

Zeeland Earthworks: A Productive Landscape for the Transformation of Estuarine Flows

Reflective Paper

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Transitional Territories: Landscapes of Coexistence

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The following paper is a reflection on my graduation project, Zeeland Earthworks, in partial fulfilment of the master programme, architecture track in the Transitional Territories studio. The project has been developed with an ecological approach to both landscape and material, focusing on the interactions and alterations which occur between systems. The research and design have been developed in collaboration with my mentors, Stefano Milani, Taneha Bacchin and Sjaap Holst, through a process of iterative testing of the quantitative and qualitative aspects of a productive landscape. The architectural proposal that resulted from this research is a filter wall, allowing for the controlled inflow of elements from water to the land, and the manipulation of these elements in a factory for contaminated ceramics. As a methodological approach, this ecological approach emphasises the role of architecture as an alteration of existing flows and an articulation of this transformation.

Research and Design

The studio's research began at the scale of the North Sea, where the analysis of various flows of goods, animals, and materials through the fluid body of the sea was the subject of our shared cartographic investigation. The Atlas produced highlighted the role of the North Sea estuaries as hot spots where conflicting human and non-human systems are made visible as they compete for space along the banks. It was out of an interest in these spaces of conflict that my urban scale research began in Zeeland, in the South of the Netherlands. A literature review of reports on the future of the Scheldt from the Port of Antwerp, the Dutch and Belgian water management boards, and ecologists enabled me to understand the conflicting logics between Antwerp's huge urban port, Dutch agricultural polderland, and the biodiverse wetlands and sandbars.

Using a scenario-based approach I translated this research into a future narrative where the threat of sea level rise and the trend towards automation and larger ships necessitate the depolderisation of Zeeland's estuarine banks citing the co-benefits of decreased dredging requirements and greater areas of biodiverse intertidal wetlands. (See Figure 1.)

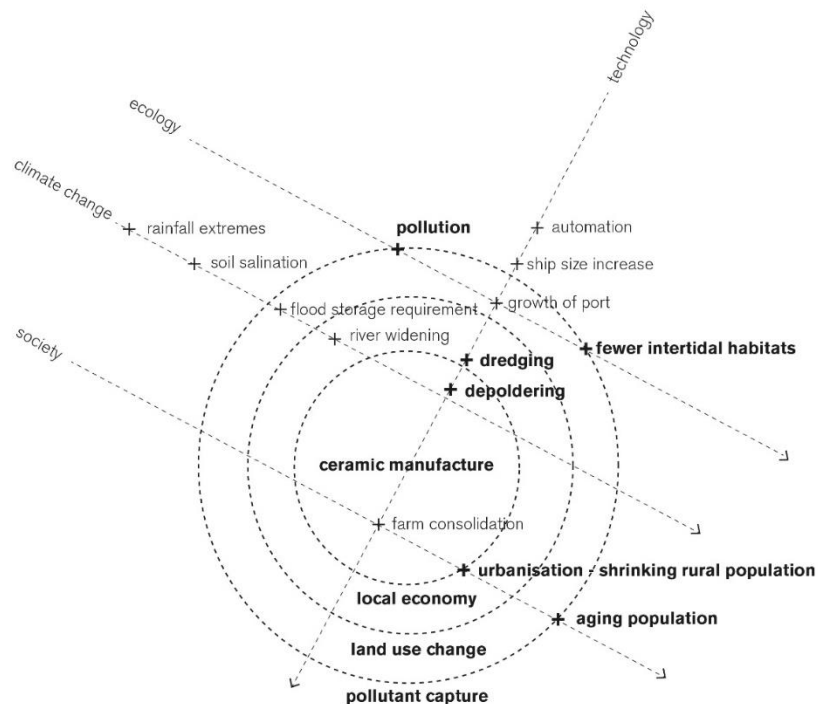


Figure 1: Future scenario of depolderisation emerging out of a network of actors

With this scenario in mind my project asked the question; *how can an open system of flood defence create a new estuarine condition?* By imagining an open system I was led to examine the new elements entering the inland water system, sediment, saltwater, and heavy metal contaminants. This led to a second stage of territorial research which focused on the way that the port, the polder and the wetland all manipulate the earth as a method of elemental control, evident in the dike system of the polder, in the dredging land and spoils grounds of the port and the physiology of resistant wetland plant species which contain and sequester heavy metals.

My projective design was a direct result of this locally specific research; the manipulation of earth to create a new estuarine condition capable of dealing with the scenario of a growing port, and a rising sea. By choosing the historic town of Borselle as the site for locally managed depolderisation the twin role of my project as protective and productive led me to research flood defence strategies of dikes, moats and storage basins.

Once the stage was set the design phase research focused in on the micro scale potential of the Schelde's sediment, leading me to discover of the ability of river clay to capture heavy metal pollutants and make them inert through firing. The programmatic proposal for a contaminated ceramics factory therefore came as a response to the existing conditions of conflict present at the territorial scale. Further elaboration of the proposal required research into the specific composition of this sediment and the methods employed in various industrial typologies to collect, filter and fire clay.

Method

The translation of research into design was achieved by a combination of projective maps and volumetric calculations based on the expected inflows of sediment, eventually leading to a list of programmatic requirements. An iterative design process negotiated the reciprocal relationships between the scale of the landscape intervention, the volumes of captured sediment, the scale of the processing machinery and the method of flood defence. This process led through a series of landscape systems with which to filter and collect sediments, and a series of systems of flood defence. While early iterations included a dispersed field of ceramic factory functions positioned around a moat, consultations with water managers and hydraulic engineers emphasised the necessity of a defensive wall.

The key steps in synthesising the diverse worlds of dredging, sea walls, soil remediation, clay mining and ceramic factories occurred as acts of design imposition. The wall typology became a key holder of architectural investigation where the dual functions of a filter, of holding back and of letting through are expressed in their most simple form, expressed by the design of a productive and a public façade. Functionally, the wall limits the flow of water inland and thickens to hold the productive

functions of the ceramic factory. The wall as a limit further leads to the creation of a rhythm, where moments of breaks or changes in that rhythm reflect the adaptation of the ubiquitous dike to its local condition and the alteration of existing flows which became the conceptual foundation of the project. In this way the various requirements and constraints emerging out of the site are clarified into a single communicable element through the employment of a symbolic and fundamental architectural typology.

Graduation Topic and Studio Brief

My interest in the Transitional Territories studio came from the central role of a dynamic environment to the design work. These dynamics were central to the creation of an Atlas of New Geographies which used a scenario-based approach to spatialise changes to the North Sea region along four themes: Climate, Flows, Habitat and Ground. An important idea which emerged through this process was that of design as a dynamic act which alters the environmental network in which it is enmeshed. In the same line, the studio's emphasis on flows as a conceptual thread through which to move through scales highlighted for me the role of architecture as an alteration of existing conditions, by which natural phenomena, whether views or climate conditions, topography or raw materials are recomposed to be brought into the cultural sphere where their value is mediated by the human experience. In my case, by studying the potentials held within the existing territory; of the Scheldt, of marine sediment and of the typology of a dike wall, the re-composition of elements as a design act created a coherent logic derived from the site itself.

Beyond this methodological approach the interdisciplinary nature of the studio, which includes architects, urbanists and water managers, provided a broadened frame of reference on which to draw. Since my project acts as a landscape machine, performing the collection of sediment and the control of water, I looked to knowledge and precedents outside of the architectural field for tools. However, by broadening the problem field to the specific and quantifiable manipulation of sediment I also took on constraints which are typically outside of the architectural field, and which have absolute limits. It was only through the employment of an architectural typology, the wall, that I was able to overcome the diverse absolute interdisciplinary constraints and test the project as a specific spatial manifestation. In this way the importance of the architectural field's knowledge of ordering systems and their experiential potential redefined the project from the general to the specific. As a result, my project seeks to use design to make manifest a set of complex ideas in a simple and self-evident form.

Wider Implications

The trans-scalar methodology employed within the studio and within my project, which moved from the macro scale of the Scheldt to the micro scale of the sediment composition, has led to an architecture which is fundamentally tied to the specifics of its location. Its programme is linked to the health of both the river and the economy of the existing town, while its form is informed by the flow of water and the volumes of sediment it carries, and the materiality of the project is directly drawn from the environment in the logic of the polder system. In this way the project in method and outcome goes against the current logic of global ubiquity in both architecture and engineering where programme, function and material are primarily drawn from a globalised market logic, and the same solutions are applied at large both at the scale of seawalls and building components. In this way, the project is not for a transferable solution but a transferable approach to the manipulation of existing flows.

Ethical Issues and Dilemmas

By imposing a new element in the context of a system in conflict my project necessarily encountered an ethical dilemma: which actors to instil with agency. By assuming that the port of Antwerp will continue to grow and be allowed to pollute the Scheldt the scenario developed gives it overwhelming agency, and for some time this ethical dilemma undermined my own belief in the project. However, the position taken in response to this scenario is one in which the devolution of power leads to the local adaptation of the ubiquitous coastal dike with positive effects for both the local population of Borselle, who gain an alternative means of inhabiting the flooded land, and the surrounding wetlands, where the reduction in heavy metals pollution increases biodiversity. In this way the project reflects my own belief that by refocusing on the local and specific potentials the global threats of sea level rise and pollution can be best tackled and that by employing an ecological approach design benefits can be sought at multiple scales and for multiple actors.

The scale and nature of the human imposition of the proposal into its environment represents a second ethical dilemma which emerged from the project. The function of the proposal as a contaminated ceramics factory brought with it technical challenges only able to be solved outside the realm of architecture, including the potential pollution created by the firing of heavy metal-containing clay, and the energy intensity of this process. The potentially dangerous but ubiquitous industrial functions of material mining and processing are often overlooked in architectural imaginings of the future, necessarily restating the current status quo of polluting industries being pushed to an ever-further hinterland. In response, the project argues for the relevance of industrial typologies in developed countries and seeks to harness the naturally occurring flows of sediment and heavy metals in order to promote an opportunistic localism in which growth is limited by the bounds of the natural system.