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The role of Natura 2000 and project design in implementing flood defence projects in the Scheldt estuary

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This paper presents an account of two developments: the effect of EU Natura 2000 biodiversity policy on local planning and implementation processes, and a shift towards a 'Building' or 'Working' with Nature approach when designing water infrastructure projects. The account is based on a longitudinal case study of the 35-year chronology of a flood defence project which has been implemented along the River Scheldt in Flanders. The case study data have been analysed using a chronological time series analysis. The paper concludes that 'Building' or 'Working' with Nature is resorted to both at the EU and local level, because it works to balance previously conflicting interests and is acceptable to most actors who take part in project implementation. By placing ecological goals at the start of the planning process, the authorities elsewhere in the EU could avoid conflicts of interest and speed up project implementation in Natura 2000 estuaries.

Keywords: project implementation; Natura 2000; Flanders; project design; flood defence

1. Introduction

The EU Bird and Habitat Directives (EEC 1979, 1992) provide the legal basis for the Natura 2000 biodiversity network. The Directives oblige authorities to assess the ecological effects of intended projects on the integrity of Natura 2000 sites (art. 6 Directive 92/43/EEC). Assessments of waterways and port projects were frequently challenged by environmental NGOs, resulting in severe delays and the cancellation of many water infrastructure projects in Northwest Europe (van Hooydonk 2006). One such project is a new tidal dock in the Port of Antwerp, called the Deurganck dock (Neumann *et al*. 2002, Sahin 2007). More than 20 cases against the dock came before the courts, lodged by environmental NGOs and local inhabitants. The associated construction delay was more than one year. To prevent future judicial conflicts, the Flemish port and government authorities revised and updated the Strategic Plan for the Harbour of Antwerp in 2004. The plan stipulates that pro-active environmental measures must precede every development related to

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economically driven harbour expansion (Werkgroep Strategisch Plan Linkerscheldeoever 2004).

The increasing number of court cases related to water infrastructure throughout Northwest Europe has also triggered a response at the European level. To address the growing concerns of ports and the dredging industry, in January 2011 the European Commission published 'Guidelines on the implementation of the Birds- and Habitat directives in estuaries and coastal zones'. In the Commission's view, it is a widespread misunderstanding that the EU Bird and Habitat Directives take precedence over economic objectives. This interpretation contradicts the purpose of the Directives, which is to balance environmental benefits with social and economic requirements (art. 2.3 Directive 92/43/EEC). The Commission stresses that:

> the design of plans or projects should always be based on mutually beneficial strategies with a view to achieving dual goals of both Natura 2000 conservation objectives and socio-economic objectives, according to the 'working with nature' concept. (European Commission 2011, p. 5)

'Working with Nature' is a new approach to project development in the field of water infrastructure. It has been adopted by the World Association for Waterborne Transport and Infrastructure (PIANC 2008) and is also referred to as 'Building with Nature' (Waterman 2008, 2010, Aarninkhof *et al.* 2010). The crux of the approach is to integrate environmental concerns with the socio-economic goals of a project as early as possible in the project's design phase. Both authorities and practitioners hope that by 'Working' or 'Building with Nature' they will avoid the adverse experiences associated with applying environmental obligations in the field of water infrastructure. Thus far, too few cases have been implemented according to 'Building with Nature' principles to allow the best practices of the approach to be established. On the other hand, there are sufficient examples to illustrate the problems that triggered the new approach and the logic underlying the solution it offers. One such example is discussed in this paper.

The goal of this paper is to account for the effect of EU Natura 2000 biodiversity policy on local planning and implementation on the one hand, and to describe the shift towards contemporary design approaches such as 'Building with Nature' on the other. This has been done by a longitudinal analysis of the way the flood defence project has been implemented in the Scheldt estuary. The Scheldt flood defence strategy (Sigma plan) had been drawn up long before Natura 2000 was established, but both policies became relevant to the decision making on a flood defence project in the neighbouring towns of Kruibeke, Bazel and Rupelmonde. The history of this project, which spans more than 35 years, illustrates how the actors' learning strategies gradually enlarged the project's goals from flood defence to those related to nature, the development of Antwerp harbour, and the goals of local stakeholders. Partly as a result of the involvement of Natura 2000, the project evolved towards a design which balanced the conflicting interests of the past. In this paper, we illustrate how this evolution has come about.

The paper is structured as follows: we start by explaining the origin of the new approach and give its definition. We then introduce the case study and present the theory and the methods used in the analysis. Thereafter we analyse each implementation stage of the project in terms of its design and implementation. We summarise the case study findings and draw conclusions in the final section.

2. Natura 2000 and contemporary design approaches

The EU Bird and Habitat Directives introduced a conservation regime for habitats within Special Areas of Conservation (SAC) and birds within Special Protection Areas (SPA). SACs and SPAs together form a European network of protected areas, called Natura 2000. The consequences of the conservation regime introduced by the Directives are often more apparent at a local level than the national level of the EU member states. Research has shown that Bird and Habitat Directives have had a direct impact on the system of town and country planning operating in the UK (Bishop *et al*. 2000), and have gained importance in spatial planning decision making in the Netherlands (Beunen 2006). In the area of waterways and ports their impact has been tremendous: examples of water infrastructure projects suffering severe delays and even cancellations due to the Directives' requirements can be found in the UK, the Netherlands, Flanders, Germany and France (Ledoux *et al*. 2000, van Hooydonk 2006, Mink 2007).

The EU's Natura 2000 has promoted the identification of protected sites, but it has revealed that many priority habitats are close to urbanised areas with intensive human activity, such as agriculture, industry, transportation, tourism and recreation. The implementation of Natura 2000 therefore requires innovative, pro-active approaches to spatial planning in order to re-integrate human activities with the ecosystem. In many cases, this implies that innovative practices should be developed, supported by new – but compatible – economic activities (Zanon and Geneletti 2011). Examples of such innovative practices and planning instruments can be found across regions and sectors: integrated biodiversity networks in the urban region of Madrid, Spain (Rodríguez-Rodríguez 2011); balancing biodiversity protection and the needs of local communities in the Alpine region of Trentino, Italy (Zanon and Geneletti 2011); and agri-environmental schemes for promoting environmentally-friendly farming practices in the EU (Beckmann *et al*. 2009, Barreiro-Hurlé *et al*. 2010).

In the field of coastal and estuarine engineering, there is a shift towards a contemporary approval process for engineering designs. The key characteristics of a contemporary approval process, as opposed to a traditional process, are that (Kamphuis 2006):

- It attempts to deal with uncertainties in the design, as opposed to progressing from idea to a single, indisputable design, and then to implementation;
- It is democratic, in the sense that it reflects the pluralistic view of all the stakeholders, in contrast to traditional autocratic approval;
- It focuses on the environment instead of treating it as a 'secondary problem'; economic benefit alone no longer guarantees approval.

A shift towards contemporary approval processes for coastal engineering designs, coupled with increased environmental awareness, has given rise to several initiatives that involve a new approach to project design. 'Building with Nature' (Waterman 2008, 2010) and 'Working with Nature' (PIANC 2011) are among the initiatives that involve innovative project designs: designs that achieve a project's socio-economic goals in harmony with the environment, as well as satisfying the requirements of contemporary approval processes. The focus of this paper is on the 'Building with Nature' approach, which is explained in the next section.

3. Building with Nature

The approach termed 'Building with Nature' was originated by the Czech hydraulic engineer J.N. Svašek. It was further explored and linked to the field of integral coastal management by Waterman (2008, 2010), who defined 'Building with Nature' as the flexible integration of coast and water by making use of materials, forces and interactions present in nature, in the context of the hydrological and morphological situation (Waterman 2010). The World Association for Waterborne Transport and Infrastructure (PIANC) published its position paper 'Working with Nature' in 2008, revising it in 2011. PIANC views 'Working with Nature' as doing things in a different order: establish project needs and objectives; understand the environment; make meaningful use of stakeholder engagement; and prepare initial project design to benefit navigation and nature (PIANC 2011). The concept has been used on large-scale sand nourishments and ecological landscaping in the Netherlands by the EcoShape Foundation, which adopted three guiding principles: make optimum use of natural processes; explore opportunities for nature development as an integral component of project design; and reserve space to accommodate the natural system dynamics (Aarninkhof *et al*. 2010). In 2011 the European Commission adopted specific guidelines for dealing with the Bird and Habitat Directives in estuaries and coastal zones, in which it recommends a 'Working with Nature' approach to project development (European Commission 2011).

With the exception of minor differences, the above definitions broadly overlap. In this paper we focus on the 'Building with Nature' concept, which comprises three dimensions:

- *Integration* of project objectives and nature development goals. Nature and the environment are given equal consideration alongside a project's socio-economic goals (recreation, flood defence, waterfront development) in the initial stage of project planning and design, i.e. nature is a starting point for a project's design;
- *Use of* natural materials, such as loose, mobile material, sand and silt, and/or forces and interactions present in nature to achieve a project's objectives. Interactions present in nature include: ebb and flood, wave action, swell action, sea currents and other tidal currents, river outflow (both as a force and a supply of freshwater and sediment), gravity, wind, rain, solar radiation, interaction between dunes and vegetation, interaction between coastal zone and mangroves, interaction between marine organisms and sand, silt and coral (Waterman, 2010);
- Realisation of the area's ecological *potential*: the design aims to improve the conservation status of habitats and species compared with the existing status in the project area, thus creating added ecological value on the project's completion.

We assign each dimension mentioned above a name – '*integration*', '*use of*' and '*potential*'. At each stage of the flood control area's implementation we assess each dimension on a scale from 0 to +++ based on technical records and interviews.

4. Case study background

After the Flemish floods of 1976, King Boudewijn announced a flood risk scheme called the 'Sigma plan' in 1977. The aim of this plan was to protect the areas along the Zeescheldt (part of the River Scheldt under the tidal influence of the North Sea) and its tributaries. The plan consisted of three elements: dyke reinforcement, 13 flood control areas and a storm surge barrier. We centre our analysis on one of the 13 flood control areas in the Sigma plan. A flood control area is an area enclosed by a higher outer dyke and a lower inner dyke along the river. If, during a storm surge, the water level rises above the inner dyke, a large amount of water can be stored temporarily in these reservoirs (for the space of a single tide), resulting in a dampening of the tidal wave and thus protecting valuable areas nearby from flooding. Depending on their position in the estuary and the weather, the inundation areas will be flooded only about once or twice a year (Cox *et al*. 2006).

The envisaged flood control area (referred hereafter as 'the flood control area' or 'the project') was located on the east bank of the River Scheldt in the polders of Kruibeke, Bazel and Rupelmonde in the province of East Flanders, just 30 km from Antwerp (see Figure 1, taken directly from Flemish Nature and Forest Agency [online]). The polders were historically used for agriculture, recreation and nature. With a total area of 750 ha, this is the largest flood control area among the 13 areas proposed in the Sigma plan. Once the flood control area in Kruibeke is fully operational, the risk of flooding in the Zeescheldt basin will decrease from once in 70 years to an average of once in 400 years.

The eastern part of the flood control area (the polders of Kruibeke and Bazel) will be inundated daily at a controlled tidal height, which will lead to the creation of

Figure 1. Kruibeke, Bazel, Rupelmonde in East Flanders, Belgium (see online colour version for full interpretation).

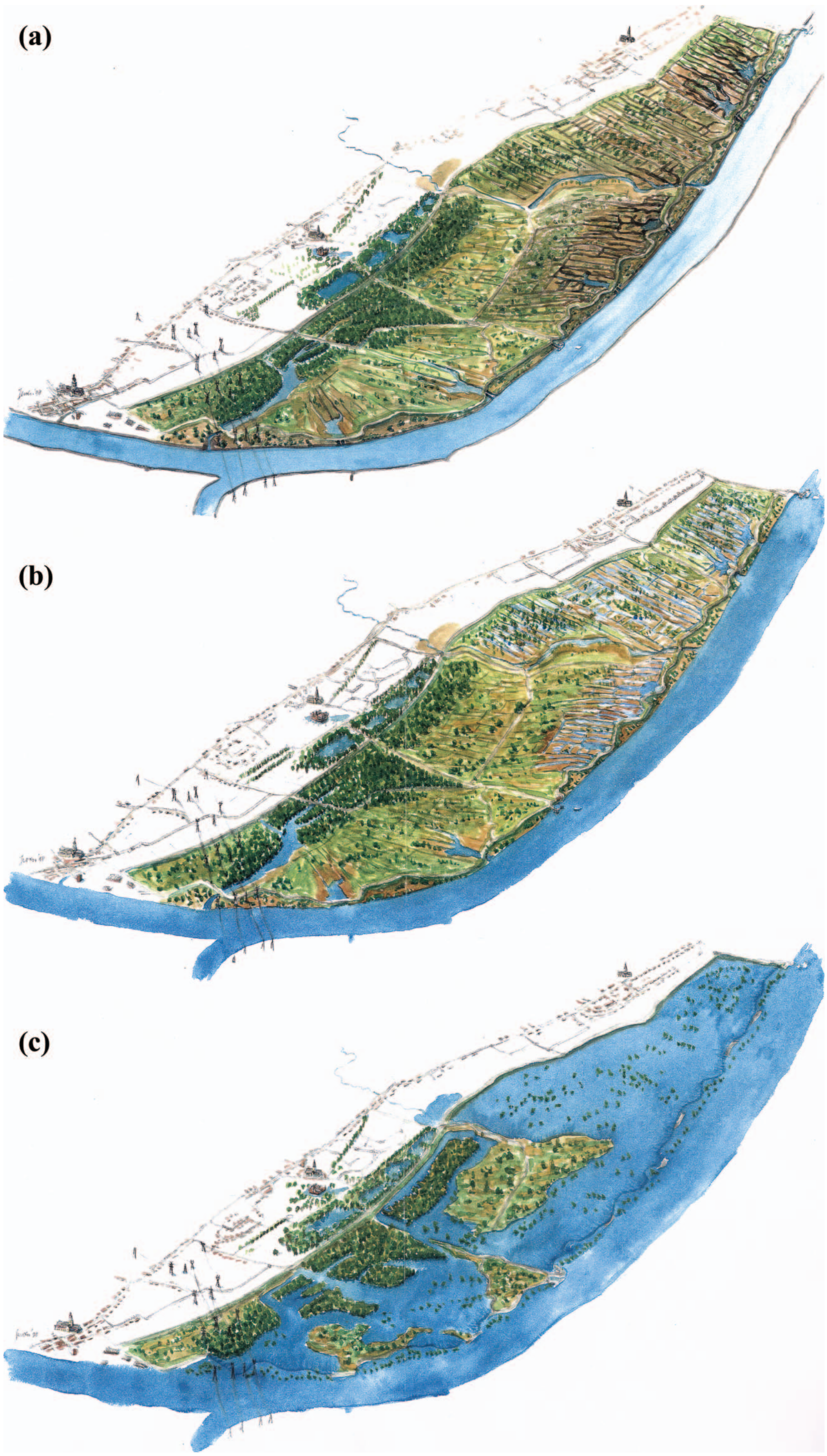


Figure 2. Kruibeke, Bazel, Rupelmonde flood control area (artist's impression, see online colour version for full interpretation).

mudflats and salt marshes (see Figures 2a and 2b, taken directly from Ministerie van Vlaamse Gemeenschap 1999). The western part of the flood control area (the polders of Bazel and Rupelmonde) will be inundated only during storm surges once or twice a year, thus allowing the wetland to develop (see Figure 2c, taken directly from Ministerie van Vlaamse Gemeenschap 1999). Eventually, the flood control area will combine the functions of nature, water management, a construction-free agricultural zone, and community and general facilities. The work on the project is scheduled for completion by the end of 2012.

5. Theoretical framework

To explore local planning and implementation in a specific context, which includes the project's nature goals, against a broader background of the Bird and Habitat Directives' requirements, we use the Contextual Interaction Theory (CIT) of policy implementation (Bressers 2004, 2009). CIT is a synthetic, 'third generation' implementation theory, which combines different contexts and provides a fuller, more valid perspective on understanding implementation (O'Toole 2000, 2004).

CIT considers policy implementation as a social interaction process among the implementers and the target groups they seek to influence. This emphasises that policy instruments adopted by governments feed into on-going social interactions and are just one element among others that shape what happens. The assumption is that the course and outcomes of implementation depend on the characteristics of the actors involved: motivation, cognitions, capacity and power.

- *Motivation* has its origins in the actors' own goals and values, the degree of external pressure and their own assessment of their effectiveness.
- *Cognitions* refer to observations and information about reality, as well as interpretations of the reality, which are influenced by filter frames and interactions with other actors.
- *Capacity and Power* can be attributed to actors by others (formal powers like legal or institutional rights) and/or rooted in such resources as money, skilled people, time and consensus.

In our analysis, the implementing actor is the Zeescheldt Division of the Waterway and Sea Channel Department of the Flemish Ministry of Mobility and Public works (hereafter: Zeescheldt Division). The target group is the municipality of Kruibeke, which covers the neighbouring towns of Kruibeke, Bazel and Rupelmonde. The policy instrument is the flood control area in Kruibeke, Bazel and Rupelmonde, as proposed by the Flemish flood control scheme, the Sigma plan.

Besides policy instruments, a multiplicity of other factors feed into the on-going social process, but they are only influential in so far as they alter the characteristics of the implementing actor and/or the target group. These factors are termed contextual factors. In our analysis we specify two layers of contextual factors (independent variables, X) at both national and European level that influence the interaction process between the Zeescheldt Division and the municipality of Kruibeke (see Figure 3).

The structural context includes the requirements of the EU Bird and Habitat directives, defined in terms of compensation measures in Kruibeke for the

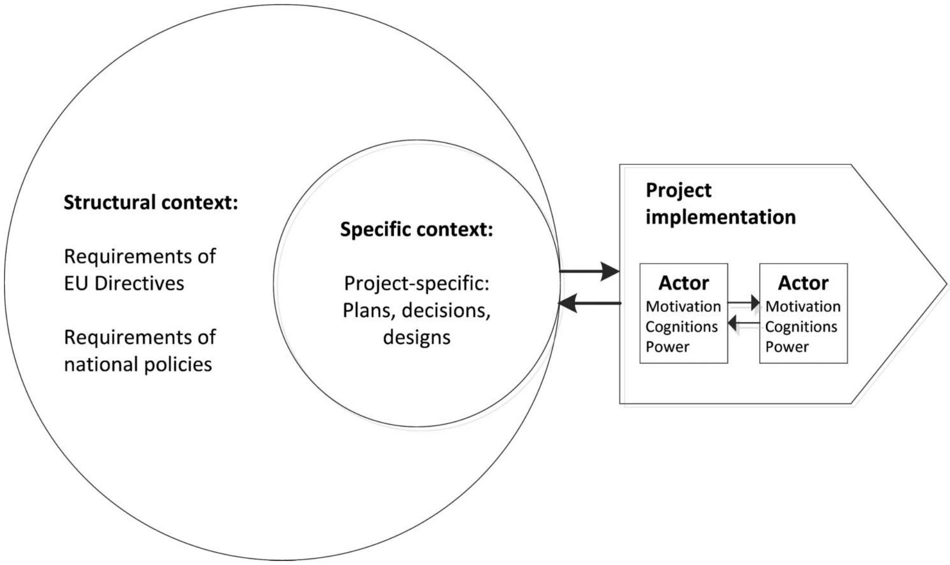


Figure 3. Contextual Interaction Theory of project implementation.

construction of the Deurganck dock. The national policy requirements refer to Flemish national (water) policies in so far as they exerted an influence on the policy instrument that is the subject of our analysis.

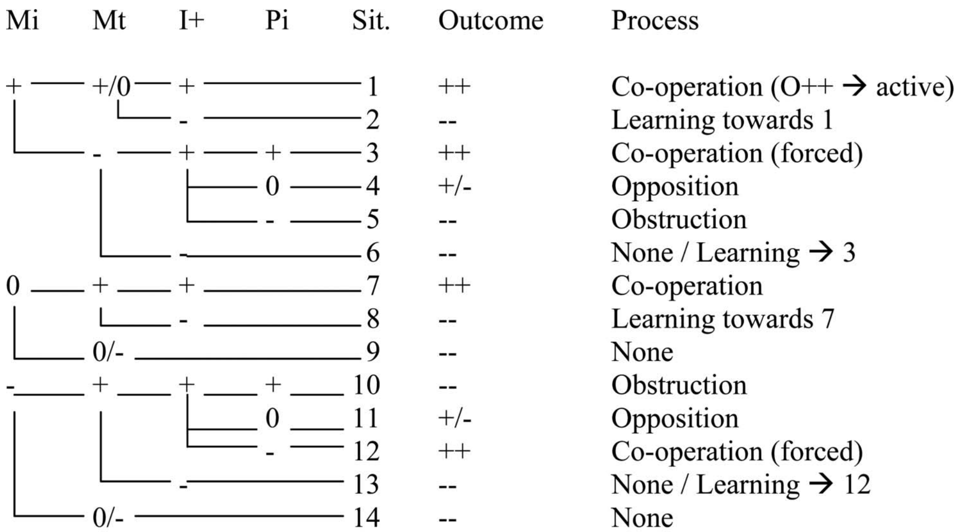
The specific context includes project-specific plans, decisions and designs related to the flood control area in Kruibeke.

The dependent variable (Y) is the outcome of project implementation, defined as a certain configuration of actor characteristics: motivation, cognitions and power.

The application of CIT to this case study allows us to include all three layers of contextual factors of interest: Natura 2000 (structural context), 'Building with Nature' design components (specific context), and local actor interactions (project implementation). Although CIT does not specify direct causal links between the two outer levels of contextual factors, it does provide a series of hypotheses for the types of interactions and the likelihood that an instrument will be applied. CIT distinguishes between various types of interaction, depending on the configuration of the actors' characteristics: motivation of implementers (Mi), motivation of a target group (Mt), information for application of positive partner(s) (I+), and the balance of power viewed from the position of the implementer (Pi). Each situation from 1 to 14 contains a hypothesis about the outcome of interaction: co-operation (active, passive or forced), opposition, and (joint) learning (see Figure 4, taken directly from Bressers 2004). We use these series of interaction outcomes to distinguish and qualitatively characterise the four phases of the project implementation. In this way, CIT helps us to explore and understand the case. It is not our aim here to test or develop the theory.

6. Data and methodology

Following the theoretical assumptions, the analysis presented in this paper is carried out at the project level; it looks at the actors' interactions. A list was drawn up of



Mi = Motivation implementers viz. application
Mt = Motivation target group viz. application
I+ = Information for application of positive partner(s) (highest level)
Pi = Balance of power viewed from position implementer

Figure 4. The likelihood of application of a policy instrument under Contextual Interaction Theory.

government institutions and stakeholders, which participated in the Deurganck dock and Kruibeke projects and their corresponding roles in the implementation processes:

- The Municipality of Kruibeke: flood control area opponents;
- The Municipality of Kruibeke: flood control area proponents;
- Flemish Nature protection society (Natuurpunt Vlaanderen): an NGO that lodged a court appeal against the construction of Deurganck dock; proponent of Kruibeke flood control area in combination with nature development;
- Antwerp Port Authority: Deurganck dock project implementer;
- Local farmers' association of the Municipality of Kruibeke: stakeholders affected by flood control area development;
- Maritime access department of the Flemish Ministry of Mobility and Public Works: Deurganck dock project initiator;
- Waterways and Sea Channel department of the Flemish Ministry of Mobility and Public Works: Kruibeke flood control area implementer.

The following sampling technique was used for the interviews: one respondent in each government institution/stakeholder organisation listed above was interviewed using semi-structured interviews. We ensured that all actors were covered, including the opponents; by cross-checking the actors with each respondent and across document sources. To minimise bias in the presentation of the problem, we analysed project documents and chronologies from a variety of sources: project opponents and project initiators, as well as neutral actors not directly involved in the implementation of either projects (e.g. Flemish Nature and Forest Agency, Flemish Research Institute for Nature and Forest). Project documentation included Ministerial policy documents, reports, decisions and project designs. Data collection took place in February and March 2011.

Since project implementation in CIT is understood as an actor interaction process, we distinguish four stages of interactions among the implementers and target group. We do this by reconstructing the chronology of events, which is a special form of time series analysis (Yin 2003, p. 125). The objective of a chronology is to carefully reconstruct and trace the relationship of events over time. In our case, this is a relationship between the main variables of interest: national and EU policies, project design and implementation outcome. More specifically, we are interested in the effect of incidental events such as Natura 2000 and Antwerp harbour development on local interaction processes that take place in the largely unchanged setting of scale, location and the actors involved in the interaction (see Figure 5).

We compiled a chronological sequence of events between 1977 and 2011, including administrative and political decisions on the flood control area and Deurganck dock projects, relevant historical events (e.g. floods), and designation decisions of the Flemish government under the requirements of the Bird and Habitat directives. For each event or decision, we outline their goals and implications for the flood control area in Kruibeke. The chronology is based on the following references: Vlaamse Regering (1999), Ministerie van de Vlaamse Gemeenschap (2000), Soresma (2001, 2006), Beheerscommissie Natuur Kruibeke-Bazel-Rupelmonde (2009),

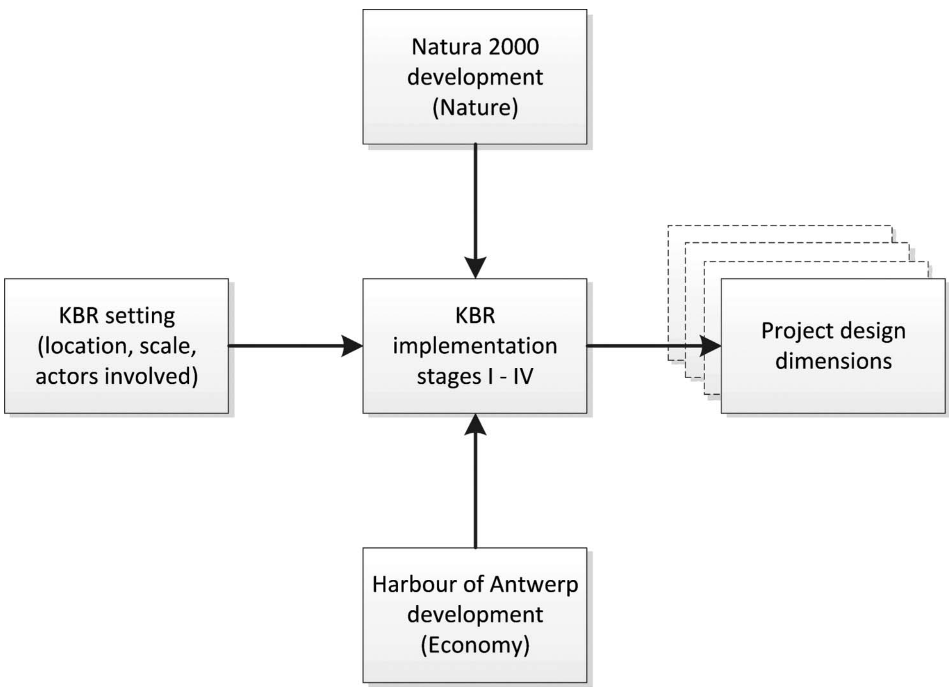


Figure 5. Case study design.

Vlaamse Havencommissie (2009). The chronology was then split into four implementation (interaction) stages, or embedded units of analysis (Yin 2003, p. 43). For each stage of implementation, actor interactions are narrated alongside the characterisations of the respective project design based on historical records and interviews. In conclusion, a series of project designs and outcomes are summarised and relationship patterns between them (if any) are observed. The character of this sort of inquiry is explorative and qualitative. The advantage of a qualitative technique applied to this case study is that it allows the researchers to account for a longitudinal development (flood defence area design evolution over a period of more than 30 years), while simultaneously including incidental events such as Natura 2000.

The internal validity of our case study is confronted with two important threats, which are inherent to time-series research: history and maturation (Kratochwill 1978). History is when extraneous factors occur concurrently with independent and dependent variables under study and produce change. Maturation occurs when physical and/or psychological changes occur within subjects over a period of time, which in turn may affect their performance on the dependent variable. This is especially applicable to our case study as it extends over a time period of more than 30 years. We assume that independent variables influenced project implementation, while it could very well be the case that the subjects (implementers and target group) have 'matured' over the years: they become older, possibly less motivated, anxious, bored and so forth. A way to reduce historical invalidity and maturation is to analyse potentially confounding historical influences that may have coincided with the intervention. This is done by careful reconstruction of chronological events.

7. Analysis

7.1. Implementation stage I: 1977–1991

Following the announcement of the Sigma plan, the Minister of Public Works charged the Zeescheldt Division with investigating alternative hydraulic solutions, requesting them to present engineering designs for all 13 flood control area projects, including Kruibeke. The purpose of the plan, and hence the motivation of the department, was security against flooding in the Zeescheldt basin.

Approximately one-quarter of the polder is municipal territory, which had always been used for agricultural and recreational purposes; it was valued for its nature. The authorities' plans to turn a polder into a flood control area first came as a shock to the inhabitants, since nobody knew what exactly was going to happen. The plans were perceived as a direct attack on municipal territory (the polder) to increase flood security elsewhere. The peaceful and quiet atmosphere always associated with the polder is especially important to the working population of Kruibeke, who are employed predominantly in industry. Furthermore, the fact that the flood defence line would be relocated further inland and thus closer to the municipality's built-up area, did not fit into the inhabitants' perception of 'flood defence'. The plan implied that the existing flood defence line would be lowered, which was a shock to them. With the exception of Rupelmonde, the municipality had never experienced a major river flood, but it had several times used the polder to absorb excess water from the local Barbier creek. The mayor of the municipality was the greatest opponent of the flood control area, and had his own ideas about the flood security measures that needed to be taken. He organised demonstrations against the flood control area every Tuesday, with the participation of farmers, nature enthusiasts and recreational anglers. At this point, the municipality was united against government plans under the mayor's slogan '*Over my dead body*'.

Faced with such a fierce reaction from the municipality, the Department of Waterways and Sea Channel decided to implement the smaller flood control areas in the Sigma plan first. As a consequence, the building permit for Kruibeke was not applied for at this stage of implementation.

With regard to the design of the Kruibeke flood defence at this point, its only objective was flood security and its design was not geared to the ecological situation in the polder (0). The flood control area's design was an engineering solution (dykes and sluices), which was based on tidal dynamics in its operation (+), but did not take the ecological potential of the area into account (0).

In theoretical terms, this stage of implementation corresponds with situation no. 9: *non-implementation*. The implementing actor (Mi, Zeescheldt Division) was hesitant to proceed (0), while the target actor was negative (Mt, the municipality). The results at this stage are summarised in Table 1.

7.2. Implementation stage II: 1992–1999

After the floods of 1992, flood defence measures were once again on the political agenda. The 1994 decision of the Flemish government confirmed the construction of the flood control area in Kruibeke and aimed to integrate it as far as possible with existing ecologically valuable areas. Another ministerial report published in 1994 – on the environmental impact of the Sigma plan (AMIS report) – announced a step towards integrated planning. From then on, implementation of the Sigma plan and all its projects had to consider environmental benefits as far as possible alongside flood security goals. For Kruibeke this meant that the project goals expanded to include nature alongside flood security. To incorporate both goals, the Institute of Nature Conservation worked out a change to the project's design (Ministerie van de Vlaamse Gemeenschap 1999). It added the following elements to the previous design: a 260 ha tidal inundation area with creeks and salt marshes; a 50 ha open grazing area up the hill in Bazel; a 260 ha varied landscape of grazing hills and wooded lowlands with freshwater streams. The plan proposed natural grazing by introducing large grazing mammals (wild horses, bovines, deer and beaver) in the area. The underlying idea of the plan was to recreate the original riverine landscape with appropriate flora and fauna. The subsequent Environmental Impact Assessment (EIA) assessed this design against an alternative of continuing the existing agricultural land use; it recommended the combination of nature and flood security. This choice was confirmed by the Flemish government in December 1999.

In the meantime, demonstrations under the mayor's leadership were still continuing. With other flood control areas in the Sigma plan nearing completion, the Zeescheldt Division tried to rethink its Kruibeke strategy. One set of groups

Table 1. Implementation stage I: 1977–1991.

Specific context: design and nature			Actor characteristics				
Integration	Use of	Potential	Mi	Mt	I+	Pi	Outcome
0	+	0	0	–			None

involved in this exercise was the nature protection associations. The greater environmental focus of the latest government decisions and the renewed project design offered an opportunity to create more support for the flood control area among the nature protection associations. Furthermore, the EIA report contained data on the levels of soil pollution in areas of the polder used for agriculture. The combination of flood security and nature goals offered by the flood control area did indeed secure the support of the nature protection groups. However, the mayor maintained that the polder was never part of the original riverine landscape, the existing nature would be ruined by bulldozers, and the flood control area had no added value. Even with the nature protection groups in favour of the plan, the majority of polder users still supported the mayor at this stage.

The balance of power did not resolve the situation. A public inquiry, which is part of a building permit procedure under the Flemish Spatial Planning Decree, would have been certain to receive objections from the municipality. A construction permit application with its attached technical dossier is handled by the Department of Town Planning and there is no time limit stipulated by law for the issue of a permit. The mayor is an elected post in Flanders and the current mayor has been in office since 1983. His party had received the majority of votes and it was against the flood control area. With the impending risk that the mayor would bring proceedings before the Court of Appeal, the Department of Town Planning did not issue a permit and construction did not start. Up to six permit applications were attempted, with no final decision.

At this stage of implementation, the project's objectives had expanded as environmental concerns received attention alongside flood defence measures (+). Moreover, the proposed plan became even more dynamic in terms of natural processes, as the large grazers would do the maintenance work (++). The reconstruction of the original riverine landscape would maximise the ecological potential of the area (++).

In theoretical terms, this stage of implementation corresponds with situation no. 4: *opposition*. Since Kruibeke was the last unimplemented flood control area under the Sigma plan, the implementing actor was willing to complete it (Mi, +), but the target group was still negative (Mt, −). Given the information, the cognitions of the positive actor were sufficient (I+, renewed flood control area design), so the character of the interaction process came to depend on the balance of power between the two actors (Pi). A relatively equal balance of power (Town Planning's hesitancy to issue the construction permit vs. elected mayor with a majority of votes) would lead to opposition and stalemate (see Table 2).

7.3. Bird and Habitat Directives and Deurganck dock

In 1988 the polders of Kruibeke, Bazel and Rupelmonde were designated a Special Protection Area (SPA) under the Birds Directive. In 1996 they were then also

Table 2. Implementation stage II: 1992–1999.

Specific context: design and nature			Actor characteristics				
Integration	Use of	Potential	Mi	Mt	I+	Pi	Outcome
+	++	++	+	−	+	0	Opposition

designated a special area of conservation (SAC) under the Habitat Directive. Both designations were proposed by the Institute of Nature Conservation and ratified by the Flemish government. However, the practical implications of these decisions were not part of the information available to the actors in Kruibeke, Bazel and Rupelmonde at the time the designations were passed. Moreover, the practical consequences only became clear during the events surrounding the Deurganck dock. Afterwards the EIA concluded that designation took place based on the ecological potential of the area, while the majority of designated ecological values were not present in the area at the moment of designation (Soresma 2001).

The Deurganck dock decision making has been analysed in the literature (Neumann *et al*. 2002, Sahin 2007), so this paper will give only a factual summary of key events and decisions based on interviews and document analysis.

The container traffic in the port of Antwerp expanded by 80% between 1980 and 1990, and a further 80% growth was expected by 2005. As the right bank of the River Scheldt had already reached maximum capacity, the location for a new dock was sought on the left bank. The Flemish Ministry of Public Works and Mobility took the lead in this project of 'overriding national interest', which would ensure the competitive position of the port of Antwerp. It commissioned the EIA to investigate different location alternatives based on strategic, planning, technical, nautical, social, ecological and legal parameters. The EIA listed the Bird Directive under the legal parameters, while the assessment of ecological effects was based on indicators and models from the scientific literature. The assessment states that the 'planned operations have a negative effect on the ecological values in the area' (Milieu en Veiligheid 1996, Deel 6, p. 85). The EIA concluded with the choice of an alternative location which, according to the Maritime Access Division, was a realistic consideration of the natural and environmental surroundings of the area. The decision of the Flemish government on 20 January 1998 confirmed the construction of the dock according to the chosen alternative. This decision also established a working group for the preparation of the Strategic Plan for port development (Scheldt Left bank), including representatives from adjacent municipalities and environmental institutes. The strategic plan drawn up by the working group stated that:

> there is a string of (large) nature areas being created and maintained by the environmental institutes in consultation with various actors. ... The total port area, with the exception of an outer 100 meter buffer zone, will be excluded from designation under the Bird and Habitat directives. The compensation for this (including the Deurganck dock) will be provided by nature development projects under construction. (Werkgroep Strategisch Plan Linkerscheldeoever 1999, 13–14)

This stage of implementation is characterised by the balance and administrative agreement among those involved, with a succession of decisions by the Flemish government to implement these agreements: approval of the strategic port development plan (25.5.99); regional zoning plan amendment (01.06.99); and amended Bird Directive decision to designate the whole polder area as a Bird Directive area as compensation for partial loss of ecological value of Special Protection Area as a result of Deurganckdok construction (23.06.98). The construction of the dock commenced in 1999.

The events that unfolded in 2000 and 2001 were the complete opposite of the balance and agreement in the previous stage. The inhabitants of the adjacent village of Doel and nature protection associations made use of all the legislative instruments (including Bird and Habitat Directives) at their disposal, at national and European level, to delay or postpone the dock's construction. Amendments to the regional plan and construction permits were suspended by the Flemish Council of State in 2000 and 2001.

To end the conflict, Antwerp Port Authority commissioned a new EIA and sought solutions for the inhabitants of Doel. The nature protection associations were involved in preparing the new EIA and the new compensation plan. The revised EIA took account of the 600 ha SPA under the Bird Directive and the Habitat SAC along the coast. It stressed that compensation had to be implemented before or at least simultaneously with the construction of the dock, and featured Kruibeke as one of the compensation measures (Milieu en Veiligheid *et al.* 2001). The revised EIA was ready by September 2001 and was approved in October 2001. On 14 December 2001 the Flemish Parliament approved by a majority of votes a Validation Decree enabling work on the Deurganck dock to resume. Work resumed on 13 April 2002.

7.4. Implementation stage III: 2000–2002

The Deurganck dock compensation had consequences for the situation in Kruibeke. The Validation Decree of the Flemish Parliament (14/12/2001) and the Resolution of the Flemish government (20/02/2002) ensured the construction and exploitation of the Deurganck dock on condition that the requirements of the Bird and Habitat Directives were met. The decree linked each construction permit for infrastructure works with a permit for nature compensation measures. The permits were guaranteed and could not be challenged in the court of appeal. Moreover, the decree provided a detailed matrix of responsibilities for each actor at each stage of implementation of the compensation measures. It also launched a monitoring programme and maintenance commission to ensure that compensation goals were attained. The Resolution of the Flemish Government facilitated the implementation of compensation measures in Kruibeke as well as on the Left Bank of the River Scheldt. The following compensation measures were assigned for Kruibeke: 300 ha of mudflats and marshes, a 150-ha meadow for birds, and 40 ha of forest compensation. This meant a change in the project design compared to the 1999 proposal. The statement to the European Commission of the position of Kruibeke in Natura 2000 (Soresma 2001) was commissioned by the Zeescheldt Division. A varied landscape of grazing heights and wooded lowlands had to be replaced with a more pronounced separation of forest and grassland to accommodate 100 breeding pairs of meadow birds. A set up like this requires grassland to be maintained to keep it from overgrowing.

The first construction permit for the Kruibeke flood control area was issued in 2002. However, expropriation decisions were also needed to relocate the farmers from their plots and this could take a considerable amount of time. Unaware of the implications of the Validation Decree, the majority of polder users were still opposed to the project and unwilling to co-operate. Flemish Dyke law permits the authorities to start work while expropriation decisions are still underway, and the Zeescheldt Division made use of this instrument. Work commenced on the first farming plots by locating building materials, a shed and hiring a contractor. This was a tactical move to show that the flood control area had moved from preparation into the realisation stage. Farmers on whose plots the work started were the first to react, as they could no longer access their plots while construction literally took place in their backyard.

They knew all too well that the financial compensation offered by the government for expropriation was not a viable solution for all 72 farmers in the area and could result in considerable income loss. Eventually, negotiations between the authorities and the farmers opened and dyke law was in the end enforced on fewer than 10 farming plots out of 1385.

At this stage of implementation, the project's flood defence and ecology objectives were linked to a project of overriding public interest (the Deurganck dock), thereby indirectly increasing the societal ambition of the flood control area (++). At the same time, the project's ecological design was reformulated to accommodate the compensation measures, becoming less dynamic as the open meadow birds area required different maintenance and meant less variation of the landscape. However, the tidal inundation area with mudflats and marshes remained almost intact compared with the previous stage (+). The added ecological value would still be considerable compared to the existing situation in the polder, although it would not fully restore the original riverine landscape (+).

In theoretical terms, this stage corresponds to situation no. 3: *forced co-operation*. The balance of power changed in favour of the implementing actor (Pi, Validation decree, Dyke law, and eventually Expropriation decisions) and led to forced co-operation. Other parameters remained unchanged (see Table 3).

7.5. Implementation stage IV: 2003–2011

With the construction permit issued and the expropriation decisions finalised, implementation of the flood control area was secured. The Zeescheldt Division was now motivated to return ownership of the project to the local level, involve the inhabitants and make them 'ambassadors' for the project. The largest group of land users in the polder were the farmers, who were looking to maintain their income, even if only temporarily. Negotiations with the farmers had already been opened and both actors together sought common solutions and options to make optimum use of the construction time, which it was estimated would take up to 10 years. As the negotiations progressed, each farmer's situation was analysed case by case. Apart from financial compensation for the farmers who moved out of the area, two solutions were agreed for those who could remain, given the area's new functions: temporary maintenance contracts for mowing and grazing the grasslands during construction time, and dung subsidies for stock farmers affected by expropriation. As a result of these measures 43 of 72 farmers signed maintenance contracts and are still active in the area at the time of writing. Aside from economic benefit, the farmers perceived the relocation of individual plots closer together and removal of trees in the polder as advantageous.

With these measures in place, the farmers no longer supported the mayor of Kruibeke, who still remained strongly opposed to the project. Two groups emerged

Table 3. Implementation stage III: 2000–2002.

Specific context: design and nature			Actor characteristics				
Integration	Use of	Potential	Mi	Mt	I+	Pi	Outcome
++	+	+	+	−	+	+	Forced co-operation

within the municipality at this stage: 'believers' and opponents (the mayor's party). Believers support the project's flood security and nature goals. They believe that the existing nature will benefit from the implementation and have a more pronounced function in the long term. They value the new forest that is being created and see new opportunities for tourism and nature. The mayor's party does not support either of these goals: existing nature is being destroyed and the flood security calculations by the authorities are not to be trusted. Furthermore, nature and flood security cannot be combined in one area. Engineering solutions to the problem involve storm dams, not flood control areas. In the last elections in 2007 the mayor's party failed to gain the majority of votes and the new coalition took a positive stance on the flood control area project.

The EIA for the remaining construction permits was finalised in 2006 and permits were issued for all works. There is regular consultation between the municipality and the Zeescheldt Division within the project management committee, where current issues and the state of affairs are discussed. The committee was installed under the Validation Decree and the representatives of Agriculture, Environmental Affairs and the Agency for Wildlife and Forests are also represented on it.

At this stage of implementation, the Zeescheldt Division integrated the project design even further by coupling the economic interests of local stakeholders with the project's ecological objectives, despite the fact that the goals of agriculture are often considered to be at odds with nature (+++). In theoretical terms, this stage corresponds with situation no. 1: *co-operation*. The target group (Mt) is now neutral to implementation. The remaining parameters are unchanged (see Table 4).

8. Summary of findings

The findings of the case study are summarised in Table 5.

The most obvious role of the EU Natura 2000 was in providing the link to a project of overriding public interest (Deurganck dock). This link changed the balance of power in favour of the implementer (Zeescheldt Division), moving implementation from opposition and non-application into a forced co-operation stage. The move from forced co-operation to a co-operation stage was the initiative of the implementer, but to some extent it was made possible by the compensation requirements for the meadow birds, which offered an opportunity to introduce maintenance contracts. This would not have been possible under design II, which envisaged maintenance by large grazing mammals and excluded any agricultural option.

Design IV, which will be implemented, combines the most project objectives compared with previous designs: flood security, ecology, economy (via Deurganck dock) and local stakeholder interests (partly economic). It reflects a gradual

Table 4. Implementation stage IV: 2003–2011.

Specific context: design and nature			Actor characteristics				
Integration	Use of	Potential	Mi	Mt	I+	Pi	Outcome
+++	+	+	+	+/0	+		Co-operation

Table 5. Summary of case study findings.

Stage	Project objective(s)	Project design			Outcome of implementation
		Integration	Use of	Potential	
I. 1977–1991	Flood security	0	+	0	None
II. 1992–1999	Flood security Nature	+	++	++	Opposition
Bird and Habitat Directives: Deurganck dock					
III. 2000–2002	Flood security Nature as compensation for the project of overriding public interest	++	+	+	Forced co-operation
IV. 2003–2010	Flood security Nature as compensation for the project of overriding public interest Local stakeholder involvement	+++	+	+	Co-operation

progression of project objectives over the years: in terms of flood security, design I would be sufficient. In terms of ecology, the optimum (dynamic and naturally maintained ecosystem) would be design II. In terms of economy, the Deurganck dock would sooner be realised without extra costs for compensation (without design III) and legal tussles. The biggest local stakeholder, the farmers of Kruibeke, would opt for no flood control area at all, because even with the maintenance measures in place they will suffer a net economic loss. However, none of these designs could be implemented: the authorities were wary of proceeding with design I; design II faced opposition; the Deurganck dock faced a legal battle; and no flood control area was not an option, given the flood security risk. The design thus evolved towards a balance among the interests of flood defence, ecology, economy and local stakeholder interests.

9. Conclusion

The goal of this paper was to account for the effect of the EU Natura 2000 biodiversity policy on local planning and implementation processes on the one hand, and a shift towards contemporary design approaches such as 'Building with Nature' on the other. The Kruibeke, Bazel, Rupelmonde case shows that these two processes are part of the same learning process. At the national level, projects implemented predominantly for economic benefit (Deurganck dock) are faced with the environmental requirements of Natura 2000, while local flood defence projects (Kruibeke flood control area) are accorded low political priority. At the European level, workable approaches are sought to address the accumulated misunderstanding of the Bird and Habitat Directives by industry and the resulting case law. 'Building' or 'Working with Nature' is then resorted to, because it works to balance previously conflicting interests and is acceptable to most actors participating in implementation. In its final form this design, or the underlying philosophy, can be replicated elsewhere in Natura 2000 estuaries that face similar challenges. By placing ecological goals at the start of the planning process, the authorities could avoid conflicts of interests and speed up project implementation. The 'Building with Nature' design approach could be helpful in doing this.

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