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Waterscapes in Transformation: The Case of the Belgian Coastal Area

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ABSTRACT - *The socio-economic impact of nature in Belgian coastal landscapes on a regional scale is high due to their general attractiveness for visitors, their strongly developed tertiary service economy and other related sectors (tourism, residential, agriculture…). Due to climate changes however, these coastal landscapes and their required accessibility and continuous character are threatened by the unavoidable planned infrastructures (dikes, new connections, floodable areas, etc.) that will generate ruptures, frictions and additional transition spaces within the landscape. Flanders urgently needs to unfold policies and strategies to avoid or reduce the undesirable effects of the expected changes. Influential changes for the coastal zone will be sea level rising, increasing temperature, changing rainfall patterns, floods, fragmented ecological system, salinization, and reduced drainage capabilities to sea. A thoughtful planning policy forms the necessary key to a sustainable development. Policies and plans lead to the formulation of spatial proposals for mitigation and adaptation, to be executed by major infrastructural works planned for the next decades. Most of these infrastructures, conceived at a large scale, generate a different model of accessibility for the Flemish Coastal landscape.*

Keywords: accessibility, Belgian Coast, climate change, landscape resilience, waterscapes

The aim of this research is to produce insights on how to improve access to the coastal landscapes by developing a case study situated on the Belgian Coast, the *Uitkerkse Polders*. This case study and the following exploration of spatial strategies to improve accessibility contribute to the discussion on maintaining or even improving the socio-economic impact of nature in this region.

NARRATIVE AND REFLECTION ON THE BELGIAN COASTLINE

The scene of the Belgian coastline today is unique in Europe, both in its quirkiness and its abomination. Until the nineteenth century, the coastal zone was a unique entity on a geo-morphological level, with only limited occupancy. Social phenomena caused a transformation of this coast at the North Sea, with privileged groups enjoying seaside holidays. The spatial impact on the coastal landscape was until then non-existent. Entrepreneurs saw a chance to profit from this uncultivated landscape. From 1850 until the beginning of 1900, they transformed fisher villages into seaside resorts and created new seaside villages in the untouched dunes. The curative aspect of tourism

Figure 1. The Belgian pier of Blankenberge.

shifted towards leisure and entertainment, towards “see and to be seen.” New facilities and structures resulted from this development, including sea dikes and walking promenades. These structures became the symbol of the coastal villages. The Belgian Pier of Blankenberge (Fig. 1) is the clearest example of this development. Real estate companies and property developers took initiatives. The city of Oostende and seafront fishing villages (Blankenberge, Heist, Wenduine) transformed into coastal towns with a more urban lifestyle, with compact buildings replacing the original houses.

The construction of the tramline in 1886 caused a definitive uptick in tourism in the coastal zone (Fig. 2). New coastal villages emerged in a short time. The first example of an entire new coastal village is Nieuwpoort, followed by Middelkerke, Westende and Knokke. These developments had a linear division of building blocks. In other coastal villages, the starting point of the organization was not the closed building block, but a romantic image of landscape and nature. The urban concept of the garden city was the basis for the design of those new villages with a more elite public as final user (Het Zoute, Duinbergen, De Haan).
One may say that the spatial structure of the coastal zone was fixed before World War I. Hotels and villas were the only form of lodging. The touristic clientele was international and belonged to the upper class. Despite these urban developments, the large, untouched dune landscapes were still the dominant character of the coastal landscape.
This changed slowly after Word War I. The eight-hour workday and the law decreeing annually paid holidays (issued in 1936) for workers and employees

Figure 2. Old Belgian tramline (Koninklijke Baan), Bredene, Belg., 1980.

had a clear influence on the holiday phenomenon. New, cheap lodging facilities appeared. Entrepreneurs got permission to set up camping zones, even in dune landscapes. Social holiday homes spread out in a short period. The “royal road,” parallel to the coastline, was completed in 1933, stimulating new built-up areas. At this time, large dune landscapes were still connected to each other.[1,2]

After the disappearance of the “concrete defensive barrier” of the German occupier following World War II, property developers took over the network of

Figure 3. Human land use of the Belgian coastline from 1850 to 1982.

bunkers and defences. Within a few decades, another “concrete rampart” appeared where revenue builders and mediocrity flourished. Inside this narrow “concrete line,” all aesthetic standards were violated. Extremely liberal construction policies were dominant in Belgium during the second half of the previous century and were most visible on the coastline, reducing architecture to a play of blocks of flats, whereby urban design rules were lifted.

Now, a web of social structures appears as a kind of neurotic urbanization. It is clear that Belgians placed individual comfort above the greater good and in fact, there are apartments for the “the common citizen,” offering a sea view to many.

Eric de Kuyper states in his work *Met zicht op zee [With a Sea View]* (1997): “That’s the way the Belgian think. We regard this coastal architecture as kitsch, secretly we hang our heads in shame, but we can live with it when it suits us. So it is opportunistic achitecture.” [3]

The flow of tourists that makes its way to the sea along several main arteries every summer does not consist, unfortunately, of architecture fans, but of sun-seekers. What motivates and attracts them is the sea itself, and the wide sandy beach in front of it. The architecture and urbanism are purely functional and, because of their compact form and tasteless design, still affordable.

This starkly contrasts with the architecture from the end of the nineteenth century. Traces of this period are still noticeable, with the *belle epoque* style visible in parts of Blankenberge and Oostende. Later on, in the first half of the twentieth century, some buildings with architectural quality were built too. Unfortunately, many of these went down during the building boom during the second part of the same century.[4]

Charles Vermeersch drew a diagram (Fig. 3) that shows how human land use took over open coastal spaces during a period of only one-and-a-half century. In 2012, the coastal zone of Belgium had 417.570 inhabitants; an increase of 4% compared to 2002. The aging population of this region is evident: almost half of the inhabitants (49,4%) is over fifty years old, over 25% is over sixty-five years old (Fig. 4).

Another notable number is the amount of housing units situated in apartment blocks in the Belgian coastal towns: 54%. Beside this figure, 39% of the housing units in the coastal zone are not used for permanent living. Compared to other European countries, Figure 5 proves that the Belgian coastline is a very dense region. Compared with other nearby coastal zones, the zone is also the most artificial one (Fig. 5).

Cités de sable, the working title of a photo publication by Christian Meynen (Fig. 6), perfectly reflects the ephemeral character of our constantly rebuilt coastline. Just as an incoming tide is enough to wash away the sandcastles in a single afternoon, it takes less than a generation for a block of apartments to be demolished and another one to be erected in its place. Many plots were redeveloped four times or more in the last century.[5] (Fig.7)

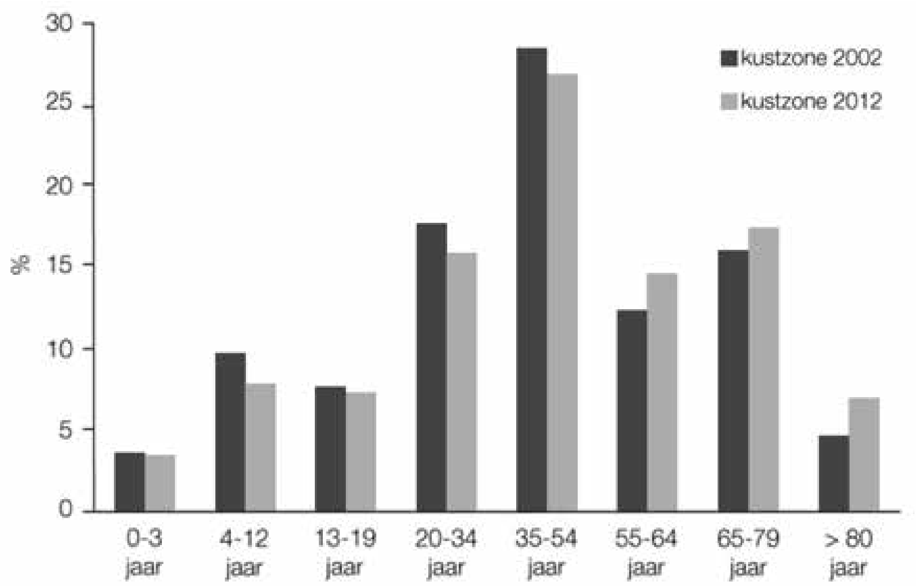

Figure 4. Social structures. The coast and its inhabitants.

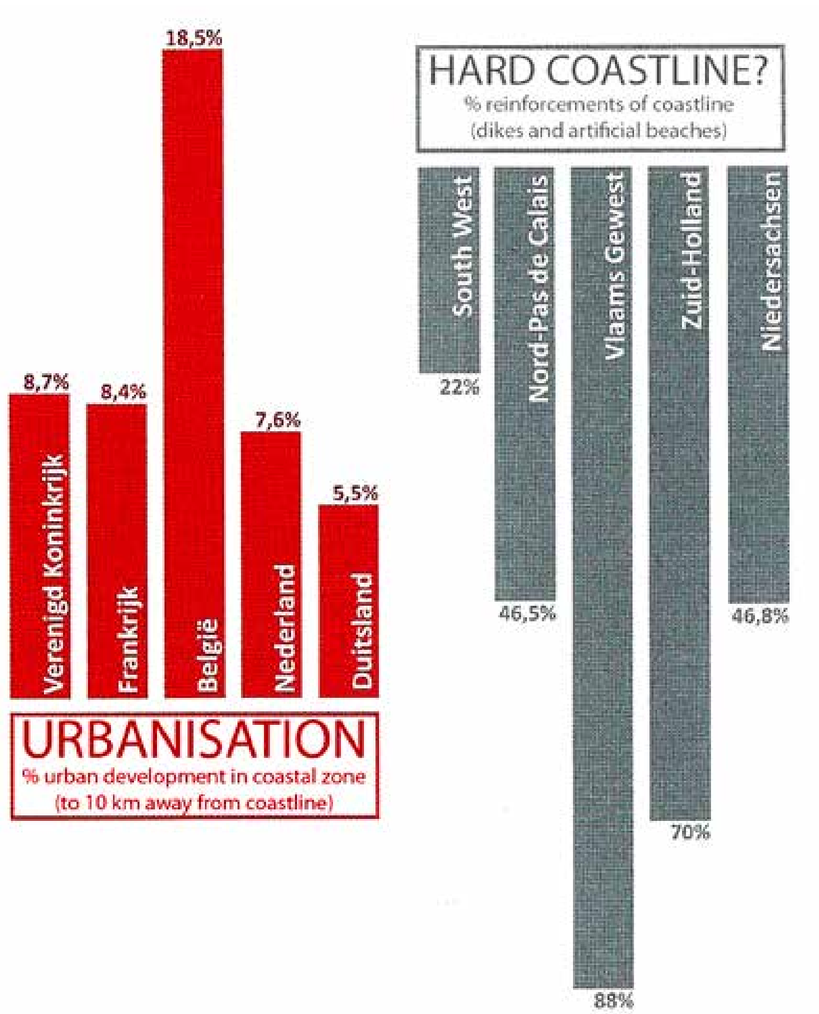

Figure 5. EUROSIAN. Urbanization and “hardness” of the Belgian Coast, 2004.

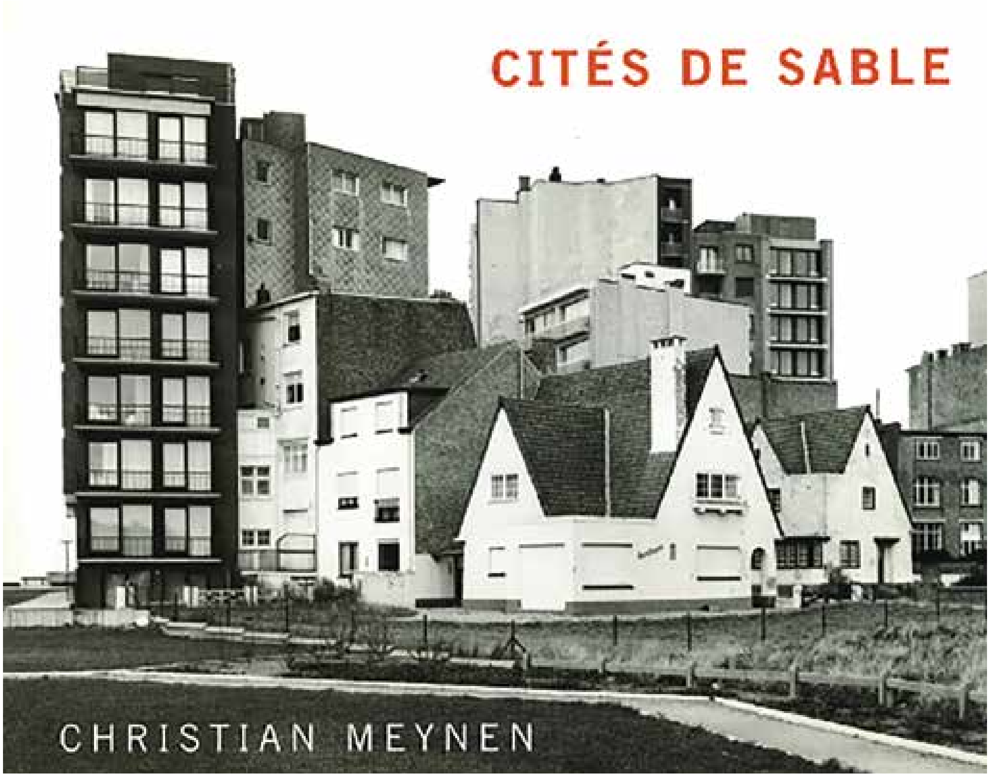

Figure 6. Cover of the book *Cités de sable*, by Christian Meynen (2001).

As Willy Van den Bussche, former Chief curator of the Museum of Modern Art Ostend, put it: “The coastal strip is constantly regenerated. Like the edge of a forest where vegetation is poor, shoots spring up and trunks waste away.” [6] The Belgian coastline was never a border or a limit, but a very dynamic

Figure 7. Heist, Belgium.

landscape that was always changing. However, humans created a firm line of buildings in the twentieth century.
This line can cause problems at the level of resilience. How can we deal with these limitations? Is the linear construction of the coastline an advantage or a disadvantage when creating landscape resilience for the future in terms of climate change? Those limits may serve as a starting point for a clear view on the future.

LANDSCAPE AS PALIMPSEST

A palimpsest landscape is one where, in any given region, the different landforms that make up the landscape are not of the same age. Spatially, therefore, landscapes are composed of a mosaic of active and relict (inactive) landforms of different ages.
As André Corboz stated: “The land, so heavily charged with traces and with past readings, seems very similar to a palimpsest. To set up new developments, to exploit more rationally certain lands, it is often necessary to modify their substance in an irreversible manner. But the land is not a throw-away wrapper or a consumer product which can be replaced. Every land is unique, whence the need to “recycle”, to scrape clean once more (if possible) with the greatest care the ancient text where men have written across the irreplaceable surface of the soil, in order to make it available again so that it meets today’s needs before being done away with in its turn.” [7]
Some landscapes are very sensitive to external shaping by climate or

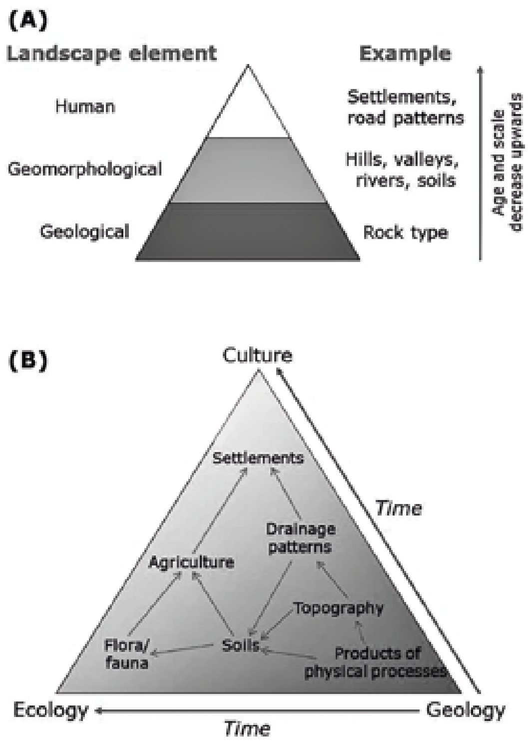

Figure 8. Illustrations showing the interrelationships between landscape elements of different ages. Diagram A shows that elements of the local human landscape are built upon and are thus influenced by underlying geomorphological patterns; and that geomorphological patterns are in turn built upon and influenced by regional geological patterns. The age and spatial scale of these elements both decrease up the pyramid. Diagram B shows the interconnections between the geological and geomorphological basis of all landscapes (bottom right of the ternary diagram) and how these influence other physical and human landscape elements and the development of cultural and ecological landscape patterns over time.

Figure 9. Land van Saeftinghe, The Netherlands (top); Wadden Sea, The Netherlands (middle); Zwin, Belgium (bottom).

human activity, and can change very dynamically over short timescales, whereas other landscapes appear to have changed very little over timescales of millions of years.
Physical landscapes worldwide have been strongly affected by human activity since the development of settled agriculture around 7.000 years ago, and humans are now the most powerful geomorphic agents on Earth.[8] The relationship between physical and human landscape elements can be considered in a hierarchical context (Fig. 8), in which human activity responds to and is influenced by landscape physical patterns and the distribution of geological and geomorphologic resources. An important principle that this hierarchical relationship represents is the role of time in landscape evolution and thus in the development of landscape palimpsests.

The Belgian coastal landscape changed constantly during in course of its history, and drastically through human activity in recent history. In geological timescales, our coastline has always been in motion. Because of a daily pattern of fluctuating seawater, different landscapes or depositional environments arose - coastal barriers, sand flats, tidal flats, marshes, coastal peat swamps, all intersected by tidal channels. They all have their specific relationship with seawater levels. The intertidal area, the zone between the high-water mark and the low-water mark, is characterized by tidal flats and marshes that are very dynamic, adapting themselves to the smallest rise of seawater levels. As tidal flats are silting higher up, and parts of the gutter are becoming land, the area is less influenced by the tide. Marshes are expanding more seaward, followed by coastal peat wetlands landward. When those marshes were influenced again by the tide because of a displaced gutter for example, they evolved quite fast towards tidal flats again. This evolution was active during the general seawater level rising that happened over 7.500 years ago (a rise of 7 m [23 ft.] over 1.000 years).[9] Gutters reached the hinterland increasingly; tidal flats expanded over marshes and basal peat, which in their turn shifted inland. Such shifts of different depositional environments were constantly present during history, due to the driving force of the sea level rising.

The result of the first slowdown in rising sea levels between 7.500 and 5.500 years ago was that parts of the tidal area became high enough to stay dry, leading to the appearance of freshwater marshes. Reeds piled onto peat, gutters continued to move, looking for space to get rid of their sediments. Peat lands evolved again towards tidal areas and through the gutter, abandoned zones had the chance to evolve towards tidal flats, marshes and freshwater marshes. The place where the sediments were dropped by the sea were important for the inhabitation that followed later. This inhabitation, the actual topography and the agriculture all linked with the way of sedimentation.
These dynamic processes were determined by nature and the daily rhythm of the sea. The Wadden Sea is an actual example of this dynamic process (Fig. 9).

At the second decrease in rising sea levels (between 5.500 and 5.000 years ago), the rising lost its driving force. Peat lands became more expansive and existed for a longer time. Peat had the chance to keep on growing and piled up during 2.000 to 3.000 years. There was also a lateral extension, and about 4.800 years ago, the entire coastal area was transformed into coastal peat and swamps, with the exception of de Moeren [marshy region in the Westhoek, politically divided between the French-Belgian border] and the former seaward areas where the deposition of sand and clay continued. In the central and eastern part, the coastal area stretched even further seaward than today, by two to three km [1.2 to 1.8 mi.].
The “Dunkirk-transgressions theory” explains large fluctuations, even floods, in the coastline during the Roman period and the early Middle Ages. A transgression occurred when the coastline shifted inland over a greater length. Between periods of transgression, there were periods where the coastline shifted seaward again, a period of regression. Recent studies are showing that this theory is not correct, since those evolutions happened more gradually.[10]
Tidal flats and marshes are separated from the sea by natural coastal barriers (dunes); they have a temporary character because they exist in a dynamic balance with the sea level. When sea levels rise, sand is eroded and brought into the tidal flat zone. This happens through sea inlets or waves knocking over the barrier. Now the coastal barrier shifts gradually inland and can continue filling the flats in relation to the rising sea level. When surface-peat is developing, the coastal barrier is moving seaward. This dynamic character explains why dunes develop well on a coastal barrier when sea level rising is stable.

The first traces of human activity date from the ninth century. Landowners exploited sheep on the higher points of the marshes landscape. In the eleventh century, Dunkirk- transgression III took place. In the form of a system of creeks, this gradual flood threatened inhabited regions. The threatened population started to defend their homes by constructing dikes. Other areas remained under the influence of tidal gutters. In the region of what is Oostende today, there was an active gutter until the year 860. In Veurne, the total reclamation happened only in 1400. Because of the diking of the region, water drainage of the land had to be arranged through channels and locks.
This drainage system was the cause of the compression of the upper soil deposits and surface lowering. Peat compacts two times more than clay and twenty times more than sand. This difference is the cause for differential compaction. This micro-relief is defined as “inversion of the relief” (Fig. 10).
This can be explained by the term selective sedimentation: sand is deposited in creeks and clay in zones next to the creeks. The inversion of the relief took place when dikes were constructed, drainage systems were built and the landscape became dry. The peat and clay layer subsidence was much stronger than the sand layer of the creek that stayed on the

Figure 10. The inversion of the relief.

same level. Here, creek ridges were formed (Figs. 11, 12). There are some contradictory theories about the cause of this inversion, but it resulted in landscapes with settlements on those dry creek ridges, and infrastructure roads on the higher creek ridges.

Landscape as palimpsest characterizes the dynamic character of the coastline and the landscape. The coastal landscape, the impoldering and the inhabitation of the coast, among other factors, left traces in the

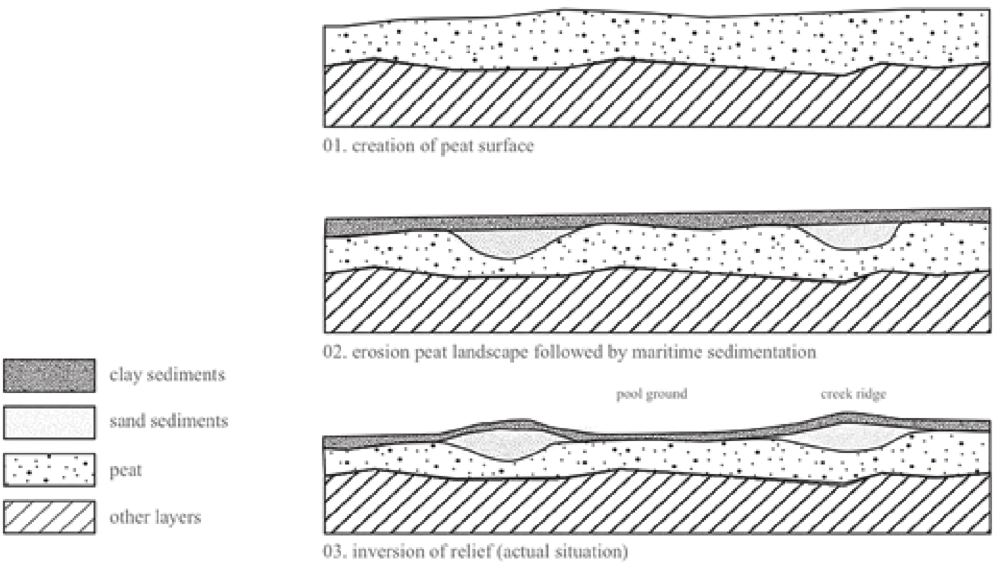

Figure 11. Tavernier, 1970.

Figure 12. Old creeks in the Belgian coastal zone are visible in this aerial view.

landscape that are currently still present. These traces were formed by a natural, dynamic border (in time and space gradient) between land and water. Is it possible to introduce a tidal area into the existing polder landscape of today? Can this resilient zone create a more natural, more secure boundary between land and water? How will a prospective tidal zone react to other climate change effects (increase of precipitation, droughts, etc.)?

COAST AS LINE HAS NEVER BEEN QUESTIONED

Belgians are used to it: the coast as one straight line. It provides an easy landscape to connect and develop; the "royal road" and the tramline (see Fig. 2) go hand-in-hand with tourism and urbanization.
But how can we protect our coast against the effects of climate change? The Flemish government has a Coastline Safety Masterplan [11] to protect our coast, in the first phase on the short term. The whole Masterplan is based upon the coastal defense principle: "hold the line." The Masterplan is designed "to combat a 1000-year storm." [12] It maps the weak points and searches for a solution to ensure the safety for the entire coast until 2050. Another project of the Flemish government, *Vlaamse baaien* [Flemish bays in Dutch],[13] looks further ahead, with a time-frame until 2100. Its main goal is to approach climate change and sea level rises in an integral way using five pillars: Safety, Nature Quality, Attractiveness, Sustainability and Economic development. Here, the government is working closely with private dredging companies.
Effective measures included in the Coastline Safety Masterplan for 2050 are dune supplementations, beach elevations, storm surge barriers, the construction of storm walls, the reinforcement of existing dikes, the adaptation of dike slopes, etc. The entire Masterplan will cost 300 million

euros, with 8 million to be added annually to the total cost in order to maintain the beaches.[14]
The government decided to defend these zones by the “hold the line” principle. When one zooms in on the safety Masterplan (underneath the eastern part), we see that the coastline is divided into different zones, characterized by different color codes. Red stands for seawall security problems according to a “1000-year storm,” and orange translates as problems for the hinterland when there is a breach.

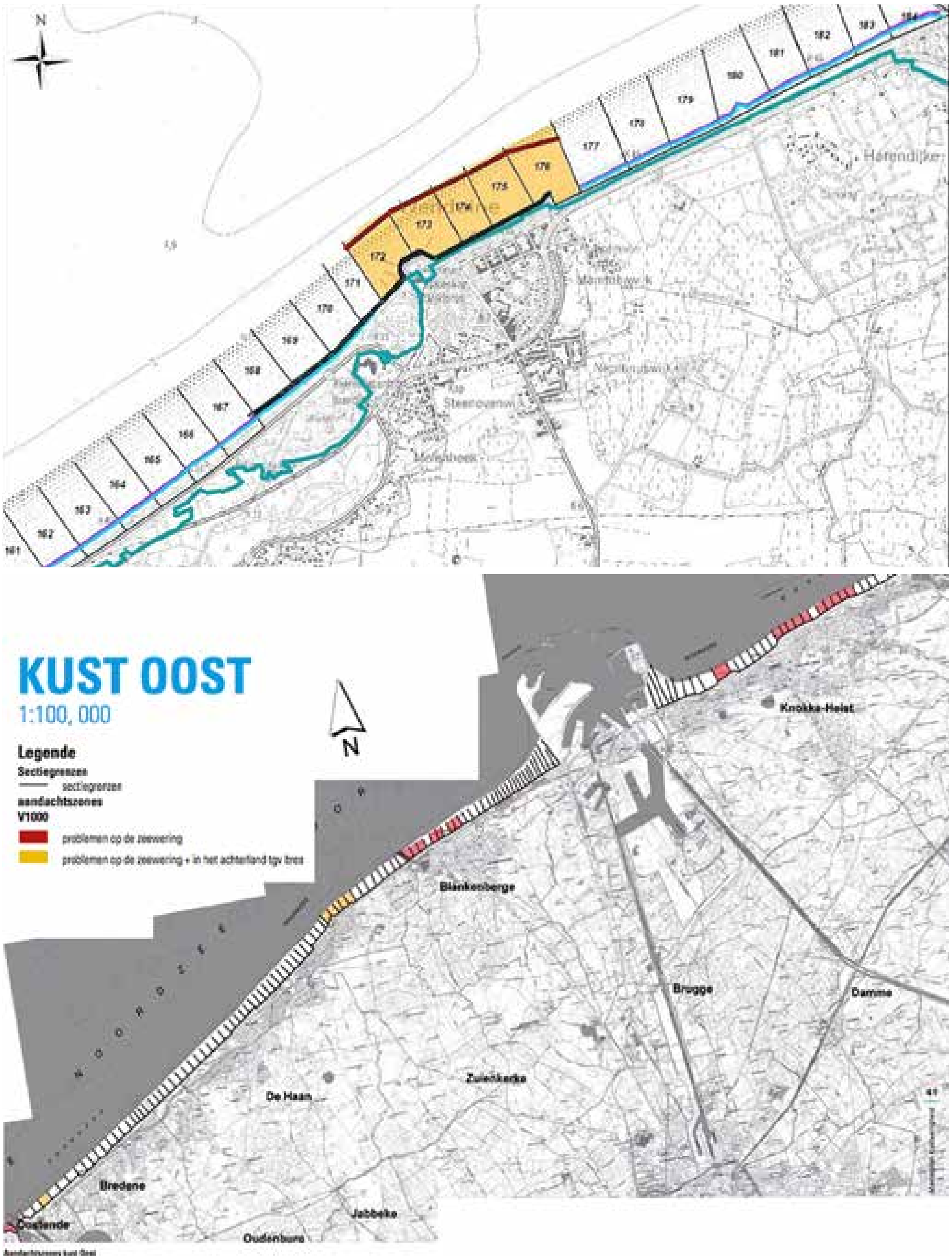

Figure 13. Fragment of the “Coastal Safety Masterplan 2100,” zoom-in on the eastern side of the Belgian Coastal zone and a zoom-in on the coastal village Wenduine.

When one zooms in even more, on the small coastal village of Wenduine (Fig. 13), we see where the weak zones are situated. Specific measures include beach supplementation with low beach (lower than dike). The amount of sand needed will be around 700.000 m^3 [915,600 cu. yd.]. This will be combined with a high wall around the roundabout and a storm wall on the dike.

Both climate plans, the safety Masterplan 2050 and *Vlaamse baaien* are fixated on the sea defense issue and start from the same perspective: protect. Actual developments and security levels are not questioned, and should in the future be maintained at all costs. Other coastal defense principles are “Managed Retreat” (through planned interventions; the coastline is allowed to retreat in a controlled way), “Acceptance” (involves no defense activity other than ensuring safety) and “Advance the line” (involves moving defenses seaward).
Other negative climate effects like extreme rainfall periods (hinterland floods with troubles of drainage), periods of drought and salinization of the soil are not mentioned in the Flemish Coastline Safety Masterplan.
Repeated sand elevations, continuous benches on the dike and a concrete railing as disguised dike defenses suffice for now. The question is whether these measures of the Masterplan remain feasible and affordable after

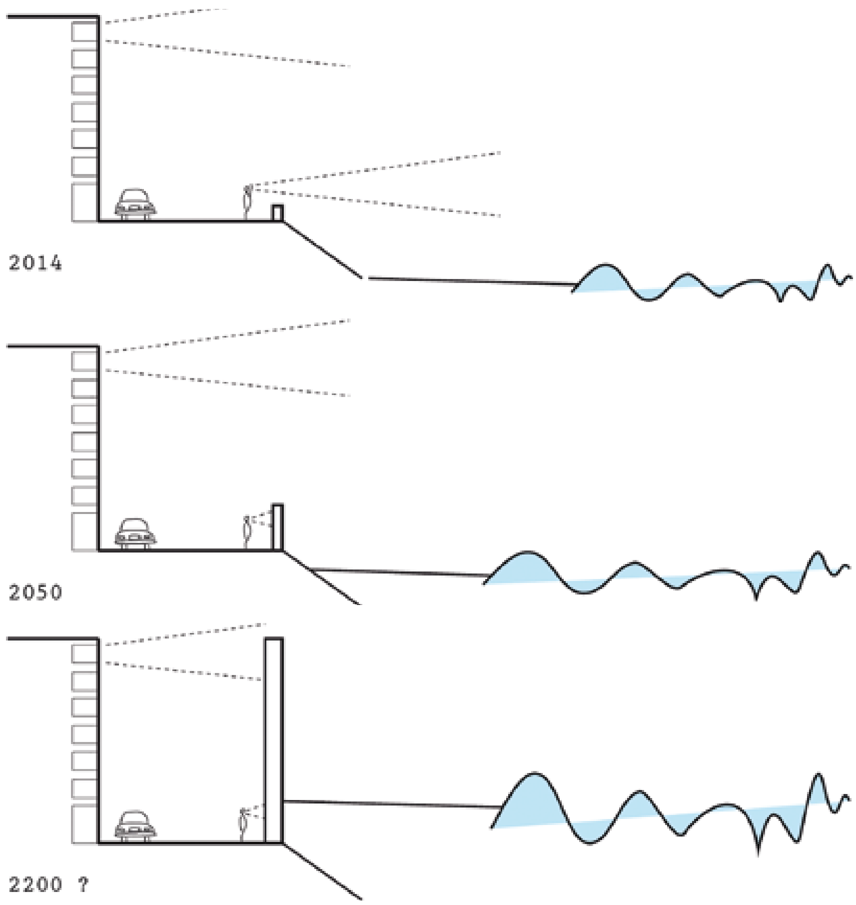

Figure 14. Flemish Coastal Safety Masterplan, an interpretation of the transformation until 2200.

2050. The rise in sea levels continues and any mitigation measure is only temporary. The measures taken are short-term solutions, not solutions for a more distant future; because of this small-step approach, too much time is wasted. To maintain the current levels of safety, the system should be elaborated. Time after time however, structures are expanded, making it increasingly difficult to return and invest in a more resilient concept to deal with the effects of climate change in the Belgian coastal zone (Fig. 14).

The Masterplan suggests that the taken measures provide the necessary flexibility. The plan talks about "solutions that we will not regret" and suggests the pursuit of a resilient coastal front. But the conventional measures and the natural resilience of the coast seem irreconcilable today.[15]
I am questioning whether dredging companies create their own work and are pursuing profit due to this safety Masterplan. They are enlarging the beaches with sand supplementations mentioned in the plan. This sand will erode within a short period and will flow towards the lower sea parts (shipping channels), that will be dredged out again to ensure the continued existence of the harbors.
There are other interpretations on how to deal with our coast and its future. In 2013, the exhibition *Wisselland* [16] displayed another way of dealing with the future of our coast. One of the projects was the project CcASPAR, an alternative approach that will be clarified in the next chapter.

THE COAST AS A RESILIENT ZONE

The project CcASPAR was initiated in January 2009. It took the initiative to look at the spatial effects of climate change in Flanders. CcASPAR (Climate Change and Changes in Spatial Structures) is an inter-academic and interdisciplinary strategic research project funded by the Flemish Agency for Innovation by Science and Technology. Next to the climate effect of the sea level rising, the project is zooming in on other effects that are often disregarded, such as the rise in temperature, changing rainfall patterns, river drainages, etc. The objectives and research approaches are:

- An exploration of Flemish spatial structures, to define and situate the most vulnerable areas due to climate change.
- A qualitative exploration through research by design of possible planning concepts for a more adaptive approach towards changes in spatial structures as a result of climate change.
- A review and evaluation of existing planning instruments and governance mechanisms for the implementation of spatial planning strategies in relation to climate change.[17]

CcASPAR looked at different case studies in Flanders, including the coast. They also questioned whether the current system of uniform coast defence would remain feasible. Natural coastal dynamics cannot be

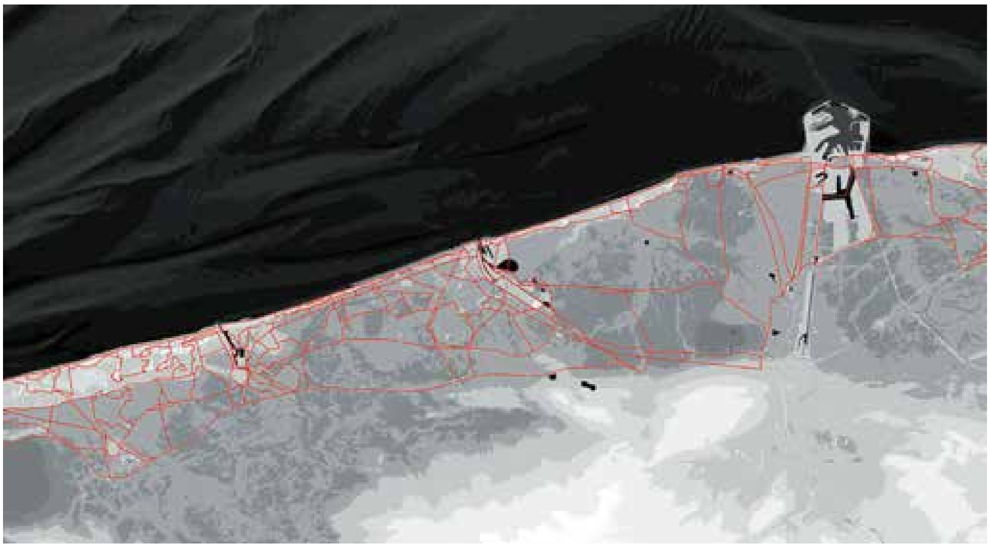

Figure 15. Exhibition *Wisselland*, project presentation CcASPAR, Knokke, 2013-2014.

ignored; these dynamics can deliver spontaneous suggestions, like the natural dune formation along the coastline. CcASPAR argues for the use of existing structures. Every layer of old dike-structures, roads, railway structures, etc. forms artificial micro-reliefs in the landscape, elements for a redesign (Fig. 15).
Redesigning the coast means questioning the notion of "risk." Inspiration can be found in shipbuilding, where instead of strengthening the body of the ship, partitions are placed. An incident is possible, but a disaster is prevented by the partitions. The ship is still floating and the damage can be restored.[18] Another clearer example for architects can be found in fire safety where public buildings are divided into different compartments to minimize damage during a fire.
Instead of one strict line that divides sea and land, the concept of compartmentalization divides the coastal strip into zones. In this way, the coastal zone becomes a dynamic linking system of diverse coastal landscapes. Some compartments are bordered by technical structures like dikes, motorways, railways and so on; others are focused on natural coastal dynamic systems. A composition of dunes, polders, bath villages, water landscapes, marshes, inlet polders, salt grasslands, and mud flats appears.[19]

Compartmentalization allows for a differentiated climate adaptation. This differentiated approach requires the creation of a vision on two scales: the coastal area as a whole and the local compartment. The vision on both scales requires knowledge produced by both science and local actors. The general climate impacts in the coastal region must be listed, but the local vulnerability must also be mapped. As for the field of socio-economic development, there is a need for a vision that encompasses both the coast as a whole and the various components. Only when a broadly supported vision has been developed on both scales can one work on an integrated

climate adaptation. The strategies for the coast as a whole ensure long-term sustainability. Considering local points of attention makes it possible to actively adapt adaptations for area development. [20]
The research "Waterscapes in Transformation: Insights on Landscape Accessibility Challenged by New Infrastructures for Climate Resilience: the Case of the Belgian Coastal Area" focuses on a specific area, Uitkerkse Polder. The research objective is to produce insights and design strategies on how to maintain or improve accessibility and permeability in landscapes challenged by new infrastructures for climate resilience, to maintain the socio-economic impact of nature in the coastal region.

CONCLUSION: WATER AS PROTAGONIST

Climate Change and the Bigger Picture

Climate change is an acute urgency of a global nature with many spatial implications at different scales: [21] new climatological conditions put pressure on existing landscapes, especially the ones defined by water,[22] as the spatial system is defined by a continuity that is now challenged. There are different ways to approach this challenge: both concepts of climate mitigation and climate adaptation are widely used in scientific and political

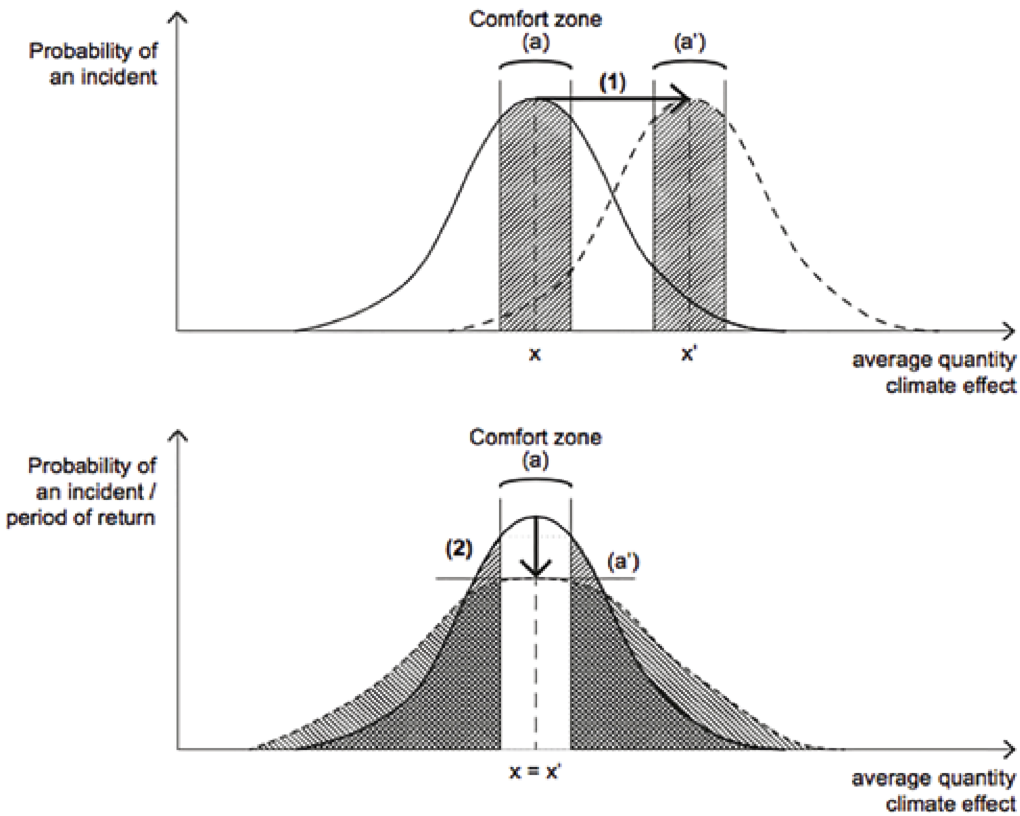

Figure 16. Variations and extremes with changing average amount and changing of variation in average quantity of climate effects.

discourses.[23] The main question here remains: should we tackle climate change or do we have to adapt to this new condition? Mitigation tries to limit the human causes of climate change, while adaptation tries to formulate effect-related answers. Mitigation concentrates on the reduction of pollutant emissions to tackle them at the source; a long-term process and an effort on a global scale. Adaptation however focuses on how to deal with those climate change effects. It works on short and medium time frames and demands engagement on local and regional levels. Decisions on whether measures for adaptation and mitigation should be taken have to be based on the approximation of risks and not on perception.
As *The Economist* stated in 2010:

> Acceptance, however, does not mean inaction. Since the beginning of time, creatures have adapted to changes in their environment. Unfortunately, such adaptation has always meant a large numbers of deaths. Evolution works that way. But humankind is luckier than most species. It has the advantage of being able to think ahead, and to prepare for the changes to come. That's what needs to happen now.[24]

Variation and extremes are an inherent part of the climate. A society or region builds a historical relation with the average climate effects on a local level and this relation evolves in time.[25] This relation can be compared to a zone of comfort, the degree to which a society or spatial configuration has to deal with a certain quantity of climate effects. When there is an exposure towards effects outside of the comfort zone, there will be a need for extra adaptation measures. Two evolutions are possible (Fig. 16). Either effects of the average move slowly to the left or to the right (the zone of comfort will have to be adapted slowly over time), or the average amount of climate effects remains the same, but the variation is changing, with higher extremes as a result. Such a situation can have catastrophic effects and has immediate impact, leaving no time for gradual adaptation like the previous case (changes in precipitation patterns, more droughts and heat waves, stronger and more intense hurricanes, rising sea levels, an overall temperature rise).[26]

Our society has to be adapted to the effects of climate change: we have to protect our vulnerable structures in a resilient and sustainable way. This vulnerability applies to our ports, our cities and our transport systems; but also to our drinking water supply, natural landscapes and agriculture. In Flanders, water issues, drought and storm damage are the core issues of climate shocks. Whichever evolution occurs in the near future, Flanders urgently needs to unfold policies and strategies to avoid or reduce the undesirable effects of the expected changes. The landscapes of the coastal zones will the first to be confronted with climate change effects. The most influential changes for the coastal zone will be: rising sea levels, an increase in temperature, changing rainfall patterns, floods, fragmentation of the ecological system, salinization of the soil and reduced drainage capabilities to the sea.

Landscape Resilience for a Tolerant Accessibility

A thoughtful planning policy forms the necessary key to sustainable development. This message is also expressed in the “white book” for the new urban plan of Flanders: “In Flanders, we want to increase spatial resilience to be less vulnerable to the impacts of climate change.” [27] As an answer to the challenge of climate change on the Belgian coast, policies and plans have been developed and implemented at a European, national, regional and local level.[28] These policies and plans led to the formulation of spatial proposals for mitigation and adaptation, to be executed by major infrastructural works planned for the next decades. Most of these infrastructures, conceived at a large scale, generate a different model of accessibility for the Belgian Coastal landscape: [29] the relation dry/wet is often inverted, topographic changes imply discontinuities in the landscape, roadways and paths need to be reconfigured to guarantee connectivity. These measures change the overall accessibility and permeability of the region. Connecting large-scale infrastructures with the local, small and intermediate scales is crucial for socio-economic development.
Spatial decisions have to be made with water as a guide for spatial planning and architectural decisions on the small and intermediate scale. In the case study of this research, Uitkerkse Polder, space is made for water, a space for both the seaside and shore side, a space for salt and fresh water and a controlled zone where the fresh water meets the salt water. A tidal zone as a statement and good practice for a resilient and sustainable approach to the effects of climate change.

The research strategy of the project “Waterscapes in Transformation” contains the coupling of long-term transformation of the landscape (in function of climate changes and often initiated by the government) with relatively short-term, small-scale (often individual/private) spatial interventions that guarantee the accessibility of this landscape, as a condition for maintaining or improving its socioeconomic impact. For example, how do you position and build a necessary water contention barrier in a way that allows access to the landscape? How do you articulate a community building in a flood proof manner without conditioning its full appropriation by the inhabitants? How do you maintain the continuity of experience in the landscape while designing the needed landscape adaption measures such as dikes, topographic changes, flood fields, etc.? This allows for a bet on gains in terms of spatial quality (landscape and architectural) and an acceleration of its implementation processes in the long term (efficiency and budget gains over time, acceptance by the environment, etc.).

Every corner of the researched triangle - Governance (A), Market (B), Civil Society (C) - has its own strategic dimension. The intention is to project spatial qualities on future landscape transformations caused by climate change, and by doing so to define models of spatial strategies for landscape accessibility and permeability. By developing efficient and coherent high-resolution interventions today, coherent with a future and broad vision, strategic plans and policies, “A” can be further developed by a plurality of companies, stakeholders, universities and research institutions. The risk of a negative socio-economic impact on pressured landscapes, because of a loss of accessibility and permeability when new dikes, bridges, flood fields, etc. are constructed, will be countered through this research. Through defining spatial strategy models, within the context of a “Research & Design Platform,” which guarantee continued landscape accessibility, the existing economies will not disappear and possible future economies can appear (B). By giving “spatial quality” a place in today’s doom-thinking about the future, this “doom and gloom” shifts to positive action: spatial interventions of tomorrow that encourage action today. By providing opportunities for future architectural and landscape scenarios, people will have the courage to take bigger steps, and policymakers (A) will see opportunities, preparing in a positive way for a world in flux. The topic “climate change” is a contemporary issue. There have been numerous studies benefitting this research: results of completed studies may be included in the process and reinterpreted. The project requires research into the history of dynamic landscapes and the impact humanity has played and will play. The architectural testing of interventions will question existing structures, but also provide solutions to future-oriented issues. Yet, the subject of the majority of research will be the end user; the daily user (C) of our changing landscapes, today and tomorrow. The research is a call to maximize the intentions of urban architecture in times of change.

The creation of an overall risk-free unconditional access to a landscape like the Uitkerkse Polder in the future is impossible. But the creation of an ephemeral, ever-changing accessibility in a resilient landscape has to be the ambition.

Notes

NB: This research takes place in the context of a Research & Design Platform, a collaboration between the academic and professional field: KU-Leuven and Team Vlaams Bouwmeester, together with local stakeholders and a number of governmental and private research and design agencies and offices that deal with climate resilience in architecture and urban design and that are already involved in these processes of landscape transformation.

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13. Vlaamse Baaien, 2014, http://www.vlaamsebaaien.com/.
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15. Exhibition *Wisselland*, Knokke-Heist, Belg., 2013-2014.
16. Georges Allaert, Laurens Bouwer, Renaat De Sutter, Hubert Gulinck, Patrick Meire, Sylvie Van Damme, Pieter Van den Broeck and Veerle Van Eetvelde, *CcASPAR: Klimaat in Vlaanderen als ruimtelijke uitdaging* (Ghent, Belg.: Academia Press, 2012).
17. Exhibition *Wisselland*.
18. Exhibition *Wisselland*.
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Credits

Figure 1: photo by the Author, 2017.
Figure 2: image retrieved from NMVB groep kust, 1980.
Figure 3: image retrieved from Charles Vermeersch, 1986.
Figure 4: image retrieved from http://compendiumkustenzee.be, 2015.
Figure 5: image retrieved from EUROSIAN, 2004.
Figure 6: photo by the Author, 2014.
Figure 7: image retrieved from ARP Editions.
Figure 8: diagrams by J. Knight, University of the Witwatersrand, School of Geography, Archaeology & Environmental Studies, 2014.
Figure 9a-c: images retrieved from Google Earth, 2017.
Figure 10: photo by the Author, 2014.
Figure 11: image retrieved from René Tavernier, 1970.
Figure 12: photo retrieved from Decleer, M. Kustfotografie, 2014.
Figure 13: images retrieved from http://afdelingkust.be/, 2014.
Figure 14: diagram by the Author, 2014.
Figure 15: image retrieved from the exhibition *Wisselland*, CC Scharpoord, Knokke, 2013.
Figure 16: image retrieved from Smit et al., 2000.

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