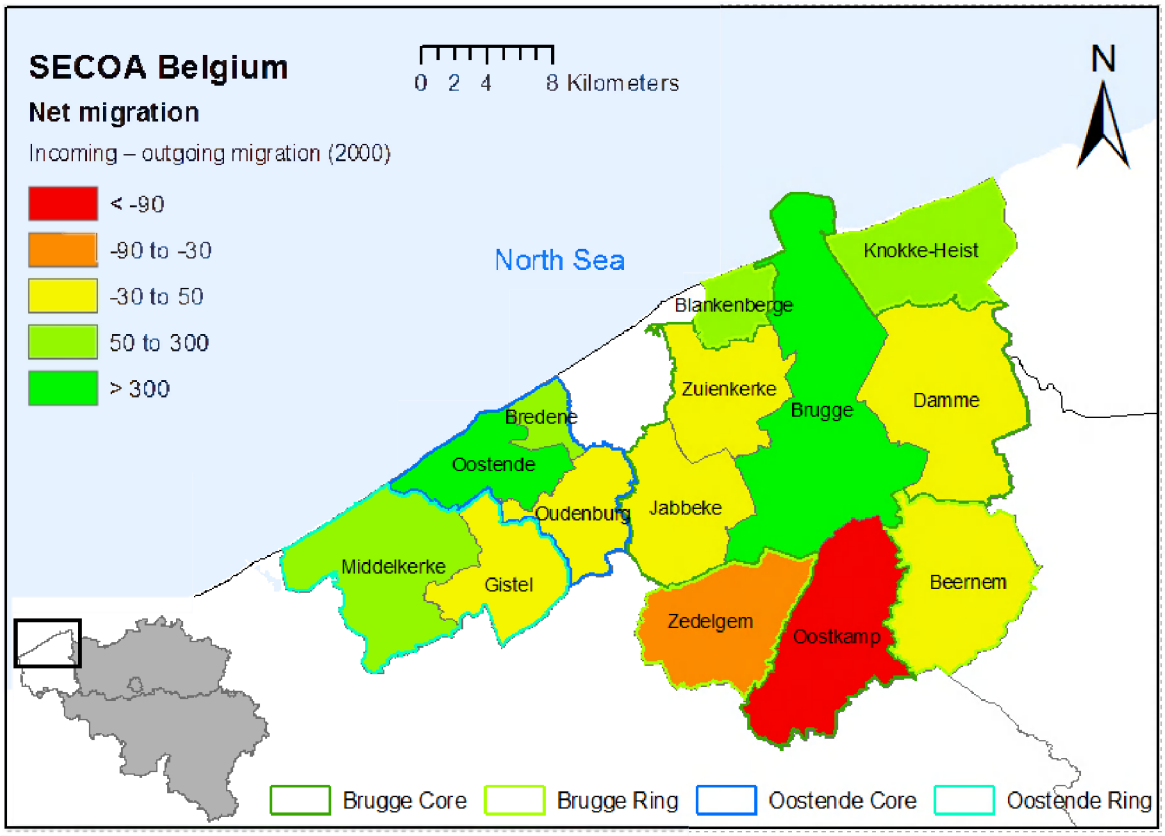
Table 3.12. Migration between the ring and the core of the Brugge SA in 2000.

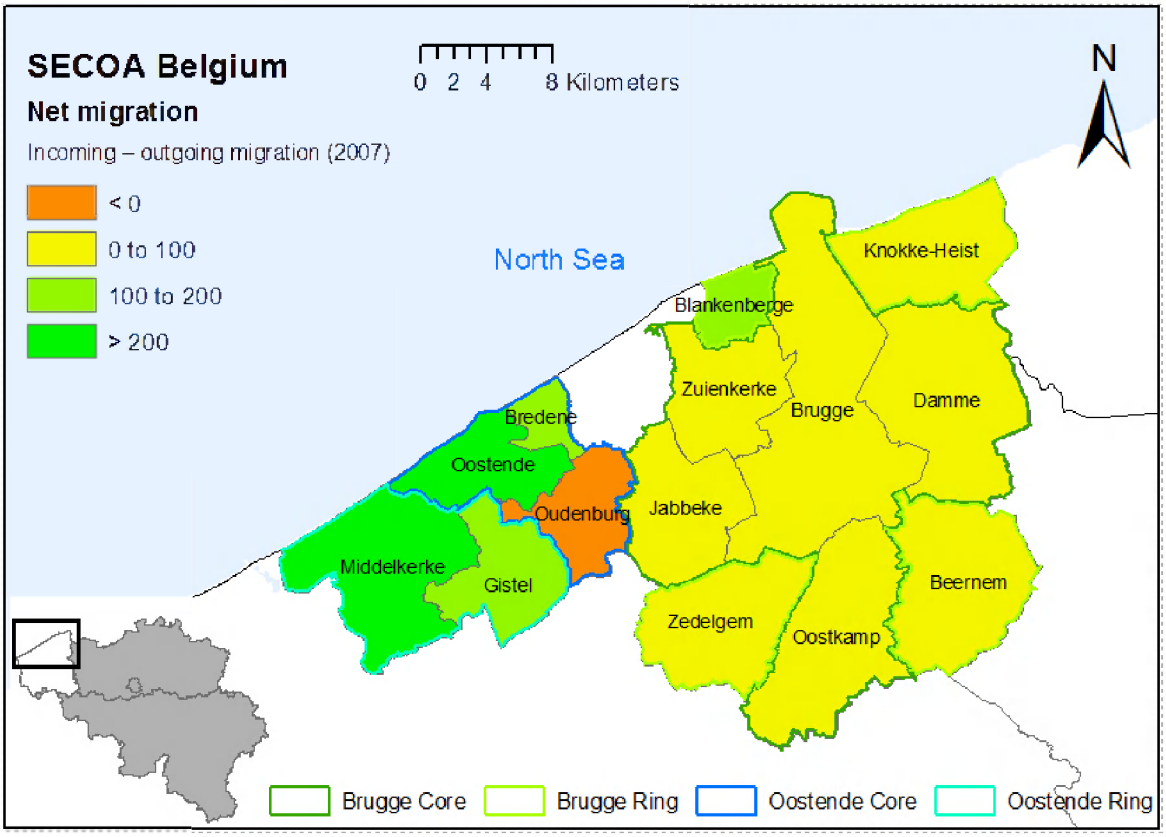
Year 2000	From\To	Core	Ring	Total
Brugge SA	Core	10121	1077	11198
	Ring	1242	4612	5854
	Outside	2432	2383	

External migration shows the movement amongst different countries, i.e. number of people moving in and out of Belgium, also called international migration. Brugge Municipality in general the most popular destination for foreign migrants.

During the period 1997-2002, many communes saw a negative Figure 3.for external migration, which signifies that the number of people moving in from abroad was lower than the number moving out to foreign destinations. Brugge and Knokke-Hesit are the two communes with the strongest positive trends throughout the period 1997-2007, with more people coming in than went out.

Figure 3.7. Net Migration 2000 and 2007.





3.1.2 Oostende SA

The Oostende Study Area (SA) accommodates a total of 124,209 people, distributed across a total area of around 20,500 ha. Table 3.12 gives details of the population of each commune in the study area, disaggregated by age groups (West Vlanderen Ontcijferd, 2001-2010).

Table 3.13. Population of the Oostende SA by end 2008.

Commune	0-17 y	18-64 y	65+ y	Total	Density
Gistel	2,526	7,171	1,997	11,694	269
Middelkerke	2,832	10,876	4,911	18,619	243
Sub-total Ring zone	*5,358*	*18,047*	*6,908*	*30,313*	*252*
Bredene	3,123	10,049	2,695	15,867	1191
Oostende	10,631	40,602	17,812	69,045	1834
Oudenburg	1,764	5,484	1,736	8,984	253
Sub-total Core zone	*15,518*	*56,135*	*22,243*	*93,896*	*1087*
Oostende Area	41,752	148,364	58,302	248,418	605

The population has increased slowly in both the core and the ring of the Oostende SA with the growth rate of the ring being a little higher than that of the core: therefore, as in Brugge, there is relative population decentralization. Population growth has been faster during the period 2000-2008 than during the period 1991-1999. Although the population grows slowly, Oostende SA still has one of the fastest growth rates in the Province of West-Flanders. There is a high degree of concentration of population, and population growth Most of the growth occurs in the core. The core area of Oostende SA accommodates two-third of the total population of the Study Area, with three-fourth of that population concentrated in Oostende Municipality.

Oostende Municipality, the city core, has the oldest age structure, with nearly 30% being aged over 65. Only Middelkerke, in the ring area, has an older age profile.

The average density of the entire study area is 605 people per square kilometer. The core zone has a much higher density than the ring, with Oostende Municipality having a density 3 times higher than the regional average. Oostende Municipality has the highest population density in the Province of West-Flanders (West-Vlaanderen Ontcijferd 2010). Together, Oostende and Bredene Municipalities are the two most populated communes in West-Flanders. Both border the sea. The third most populated commune in West-Flanders is also a coastal

commune, Blankenberge. In Oostende, there are many sub-areas with population densities of over 9000 people/km^2, many of them on the coast (see the Population Density map in the Brugge case study).

In contrast, coastal communes have lower household sizes, with the average household size in most such communes being below 2.3. In the Oostende SA, Gistel (in the ring) had the largest household size of 2.45 in 2008. Oostende Municipality has the lowest private household size in the Province of West-Flanders of just 1.97 (West-Vlaanderen Ontcijferd 2010). In both the core and the ring, the average size of private households has decreased during the last fifteen years.

During the period 1997-2007, the Oostende SA has experienced a gradual increase in in-migration. Oostende is the most popular destination, followed by Middelkerke, then Bredene. All three are located at the coast. The core receives around three-fifth of the total in-migrants – slightly less than its share of total population, suggesting that migration is also contributing to the overall patterns or modest relative population decentralization.

Most of the people leaving the area were from Oostende Municipality, Middelkerke and Bredene. There were also far more people leaving the core than the ring. In the Oostende Municipality, the out-flux of population declined during the period 1999-2002 then picked up again in the period after 2002. Out-migration in the core accounts for around 76.5% of the total out-migration of the SA. The proportion remains quite stable during the period 97-07.

Internal migration reflects the movement of population amongst Belgian communes. In the Oostende SA, Oostende Municipality experienced positive internal migration between 1998 and 2006, with a peak in 2002. In 2007, Oostende Municipality had a negative figure, indicating that people moving out of the area outnumbered the number moving inwards. In general, more people moved into the ring than the core, even thought the latter accounted for some two thirds of the total population of the metropolitan area. In the Core, there is a declining trend in internal migration, with less and less people moving in – although the overall net internal migration continues to be positive.

External migration reflects international migration into and out of Belgium. Oostende Municipality is the main destination for international migrants in the metropolitan area, with positive international migration figures during the last 5 years. Most (more than 90 % in 2007) of the international migrants choose the core to move in.

3.2 Industrial/Commerce/Agricultural holdings

The number of businesses in the primary sectors (agriculture, forestry and fisheries) has been increasing marginally in the core and reducing more noticeably in the ring in both Brugge SA and Oostende SA during the last decade. The number of businesses in industry and construction in Brugge SA has reduced by around 7% between 2001 and 2008 in both the core and the ring while in Oostende SA the reduction is observed in the core (at the rate of 8.4%) while a 4.4% increase is observed in the ring during the same period. For Brugge SA, businesses in commerce and services have been increasing in both the ring and the core, with the core sees the most development (around 10.5%). Meanwhile, in Oostende SA, commerce and service sectors has not picked up the places left by other sectors, with a marginal increase of near 2% in the core.

Overall, in both SAs, commerces and services are the major players, accounting for more than 80% number of businesses. They also provide substantial employment (more than 80% in Brugge SA and more than 70% in Oostende SA).

3.3 Tourism establishments

Brugge city is considered one of the most attractive historic-cultural cities in Europe. In 2007, Brugge SA attracted a total of approximately 1,150,000 visitors, and 69% of these had visited the core area (mainly Brugge Municipality). During the last 5 years, number of lodging establishments remains stable in the central core (the Brugge Municipality).

Table 3.14. Number of lodging establishments in the Brugge Municipality.[*]

Type of lodging	2006	2007	2008	2009
Number of hotels	109	111	111	113
Number of hotel rooms	3,112	3,171	3,264	3,497
Number of hotel beds	6,998	7,118	7,180	7,693
Number of guesthouses	143	157	168	168
Number of guesthouse rooms	301	337	362	363

By 2002, Oostende had 45,678 beds, accounting for 9% of the total beds in the coastal area of Belgium. Three fourth of the amount are come from individual rental of vacation

[*] Source: Annual report of Brugge Municipality, 2009.

premises and second homes. The rest come from hotels and campsites. Although the number of tourists has increased year on year, the number of hotel beds has decreased year on year. This has important implications in terms of economic impacts, and patterns of visits – although data is lacking for both these aspects.

Table 3.15. Evolution of number of hotels in Oostende Municipality and the Coast 1997 – 2002.[*]

Year	Oostende		The Coast	
	# establishments	Total rooms	# establishments	Total rooms
1997	70	2,360	418	8,972
2000	68	2,388	387	8,443
2002	65	2,387	367	8,062
% difference 97-02	-7,1	1,1	-12,2	-10,1

3.4 Harbours

There is a port at each of the two Belgian case-studies. They are the main industrial players in the study-areas as they accommodate various types of industrial facilities within the port's area.

3.4.1 Port of Zeebrugge

Zeebrugge is internationally renown as a quick port of call where even the biggest vessels can easily moor regardless of the tide. The handling time is also limited to a minimum thanks to the high productivity and the specialized know-how of the dockworkers. Subsequently, the cargo also needs to be transported free of congestion to the customers in the European Hinterland. In order to safeguard this fluent cargo traffic, the inland connections need to be optimized constantly.

The port authority, together with the responsible bodies continually, sees to it that maritime access and connections by road, rail and inland navigation are able to ensure the mobility of the present and the future cargo volumes.

The port of Zeebrugge is a rapidly growing port within the range of ports from Hamburg to Le Havre. The port handles a volume of 45 million tons on an annual basis. The core business of Zeebrugge consists of throughput of unit loads (roro freight and containers).

[*] Source: Tourism Vlanderen, 2005.

They take up three quarters of the total port activity. The last years the container traffic has surpassed the volume of roro traffic.

During the last 10 years, container traffic in Zeebrugge has more than doubled. The seawardly location on the coast, the unlimited maritime access and the modern port equipment are important assets for Zeebrugge. These assets are essential for the newest generation of Ultra Large Container Carriers (ULCCs). Container ships with a capacity of more than 10,000 TEU are almost a daily feature in Zeebrugge. At the same time, the new infrastructure offers new impulses, mainly around the Albert II dock.

Nowadays 28,000 people have a job directly or indirectly related to the port. In 2008, the direct employment in Zeebrugge increased with 3.6% (up to 11,111 full-time equivalents). This increase can be attributed to the maritime cluster where 410 extra full-time equivalents have been deployed (mainly in the handling of goods). In 2008, the indirect employment amounted to 16,902 full-time equivalents. This can be divided into 10,714 full-time equivalents in the maritime cluster and 6,188 full-time equivalents in the non-maritime cluster. Also in this segment the employment in the maritime sector increased heavily.

The port policy aims at a balanced division over the various ways of transport. The road transport is dominant in Zeebrugge, but railway transport is also well developed. Currently, Zeebrugge still lacks an adequate connection with the European inland navigation, which is temporarily compensated through the deployment of estuary ships.

The strong increase of container traffic largely determines the evolution of the modal split. In 2009 the port handled 25 million tons of containers (2.3 million TEU). At a rough estimate, in 2030 the Western outer port will handle about 5 million TEU. The hinterland for containers is reached by road, by railway and via navigation.

3.4.2 Port of Oostende

The port of Oostende, situated in Europe's busiest maritime area, is undoubtedly a versatile shortsea port. It can accommodate all types of coastal maritime traffic. The port of Oostende has been in the passenger business for over 150 years since the establishment of the very first regular service between the UK and the continent in 1846. There is no dedicated passenger service nowadays, but Trans-Europe Ferries combines passenger and freight service on its line to Ramsgate. A contemporary passenger terminal and an entirely new cruise quay with a length of 250 m and a depth of 10 m are important assets to attract cruise companies to

Oostende. Ships berth in the middle of town and the historical cities of Flanders are within easy reach.

In the past few years, the expansion of the ro-ro port got the main focus in the modernisation of the outer port. Nowadays Oostende is an important short sea hub for traffic to the UK. The port handles about 300,000 ro-ro units per year.

The general cargo port is an essential element in the port activities. Seadregded aggregates are important import products as well as other products such as ferro sillicium, building materials, timber and fertilisers.

The construction of windmills on the Thorntonbank in the North Sea, has brought an entirely new industry to the Port of Oostende The port has invested in a new infrastructure on the East Banks of the port, which made it possible to construct and transport the windmills to sea. New projects are planned in the future.

Until 2008 there was a steady increase in the traffic of goods reported in the port. In 2008 they first reached a total amount off over 8 million ton. This was well within the expected growth rate of 5%. The biggest addition for this was to be found in 'general cargo', mainly minerals, sand and gravel, with an increase of 14.1%. The main activity at the port, roro-traffic also improved with 4.6%.

Although a positive evolution was expected for 2009, activities plunged, due to the global economic crisis. Several businesses had a hard time, and one off the biggest players in Oostende on the market of roro-traffic, Cobelfort, ceased its activities.

3.5 Second home owners

In 2007, the coastal communes of Brugge SA and Oostende SA had in total of 82,700 second homes (Gunst *et al.*, 2008). Coastal communes within Brugge SA are the most popular destinations for second-home owners, with Knokke-Heist leading the list with approximately 18,200 second homes. Blankenberge has roughly 6,600 units and Zeebrugge has around 830 units (Gunst *et al.*, 2008).

The coastal communes of the Oostende SA are also a popular destination, with Middelkerke being first ranked with more than 14,000 units, followed by Oostende with around 6,600 units. Bredene also has around 1000 second homes units (Gunst *et al.*, 2008).

Between 1989 and 2007, the total number of second homes in the coastal communes (both Brugges SA and Oostende SA) has increased by more than 25,000 units or 43%,

representing an annual increase of approximately 2% (Gunst *et al.*, 2008). Most of the second homes are at the sea-front, right onto the beaches.

Approximately 60% of the second homes are used by the owners (46%) or made free for his/her acquaintances (14%) for tourism/recreation purposes. Around 40% of the second homes are used as tourist lodging facilities (rented accommodation) (WES, 2008).

The coastal communes of the Oostende SA are a popular destination for second home owners, with Middelkerke on top with more than 14,000 units, followed by Oostende with around 6,600 units. Bredene also has around 1000 second homes (Gunst *et al.*, 2008). The number of second homes in Oostende has increased from 5,220 units in 1989 to 6,600 in 1997 and has since been relatively stable.

4. Conclusions

The two Belgian case-studies lie next to each other and occupy more than a half of the Belgian coastal zone. They are similar in many aspects but also have distinct features. While Brugge develops based on two main pillars: its multifunctional cargo port area and its touristic heritages, Oostende relies on strong beach tourism and a port as a passenger gateway. Both cases have witnessed their strong urbanization process decades ago and their development has become stabilized during the last decade. The economies rely more and more on commerce and service sector rather than traditional industrial activities. Agriculture has reduced to a marginal role, both in term of production and in term of employment.

Most of the resources are not exploited for their material values but for their extrinsic values through the protection of natural ecosystems and habitats. The most important resource in both case study areas is actually the scarce spaces where multiple uses are taking place. The major users include the local inhabitants, visitors, second-home owners, and various community groups. In Brugge, the port of Zeebrugge is one of the major users as it occupies a large area, which contains also valuable nature sites as well as important road, rail and waterway links to the hinterlands. In Oostende, competition at the beachfront is one of the main issues. Other issues confronted by the two cases are environmental protection, natural habitat conservation, better mobility condition for both local inhabitants and tourists, and social welfare and cohesion.

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ABSTRACT: This chapter presents an overview and analysis of the various aspects of resources and users in the two Belgian cases of Oostende and Brugge. These two case study areas lie next to each other and occupy around half of the total Belgian coastal zone. The Belgian coast is a densely populated and intensely used area due to its well-established infrastructure that makes the coast easily accessible for a broad (European) hinterland. Both the Belgian cases have a larger core and ring and are famous tourist attractions. While Brugge develops based on its two main pillars of multifunctional cargo port area and its touristic heritage, Oostende relies on strong beach tourism and a port as a passenger gateway. Both cases have witnessed their strong urbanization process decades ago and their development has become stabilized during the last decade. The economies rely more and more on commerce and service sector rather than traditional industrial activities. Agriculture has reduced to a marginal role, both in term of production and in term of employment. The major users include the local inhabitants, visitors, second-home owners, and various community groups. In Brugge, the port of Zeebrugge is one of the major users as it occupies a large area, which contains also valuable nature sites as well as important road, rail and waterway links to the hinterland. In Oostende, competition at the beachfront is one of the main issues. Generally ageing population, loss of agricultural lands, slight increase of mixed-use forest and nature areas, increase in port activities and urban sprawl are some of the trends observed in both cases. The scarcity of coastal space, and its contestation by a diversity of users for competing interests [mainly economic development and environmental protection] plays a pivotal role in generating a range of conflicts.

KEYWORDS: Brugge, Oostende, Belgian coastal areas, environmental characteristics, socio-economic features, coastal users.

Submitted: 01th July 2012
Accepted: 23th July 2012
Published: 20th February 2013