Time Thinking and Drawing in Designing Dynamic River Landscapes

Marijne Beenhakker, Jasper Hugtenburg, Jaap van der Salm

H+N+S Landscape Architects, Amersfoort (the Netherlands)

Abstract

This visual essay explores the use of time thinking and drawing in the design process of the Ooijen-Wanssum floodplain widening project. Through a series of project sketches, final drawings and photos of the constructed project, the authors reveal the way in which time drawing has (often implicitly) given direction to the design process. The water calendar is introduced as a design tool that integrates time-dependent river dynamics into the design process and thereby informs spatial design choices that are considered in several design sketches. These design choices include interactions with dynamic processes such as erosion, vegetation dynamics and recreational use of the river landscape.

Keywords

Floodplain design, Water calendar, Vegetation dynamics, Erosion, Dynamic landscape management, Drawing techniques

DOI

https://doi.org/10.47982/spool.2022.3.05

Introduction

When working on interventions in dynamic fluvial landscapes, time drawing is an essential design tool for both designing and communicating the changing nature of the landscape. Fluvial landscapes are affected by both cyclic and progressive water- and nature-related phenomena. Examples of cyclic phenomena are rising and falling water levels and seasonal changes in vegetation. Progressive phenomena include geomorphological changes like erosion and sedimentation, and vegetation growth and succession. Changes can be slow and gradual, with a high level of certainty and (in the case of cyclic phenomena) a certain regularity or rhythm, or they can be very abrupt and uncertain like extreme flooding events and wildfires (see Lynch 1972 and Zerubavel 2003). Time drawings should show the development of landscape over time. Purely temporal time drawings include score, timeline and film. This visual essay explores hybrids of spatial and temporal representations like the diagram, and a series of spatial representations that become a temporal representation when given a precise time tag (Van Dooren 2017).

At H+N+S Landscape Architects, time drawing has become a self-evident part of the integral research by design on dynamic water- and nature-related systems. In projects like these, uncertainty and surprise greatly influence the outcome. The designs made by H+N+S aim to set in motion a process of transformation (Van Dooren 2015). An early example of a time drawing, now known as a water calender, is the water peaks study of the Emscher river in Germany, for which a composite diagram was made to identify the space available for storing both regular water peaks and irregular extreme discharges (H+N+S 2002). Another example is an animated film made for a river bypass project south of Kampen (Netherlands) that shows how a flooding event influences the water landscape over time (H+N+S 2008).

While engaged in drawing projects that deal with landscape dynamics, landscape architects are continuously shifting between (combinations of) dimensions, and different scale levels, in order to understand the landscape and to discover its challenges and opportunities. All landscape architects architecte well versed in exploring spatial dimensions by shifting between plans, cross sections, axonometric projectections and perspectives. Moreover, drawing the dimension of time gives us an opportunity to anticipate the effects of different water levels, progressive changes to the morphology of a site by erosion and sedimentation as well as future changes due to ecological succession and thereby possible maintenance issues. All these are important components of fluvial landscape design.

In this visual essay we reflect on the role of time drawing in the design process of floodplain widening projects – the so-called 'Room for the River' projects – using the Ooijen-Wanssum project (designed and constructed from 2018 to 2020) as our main example. The villages of Ooijen and Wanssum are situated along the Meuse river in the Dutch province of Limburg. The core of the Room for the River concept is to provide narrow parts of the river with a wider flood plain to accommodate very large discharges and to reduce water levels during major floods.[1] The main objective of the Ooijen-Wanssum project was to connect a former river branch to the main river, the Meuse, in order to accommodate a large part of the river discharge during floods and at the same time to improve the ecological and recreational qualities of the river landscape. H+N+S Landscape Architects were asked to shape the future landscape and deliver construction drawings for its realization and we duly came up with strategic interventions to create conditions for the river to shape the landscape in a natural way and provide room for valuable natural processes. On the following pages we demonstrate how the awareness of time contributed to a design that interacts with the dynamics of the river landscape on different levels. By adding time to the complex range of dimensions in which the landscape is understood, new perspectives on the landscape were introduced. Although time drawing formed a crucial aspect of the design process, time is implicitly rather than explicitly present in the drawings. The sketches presented in this visual essay may be regarded as a 'backstage view' of the practice of H+N+S Landscape Architects: the drawings are mainly driven by their practical use and give insight into the process of understanding and intervening in the dynamic floodplain landscape. This involves a complex interaction between river gradient, barrier elevations, inundation frequencies and resulting ecological processes, which can be understood by drawing the way time alters the environmental conditions. The design outcome is widely appreciated as a new approach to floodplain widening, one that accommodates the unique, intrinsic characteristics of the landscape dynamics.

1 Source: https://www.stowa.nl/deltafacts/waterveiligheid/waterveiligheidsbeleid-en-regelgeving/room-river

FIGURE 1

Water calendar for the Ooijen-Wanssum floodplain widening project.

The water calendar depicts the extent of flooding and water depths from average summer discharges to extreme flooding events. The water calendar is an important design tool. Drawing the system's dynamic in time engenders an understanding of the complex interplay between water level changes, in both space and time, and threshold elevations. The current and the design heights of the thresholds influence the frequency of inundation and thus water quality and ecological conditions. By drawing the inflow and outflow, by letting the area 'flood from the pencil' so to speak, the system is understood and potential interventions emerge. The inundation zones and frequencies are then used for the design of the recreational network, to create the right conditions for ecological systems in relation to the expected vegetation, and to enable the force of the river to shape the landscape in a natural way through sedimentation and erosion.

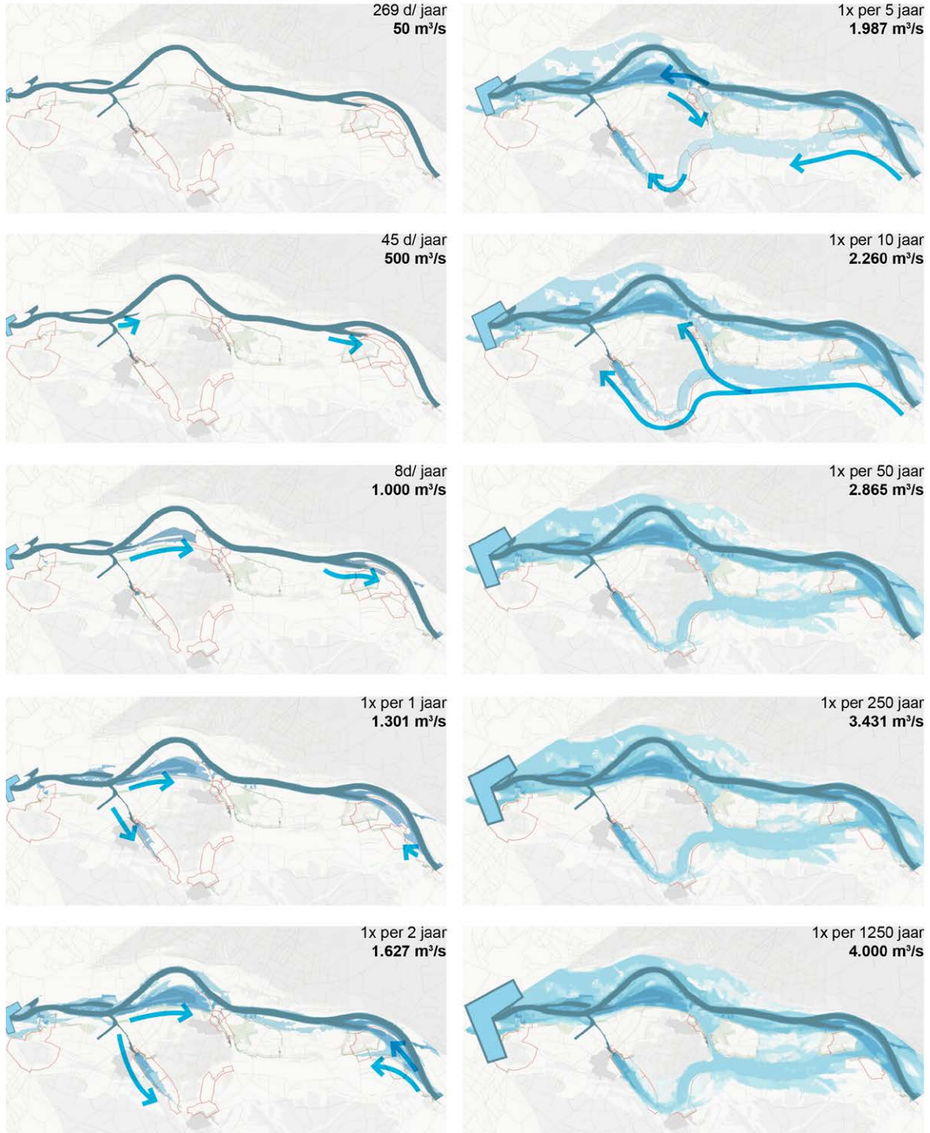

FIGURE 2 +
FIGURE 3

Sketch and drawings for determining a dynamic recreative path structure (recreatieve routing).

Based on the water calendar (*Maaspeil*), a dynamic path structure was created with different routes, such as the summer route (*zomerroute*), spring route (*voorjaarsroute*), special dyke path (*bijzondere dijkroute*) and a picketed roaming route (*struinpad met paaltjes*). These accordingord with the river's dynamic behaviour and an interactive experience of the dynamic river landscape. The goal was to provide different types of experiences over time. Some paths and small bridges (*bruggetjes*) that serve pedestrians and cyclists at average water levels will no longer be available at higher water levels. Stepping-stone crossings (*koppelstukken over laagte)* provide a final option for crossing inundated zones. The water calendar was used as a tool to play with different routes and their availability at different discharge levels, for an approximate number of days per year.

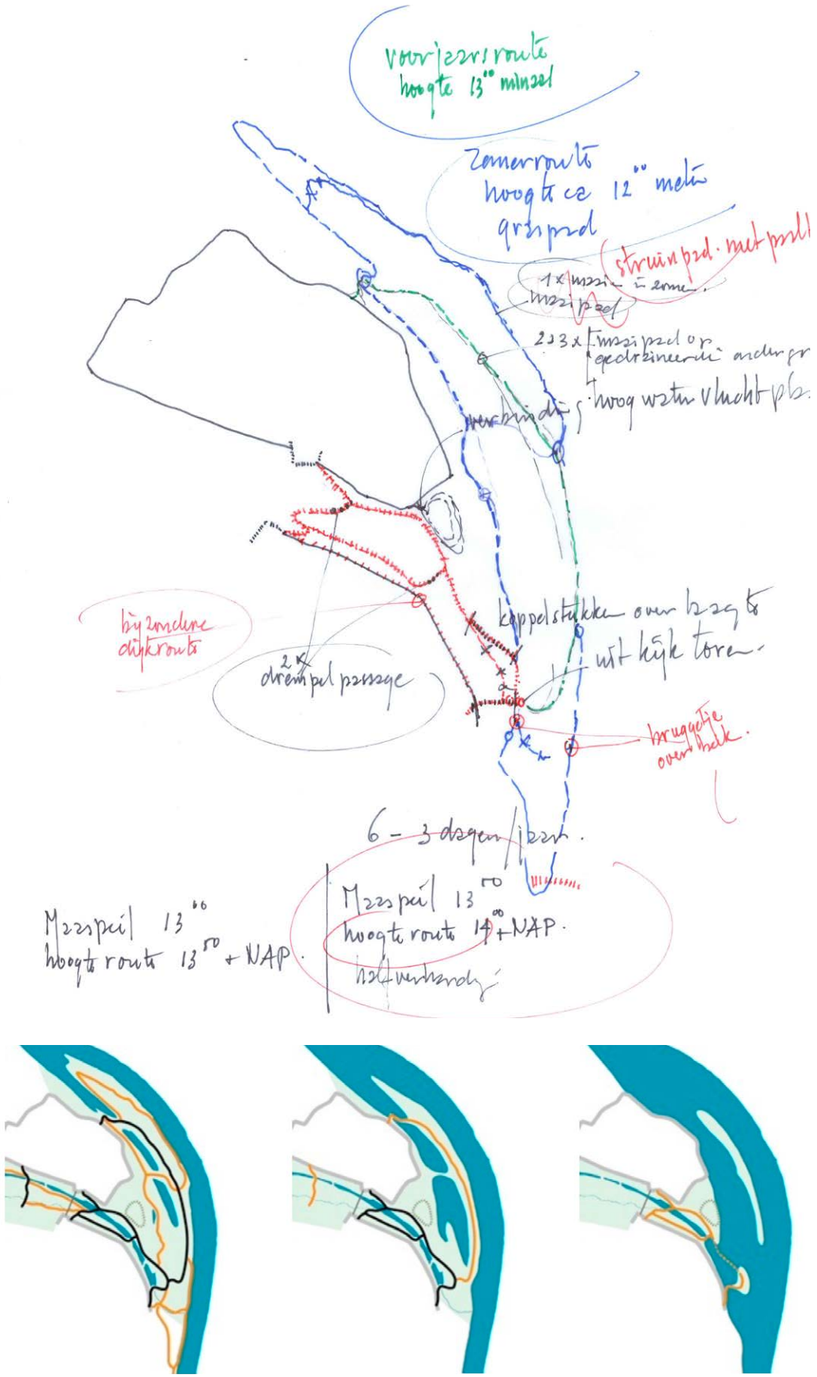

FIGURE 4

Plan drawing of the Ooijen-Wanssum project.

Blurred colouring is used to indicate the dynamic water level. Paths that will disappear under water during high water levels are dotted. This map focuses more on spatial dimensions than on the dimension of time. As for the principle of progressive change in natural landscapes, especially in river landscapes, there *can be no accurate* final project drawing of a morphological active fluvial landscape with continuously changing vegetation patterns. Rather, a combination of static and dynamic elements can be depicted so that the difference between dynamic and static elements is clearly represented.

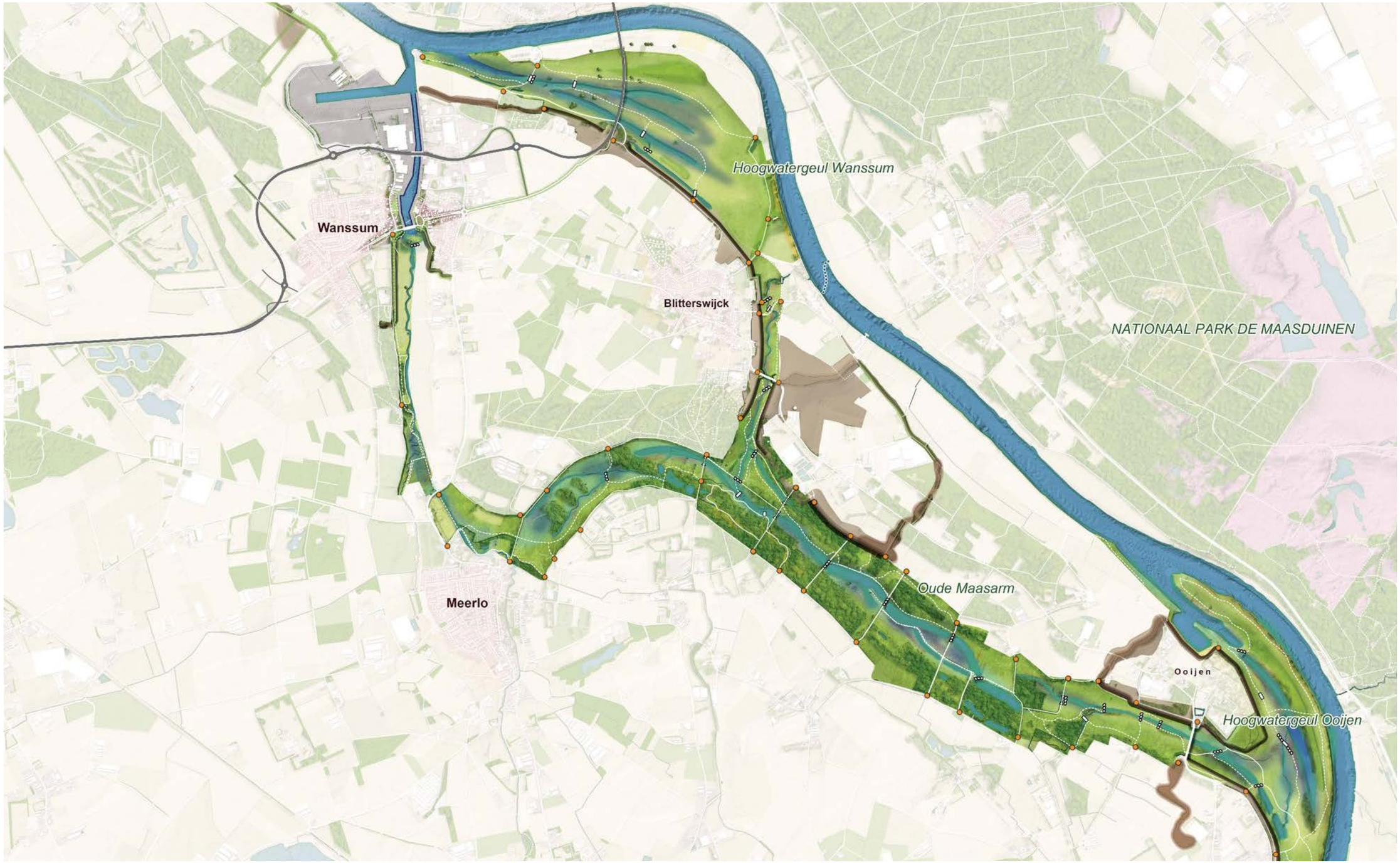

FIGURE 5

Alternative plan drawing.

Result of a study to find better ways of representing the Ooijen Wanssum project (detail of Figure 4). In this map the constructed / designed layer is shown by digital drawing lines (hard constructions, elevation contours of excavation works). The unpredictable, natural landscape that will emerge on the basis of these conditions is depicted using a blurred, manipulated version of the aerial picture, suggesting how the area may develop naturally. This is a further development of this type of plan drawing that was first made for the Nijmegen-Lent floodplain widening project.

FIGURE 6

Photo of flooded paths near watchtower.

During floods with an approximate once per year recurrence, the watchtower is temporarily inaccessible. This contributes to awareness of the dynamics and power of water: the landscape is not always accessible via the same route.

(Photograph by Paul Poels, 2021)

FIGURE 7
FIGURE 8

Sketch and drawing of dynamic vegetation management.

Sprouting willows (*wilgenopslag*) are a challenge in river widening projects. Over time, willows tend to colonize large areas that are supposed to stay open to keep the riverbed smooth. In the floodplain design, the water calendar was used to determine the extent of the zone in which willows sprout. It was then calculated that this zone was too extensive for maintaining the desired level of hydraulic resistance. This informed the design of a floodplain cross section with a distinct, relatively steep bank, minimizing the extent of the willow sprouting zone and generating a more attractive and manageable floodplain landscape

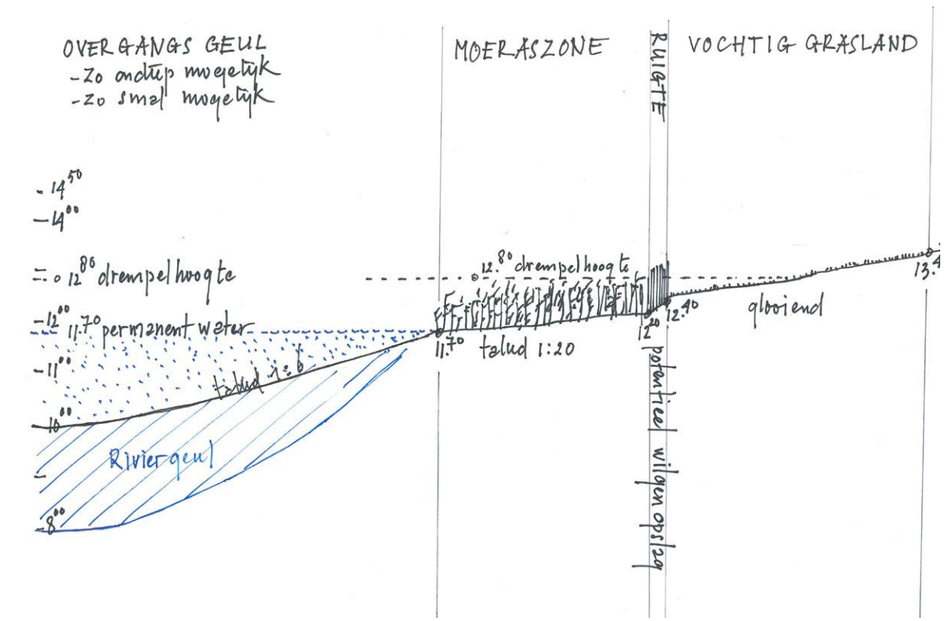

FIGURE 9

Diagram showing the river as a morphologic actor, using controlled erosion in the Ooijen-Wanssum floodplain widening project.

By removing stabilizing shoreline rocks, the natural process of erosion is reactivated. This allows the river to partially widen its own profile, which is both cost-effective and ecologically beneficial. The drawing attempts to capture all the stages in one drawing and shows the intervention starting a process in time. A natural process is given space, not through addition but through subtraction.

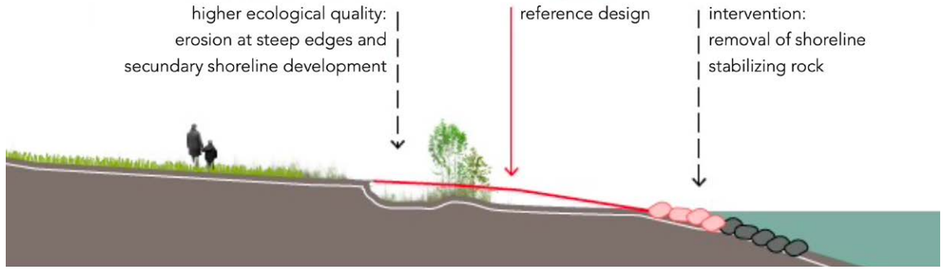

FIGURE 10

Riverbank erosion diagram for the Ooijen-Wanssum project.

This student exercise from the 2019 Drawing Time workshop conducted by TU Delft explores an alternative to drawing separate cross sections representing different moments in time. By projecting simplified versions of these sections in one diagram, the morphological changes become visible in a single time drawing.

(Image by Krit Thienvutichai, 2019)

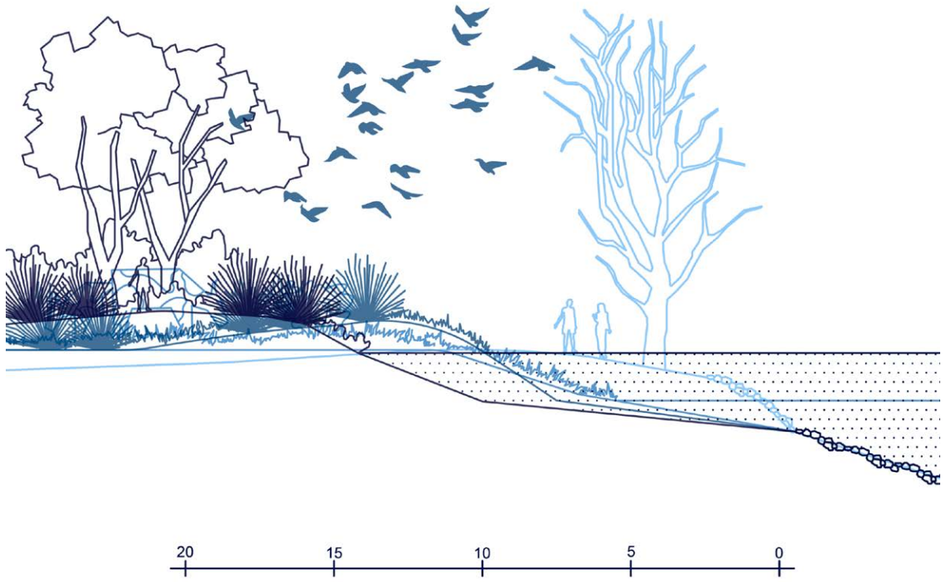

FIGURE 11

Result of the strategic morphologic intervention described in Figures 9 and 10.

Deliberate erosion was used as a strategy to develop a naturally shaped dike in part of the Ooijen-Wanssum project. Through time drawing it was determined how the intentionally unstable 2:1 slope would erode over time. In this way the extent of a buffer zone was determined, allowing enough room for natural forces to create an ecologically interesting profile but at the same time ensuring sufficient flood protection.

(Photograph by H+N+S Landscape Architects, 2019)

References

Dooren, N. van (2015). Gardening the Delta. A Dutch approach to landscape architecture. In M. Berkers, J. D. Hoekstra and N. van Dooren (Eds.) *Essay and lectures on the occasion of the 25th anniversary of H+N+S Landscape Architects*. Uitgeverij Blauwdruk.

Dooren, N. van (2017). *Drawing Time. The representation of growth, change and dynamics in Dutch landscape architectural practice after 1985.* Dissertation, University of Amsterdam.

H+N+S Landscape Architects (2002). *Die Umbau der Emscher* (Rehabilitation of the Emscher River). In cooperation with Dr. Dahlem, Ingolf Hahn, Architektur und Stadtplanung.

H+N+S Landscape Architects (2008). *Bypass Kampen – IJsseldelta Zuid (Kampen).*

H+N+S Landscape Architects (2016). *Room for the River Waal (Nijmegen-Lent).*

H+N+S Landscape Architects (2018). *Area Development Ooijen-Wanssum.*

Lynch, K. (1972). *What Time is this Place?* The MIT Press.

Zerubavel, E. (2003). *Time Maps: Collective Memory and the Social Shape of the Past.* The University of Chicago Press.