Building with landscape

On-site experimental installations informing BwN methodology

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Building with landscape

On-site experimental installations informing BwN methodology

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Abstract

The multi-dimensionality of BwN calls for the incorporation of 'designerly ways of knowing and doing' from other fields involved in this new trans-disciplinary approach. The transition out of a focus on rational design paradigms towards reflective design paradigms such as those employed in the spatial design disciplines may be a first step in this process. By extension, the knowledge base and design methodologies of BwN may be critically expanded by drawing on ways of knowing and doing in spatial design disciplines such as landscape architecture, which elaborates the agency of the term 'landscape' as counterpart to the term 'nature'. Operative perspectives and related methodologies in this discipline such as perception, anamnesis, multi-scalar thinking, and process design resonate with specific themes in the BwN approach such as design of/with natural processes, integration of functions or layers in the territory and the connection of engineering works to human-social contexts. A series of installations realised for the Oerol festival on the island of Terschelling between 2011 and 2018 serve as case studies to elaborate potential transfers and thematic elaborations towards BwN. In these projects inter-disciplinary teams of students, researchers and lecturers developed temporary landscape installations in a coastal landscape setting. Themes emerging from these project include 'mapping coastal landscapes as complex natures', 'mapping as design-generative device', 'crowd-mapping', 'people-place relationships', 'co-creation', 'narrating coastal landscapes', 'public interaction' and 'aesthetic experience'. Specific aspects of these themes relevant to the knowledge base and methodologies of BwN, include integration of sites and their contexts through descriptive and projective mappings, understanding the various spatial and temporal scales of a territory as complex natures, and the integration of collective narratives and aesthetic experiences of coastal infrastructures in the design process, via reflective dialogues.

KEYWORDS

Building-with-Nature, landscape architecture, design methodology, hydraulic infrastructures, mapping coastal landscapes, aesthetic experience, co-creation

1. Introduction

Building with Nature (BwN) offers an alternative mode of praxis for infrastructural challenges such as hydraulic infrastructures and coastal flood barriers, whereby nature and natural processes are actively engaged to serve goals such as flood safety (De Vriend, et al.,2015). At the same time BwN aims to address broader sustainability goals such as minimizing damage to natural environments and increasing ecological value around hydraulic infrastructures. To this end, the knowledge base and methodologies of BwN include and combine such fields as ecology, environmental science and engineering, as well as other disciplines involved in the built environment. The interweaving of these disciplines is commendable and promising, and resonates with intra-disciplinary developments in other areas of applied sciences. Most BwN results however, are still limited to multi-functional outcomes whereby nature, recreation and other uses are accommodated. The fact that more elaborate or hybrid outcomes are rare suggests that a true hybridization has yet to fully emerge, and that contributions leading to a further synthesis of these fields are welcome and necessary.

A first topic in this discussion is the elaboration of BwN in the area of design and design thinking. Design can be considered a culture of thinking aimed at altering an existing condition/situation/artifact into a preferred condition/situation/artifact (Schon, 1983). Exactly how the designer moves from the existing to the new, however, can differ markedly. Of these various methods, Dorst & Dijkhuis (1995) elaborate two essentially different meta-approaches to design: the Rational Problem-solving approach and the Reflection-in-Action approach (figure 1).

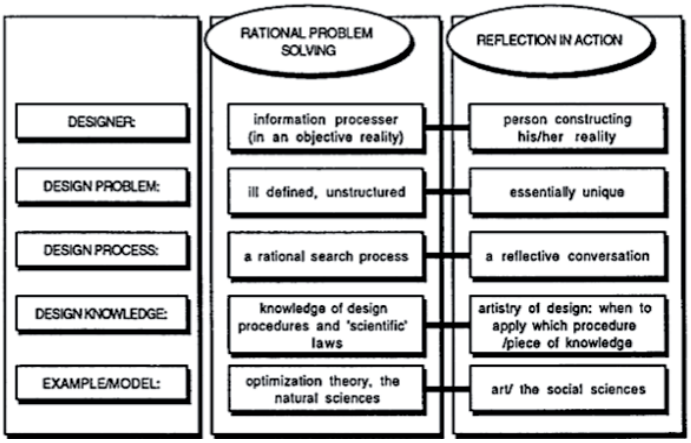


Figure 1. Matrix of rational problem solving paradigms versus reflection-in-action paradigms. (Image: Dorst & Dijkhuis, 1995)

Broadly speaking, the present state of BwN can be said to articulate design and the design process predominantly in the rational problem-solving paradigm. In the first instance then, the evolution of BwN as design process calls for its expansion out of a solely rational design paradigm, to include paradigms from the reflective design perspective. More unambiguously, the multi-dimensionality of BwN implies a necessary venture outside the confines of engineering towards 'designerly ways' found in other fields involved in this new intra-disciplinary approach.

By extension, the knowledge base and design methodologies of BwN may be critically expanded by drawing on ways of knowing and doing in disciplines engaging with the reflective design perspective, evident in some spatial design disciplines such as landscape architecture. As such, this paper elaborates the potential of landscape architecture as part of BwN's broader 'interdisciplinary venture'. Although sharing a similar focus (physical/built environment planning, design and management), landscape architecture can be said to predominantly engage the reflection paradigm in the design process. Moreover, landscape architecture is of specific interest for its focus on 'design with nature', a theme it shares with BwN. In landscape architecture discourse, design-with-nature is a notion that underpins the discipline and extends back to mankind's first manipulations of the natural environment (Girot, 2016). As such, BwN can be seen as a new chapter in an age-old tradition.

Of interest here is the way in which the term nature is interpreted; more precisely, in landscape architecture nature is juxtaposed by the term 'landscape', which forms the operative idiom of the discipline. Within this idiom three epistemological frames arise in the discourse: landscape as earth-life system, landscape as habituated milieu, and landscape as experiential scene/setting (Corner, 1999a; Van der Velde 2018). In turn these frames backdrop a quartet of operative perspectives and related methodologies for spatial (landscape) design praxis, namely (1) Perception, (2) Anamnesis, (3) Multi-scalar thinking, and (4) Process design (Marot 1999, Prominski 2004). These perspectives are relevant for this paper in that they resonate with three themes found in BwN that deserve attention in expanding and sharpening its knowledge base and methodologies: (1) design of/with natural processes, (2) integration of functions or layers in the landscape and (3) connection of engineering works to their human-social context.

To narrow down a review and migration of ways of knowing and doing from landscape architecture to BwN, a selection is made from the repertoire of the discipline to those projects operating in the same context such as coastal landscapes, or those engaging with infrastructural challenges such as flood safety. Coastal landscapes formed the setting of a series of landscape architectural projects realised for the Oerol festival on the island of Terschelling between 2011 and 2018, under the auspices of the chair of landscape ar-

chitecture at the faculty of architecture, TU Delft. The Oerol projects formed part of the master of landscape architecture elective programme, a 12-week long design-and-build module for students from landscape architecture, architecture, urbanism and industrial design, led by researchers and lecturers from the chair. Given the setting of the festival on the island of Terschelling, the problematique of climate change and flood safety formed an implicit, and sometimes explicit, backdrop to the studio. The cooperation between Oerol Festival and the chair stemmed initially from the broad ambition to create a synergy between art, science, nature and landscape. As such the projects were positioned in the 'expedition' programme of the festival, an auxiliary set of projects to complement the theatre and music agenda of the 10-day long festival. In each of the projects student teams led by researchers and staff researched, conceptualized and constructed temporary design-and-build installations to be visited by the (festival) public over a period of 10 days. For master track students it was an opportunity to take part in a 'live' design assignment and build a physical installation, to learn how to collaborate with fellow students and external stakeholders, work with a festival audience in a multidisciplinary environment, and bring together different notions of nature and landscape. A recurring conceptual frame for the projects was the notion of place: understanding how landscapes form specific locales and what landscape architectural methods can do to reveal and engage a 'sense of place'.

In the following, an examination is made of the collection of On-Site projects in the period 2011-2018 to glean various ways of knowing and doing relevant to BwN. In the first part, an overview is given of the projects and their thematic focus, followed by a discussion of these themes and their outcomes in relation to the ways of knowing and doing in BwN. Lessons learnt are summarized and related to the BwN perspective in the conclusion.

2. Landscape as agency in Oerol on-site projects

First generation: 'Landscape Mirror' & 'Feed the Wind'

The first participation in the festival's project series, the 2011 'Landscape Mirror' project, explored different landscape types present on the island such as polder, village, forest and dune, represented these landscapes in a built diorama on the beach using materials such as sand, wood and cloth. To recreate the clash between natural and man-made forces provisory dikes were built of beach sand on the shoreline, in an empirical attempt to spatialize and communicate erosion and sedimentation processes for the festival public (figure 2).

Figure 2. Island landscape diorama, 'Landscape Mirror' project (Photo: Inge Bobbink)

Figure 3. Temporary water garden, 'Feed the Wind' project (Photo: Daniel Jauslin)

A *camera obscura* installation close by in the dunes allowed visitors to experience both the immediate and the distant polder, village, forest, and dune landscapes simultaneously. The unpredictable island weather provided some useful lessons as on one of the first days, a storm surge washed away the largest part of the project, offering an unpolished experience of the power of nature. In the 2012 project 'Feed the Wind' (Jauslin & Bobbink, 2012), aeolian forces which incrementally shaped sand into the barrier islands of the Wadden sea, and the ways in which man used this power to further shape the island of Terschelling, were explored in an enclosed (water) garden. The festival public were invited to bring in sand and use foot pumps to spread it out in the pond in a pattern echoing natural sand transport in the Wadden sea area (figure 3).

Second generation: 'Institute of Place Making' & 'Institute of Time Taking', 'Pin(k) a Place'

A shift in focus to the design process and the landscape of the island characterized the second generation of projects. In the 2013 project 'Institute of Place Making', detailed mapping studies by design teams revealed the complex morphogenesis of the island including erosion, sedimentation and vegetation, and their manipulation through grazing, cultivating, dune and dike-building, and settlement (infra)structures (Pouderoijen & Piccinini, 2013) (figure 4).

Site experience and on-site experiments also became part of the design process, through meetings and interviews with local inhabitants and festival visitors. This was done by asking them to collect material from a place on the island they related to and to give a short description about this relationship. Feedback was analysed and classified into categories in an attempt to generate scientific insights about people-place relationships. Findings were communicated back to visitors in an on-site exhibition in which they could browse through a range of possible relationships other than their own (figure. 5).

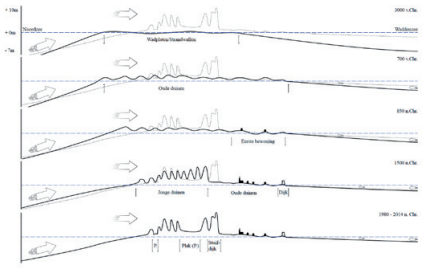


Figure 4 (left). Sectional representations of island morphogenesis, 'Institute of Time-Taking' project
Figure 5 (right). Cabinet of curiosities, 'Institute of Place Making'project

This approach was extended in the 2014 project 'Institute of Time Taking', with a focus on individual experience of landscape comparing sensorial and scientific approaches. Mapping the site and context of Terschelling formed a foundational step in this project, whereby the design process included a detailed set of descriptive and projective mappings of the spatial development of the island. In 2017 the 'Pin(k) a Place' project explored the people-place relationship further by examining what a specific forest landscape meant to people in a real-time physical experiment whereby visitors located and described the emotion of a certain point in a given forest environment (Piccinini, & van der Velde, 2017). In what might be termed a form of 'crowd mapping', multiple and alternative layers and meanings of a given landscape were revealed, complementing professional understanding of sites and landscapes.

Third generation: 'Institute of Poldering' & 'ForeSea'

In 2015 a collaboration with *Vogelbescherming Nederland* (VBN/Birdlife Netherlands) led to a project highlighting the decline of meadow birds in agricultural landscapes. The installation was designed to both depict and question the relation between (consumer) behaviour, landscape, and nature, and to show how farming was a delicate balance between business and sustaining a biodiverse and attractive landscape (figure 6). In 2016 a similar problematique backdropped the 'ForeSea' installation, an immense three-dimensional info-graphic depicting sea-level rise as result of visitor behaviour (figure 7).

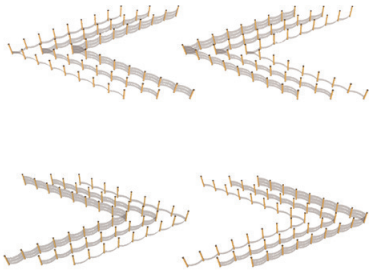
Both installations were designed as 'open-ended' constructions whereby visitor input decided the ultimate form. In this mode, the 2015 project saw a timber construction 'creep' incrementally across the meadowlands and the 2016 project developed into a dense three-dimensional airborne web of coloured threads visible from increasingly further distances. Although the primary purpose of this third generation of projects was communication, they now also took on a role of exploring how landscape architecture can address contemporary societal problems and spatial challenges by revealing the role of humans in landscape change and development.

Figure 6 (left). interactive installation, 'Institute of Poldering' project
Figure 7 (right). Dynamic info-graphic, 'ForeSea' project

Fourth generation: 'Aeolis - Gap the Border'

The issue of sea-level rise and coastal defence became an increasingly prominent theme in what can be seen as a fourth generation project realized in 2018. Whereas the 2016 'ForeSea' project raised awareness of the societal challenge of sea level rise, the 2018 project 'Aeolis - Gap the Border' actively engaged the agency of landscape in the problematique of coastal defence (Van der Velde & Van Bergen, 2018). For the coastal defence of Terschelling it is necessary for the fore and rear dunes to receive more (sand) deposits in order to keep pace with sea level rise. This premise set the scene for the first phase of the project in which aeolian techniques for dune formation were explored by students in field workshops for rapid prototyping and compositions for sediment accretion (figure 8).

By stimulating sediment accretion on the beach and in the dunes these experiments explored how to assist dune growth and compensate for coastal erosion. In early on-site workshops, 'fencing' in the form of hessian screens turned out to be a promising technique for sediment accretion.



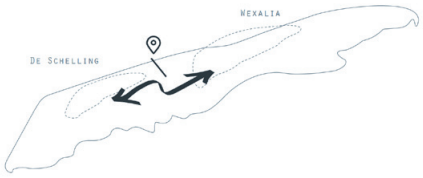


Figure 8 (left). Sand accretion prototype, 'Aeolis-Gap the Border' project
Figure 9. (right) 'Stitching' location, 'Aeolis-Gap the Border' project

Moving to the site and context of Terschelling itself, the design process turned to detailed descriptive and projective mappings of the spatial development of the island. This research revealed a complex history of natural and anthropogenic processes interacting together, including erosion, sedimentation and vegetation, and their manipulation through grazing, cultivating, dune and dike-building, and settlement (infra)structures. In line with these findings a site for the installation was chosen where the two former islands of Terschelling (Der Schelling & Wexalia) were united into one island during the middle ages (figure 9).

The technique of projective mapping led to understanding the site as a result of natural forces and anthropogenic interventions over many centuries, which was then translated into a preliminary zig-zag line placed perpendicular to the coastline from the foredune to the shoreline. This configuration effectively spatialized a large-scale (historical) stitching of the two islands

together (figure 10). The goal to capture and transport sand driven by the (angled) winds across the beach with the hessian fences, led to the further development of the scheme into a woven configuration of columns and screens in the beach–foredune complex. As such the design became a connective assembly of screens at different heights in a zigzag configuration, leading from the dynamic surf zone to the less dynamic foredune zone over a distance of 200m (figure 11).

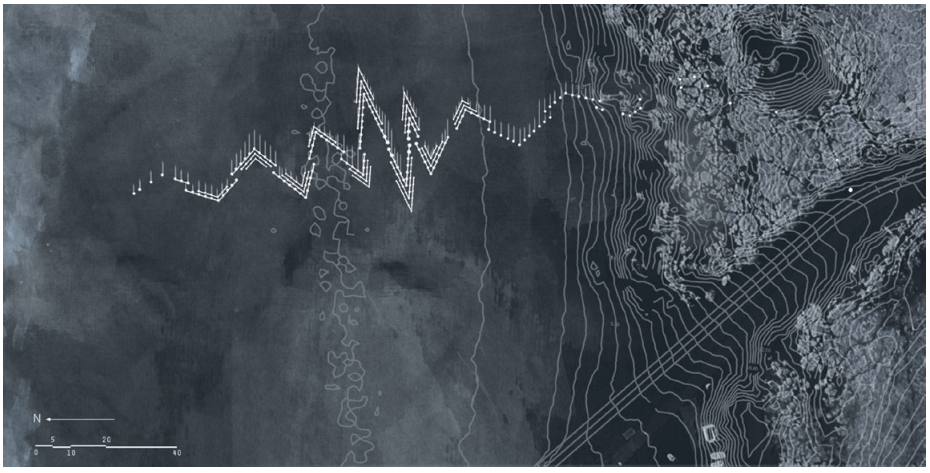


Figure 10. Screen assembly plan, 'Aeolis-Gap the Border' project

Figure 11. Installation elevation, 'Aeolis-Gap the Border' project

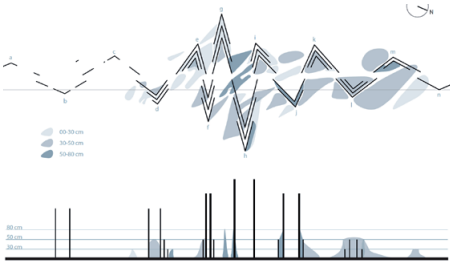


Figure 12 (left). Overview of installation from dunes, 'Aeolis-Gap the Border' project
Figure 13 (right). Accumulated in situ sand accretions, 'Aeolis-Gap the Border' project

In the final built installation, stepped fences were designed to trap different modes of sediment such as creep, saltation and suspension. The angled structure was able to trap sediment from various wind directions, including the less-favourable offshore winds, thus stopping sediment from blowing back into the sea. Rows of fences also served as tunnels for sediment transport to the inner parts of the installation while elevated 'blowholes' accelerated trapped sediment to the inner chambers of the installation, were it could settle further as start of embryonic dune growth. With the project forming part of the 'expedition' program of the festival, the public visited the installation over a 10-day period. A route was set out for visitors, starting in the mature dunes behind and above the installation. Here the public were introduced to the necessity of dune formation, with a route along panels showing the different phases of dune formation and ending in a panoramic overview over the installation (figure 12).

From this point they could observe the various stages of dune formation, including the effects of human intervention such as the decline in vegetation around beach accesses, but also the effects of 'tramping' which helps keep sediment mobile for transport. Descending to the installation, visitors passed through the central axis of the installation where they could observe the progress of accretion in the installation, by measuring its progress at stops on the route. As a BwN project exploring assisted dune development using natural forces (sediment transport by wind), the installation demonstrated novel effects on wind and sand transport and performed well in many facets of sand transport and accretion (figure 13).

In this way, although not intended purely as an installation to generate scientific results, it contributed as a conceptual model and prototype to elaborate different means for sediment accretion in response to site, wind and human dynamics. Some items of the installation, such as the stepped fences, did not fulfil their promise in the short timeframe of the festival. Other aspects, such as its angular shape did well in the prevailing south-west (offshore) wind, stopping dune sediment being transported back to sea. An unexpected outcome was the effect of higher screens which turned lower openings into 'blow holes' during higher wind speeds, transporting sediment deeper into the installation.This effect compares to beach pavilions on stilts, where the carrying construction also functions as a medium for deeper sediment transport due to higher 'compressed' windspeeds beneath the structure. It shows the spatial effects of architectural interventions in the beach dune interface that can inform future built form edifices to enhance dune formation in the fore dune zone. These insights were fed back into the ShoreScape research project of the Delft University of Technology and University of Twente to see how they can be translated to operational mechanisms for sediment transport and new urban typologies for the beach-dune interface.

3. Discussion

The contribution of the Oerol projects to the discourse and practice of BwN are further elaborated by discussing them in the frame of the four operative perspectives of landscape architecture (perception, anamnesis, multi-scalar thinking, and process design), in relation to the existing knowledge base and methodologies of BwN (design of/with natural processes, integration of functions or layers in the landscape and connection of engineering works to their human-social context).

Mapping Coastal Landscapes as 'Complex Natures'

Mapping and modeling the successive (re)workings of the territory over time was a defining aspect of early Oerol projects such as the 'Institute of Time-taking'. As methodologies, these activities draw on both the 'anamnesis' and 'process design' perspectives by revealing the incremental change of the island over time. In exposing the interaction of both natural and anthropogenic forces in this evolution, they demonstrate the historical complexity of coastal environments with relevance to BwN initiatives (figure 14). More critically, they reveal the essential interaction between man and nature on the island, and by extension raise important questions for the BwN approach: have not anthropogenic elements in these landscapes become an irreplaceable appendix to the abiotic and the biotic?; and by extension: should BwN restrict its understanding of nature to non-anthropogenic environments and 'natural' conditions?

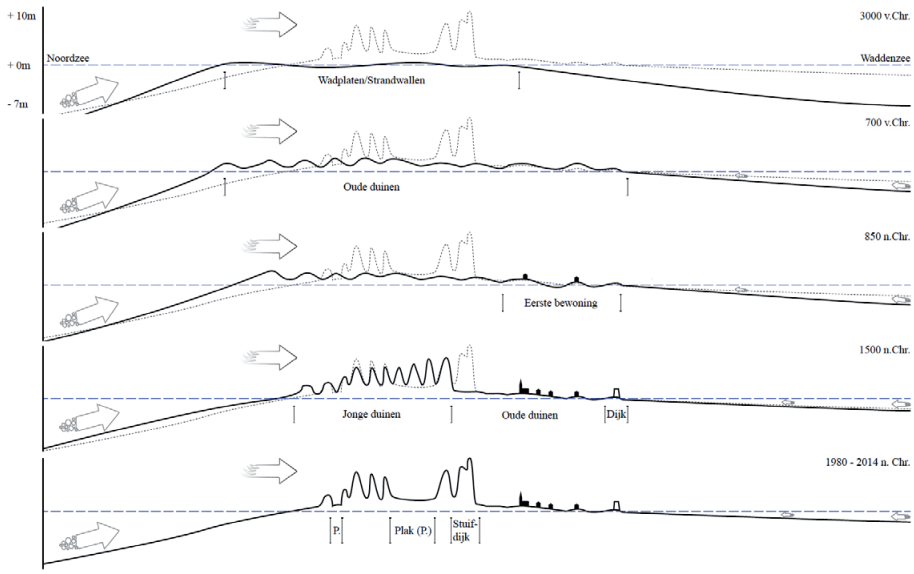


Figure 14. Sectional study of landscape formation, 'Institute of time-taking' project, 2014

In answering these questions – and before proceeding to applications – BwN might first attempt to define its understanding of nature; as Williams (1983) observes, nature is one of the most complex terms in the English language, a predicament undoubtedly relevant to other languages. He goes on to note that nature is an abstraction, a set of ideas for which many cultures have no one name, *"a singular name for the real multiplicity of things and living processes"* (Williams, 1980). From the perspective of landscape architecture the meaning of the term nature can be said to be relative to the context of the intervention; if natural and anthropogenic forces in a locale have conflated to such a degree that their distinction is irrelevant, the 'nature' of the territory is just so. By extension, a Building-with-Nature project should creatively engage with the amalgam of natural and anthropogenic forces present, within the framework of its broader sustainability objectives.

Mapping as Design-generative Device

As a methodology, mapping implies a deep understanding of the natural and anthropogenic forces at play in the territory, their interaction over time, and critically, their interpretation towards the infrastructural challenge at hand. As such, while the outcomes of these first projects had little relevance for BwN as solutions for flood defense or other civil engineering challenges, the 2018 project took this thematic through towards a solution with methodological relevance for infrastructural outcomes. The 'Aeolis-Gap the Border' project used mappings of the island to inform the location and configuration of a system of screens, which accreted sediment by capturing wind-blown sands. Leaving aside a discussion of the ultimate success of the screens in dune development (impossible to judge in the short time of the festival), the linking of the island's historical development to the solution is useful for BwN in that it engages not only the natural processes of the island, but also with the cultural forces that worked with the 'nature of the island' over centuries to shape it. As such, by translating the results from landscape mappings (historical development, layers etc) into a spatial concept, the incorporation of the embedded, deep-time working-with-nature character of the island was revealed and engaged. An implicit position here is that the island itself harbours vital information for the rollout of BwN for coastal defence, which in turn has a potential for elaborating and incorporating new patterns of occupation in coastal landscapes with benefits for the acceptance of large-scale infrastructural interventions in coastal environments.

In respect to the process itself, unlocking the island's 'DNA' is rarely a deductive process, but instead uses the agency of mapping selectively and even subjectively. Corner (1999b) observes that mappings are not neutral or passive devices for measurement and description, but, instead, (should be) seen as imaginative and operational tools. He goes on to note that '... map-

ping enables the designer to *construct* an argument, to embed it within the dominant practises of a rational culture, and ultimately to turn those practises towards more practical and collective ends' (Corner, 1999b). The possibilities (and implications) of this stance for BwN are significant; it suggests that an operative relationship can be constructed between mappings of the territory and infrastructural interventions, but that this process demands a combination of close readings and creative (re)constructions, competencies that do not exist in one single discipline as yet.

'Crowd-Mapping', People-place Relationships & Co-creation

If mapping is to be seen as an imaginative operation, then constructive mappings as a generator for design solutions might also include non-professional mapmakers. This notion emerges from the second-generation projects, which shifted investigations of the territory towards (human) perspectives of the landscape & the mapping of the social dimension of place. This shift responded to an emerging theoretical frame for the projects: understanding how landscapes form specific locales and what methods can reveal and engage a 'sense of place'. As such, the teams explored not only the identity of a particular site and territory by mapping its bio-physical and urban-infrastructural form, but also its socio-cultural 'DNA'. How landscape are perceived and appreciated by locals, visitors and other user groups thus became a central theme. In the 2013, 2014 and 2017 projects perception of landscape and different ways people connect to it led to several interactive ways of investigation to structure visitor observations, such as imaging, mapping, description and classification (figure 15). What these outcomes may mean for BwN solutions are yet not entirely clear, but they do show that perceptions of landscapes (and by inference different ideas of what 'nature' is) are more diverse than those held in professional circles. By extension, non-professional contributions as generative devices to develop BwN solutions could be much more fertile than generally assumed. At the very least, revealing and working with the 'embodied knowledge' of coastal landscapes has a critical advantage over conventional BwN approaches in terms of public relations. In the first place, by working with what people (can) know, and by extension relate to. More fundamentally, for local communities who have been part of the shaping of the island in the first place (and see how this is used to develop a new approach for dune development) there is a shift in the authorship of the work from the engineer to the island and its people. By extension, the acceptance of (innovative but uncertain) BwN measures can be expected to improve. Thus, while co-creation within BwN remains largely underdeveloped, its potential is much greater than currently acknowledged and may be even more so when inhabitants are allowed to adopt a BwN project and develop it further in different ways. This can be seen in the Sand Motor project on the South Holland

coast, which shows that BwN projects may be more suitable for this kind of shared use than traditional, 'hard' solutions.

Figure 15. Landcape preferences mapping, 'Pin(k)-a-Place' project, 2017

Narrating Coastal Landscape infrastructures

'Crowd-mapping', people-place relationships and co-creation also prompt a parallel topic critical to (the future of) BwN. In the context of increasing demand for innovative and sustainable solutions for hydraulic infrastructures, there is a need to not only embed BwN projects in their bio-physical context but also to develop social acceptance of these measures as an alternative response to challenges such as climate change. In this frame, while the outcomes of many Oerol projects may seem in the first instance to have little relevance as solutions to flood defense, they do engage the public to experience environments in various ways, with potentially important lessons for BwN.

These approaches arise through the perspective of landscape (architecture) as an understanding and the choregraphing (perceptions) of outdoor environments. Early projects were conceived as narrative installations to transfer ideas to the festival audience through interactively building replicas of island landscapes with students and visitors. They explained how landscape works by immersing visitors in an experience of how different island environments evolved, thus making the public aware of the tradition of the barrier island landscape and the constant struggle between land and sea. Later projects such as 'Institute of Place Making', 'Institute of Time Taking', and 'Pin(k) a Place' brought to light the importance of landscapes as settings for

experience and identity for individuals and communities. In the third-generation projects, awareness became an interactive component to make people conscious of the role they play in shaping landscapes through their own behavior. This was elaborated through public interaction with the installation, transforming it through the actions and opinions of individuals. For BwN, these approaches can serve as an example to engage communities by making people aware of sea level rise, and the need for BwN responses to it. The 'Aeolis-Gap the Border' installation for example begins by making aspects of the landscape that are normally invisible (such as sand transport, or effects of recreation, loss of beach vegetation, beach development) visible. In fact, the sand landscape of Terschelling can be said to have become the main feature, and the installation a facilitation and visualization of it. A necessary broadening of BwN involves making invisible landscape-forming processes visible, translating them architecturally, and sharing them with a larger audience in order to increase awareness of the landscape.

Public Interaction and Aesthetic Experience in BwN Design Processes

A more structural engagement with individuals, communities and societies in various phases of BwN projects is a final theme, not just as informative moments but as an integral part in the phases of hydraulic infrastructure projects (initiation, plan development and construction). Openings in this direction can be seen in the 'Aeolis-Gap the Border' project, where visitors and residents became aware of the history of this coastal island, of climate change and vulnerable coastal landscapes, and became familiar with succession in the dune landscape as a necessary step in response to sea level rise. However, the project also made them critical; is this science? Is this art? Is this disturbance of the landscape? As such, the project engaged the collective memory of the audience to evaluate new BwN techniques, not just in a technical way but also in a cultural sense, as an act of 'landscape building'. The physical installation served as a testing ground for people to understand, accept and participate in science, and engage with the adaptation of the dune landscape that results from it. The design of prototypes is thus not just about investigating scientific questions and technical solutions but also to bring science to a wider audience, to start a dialogue about science and its role in the transformation of landscape. This kind of approach is exemplified by the BwN projects such as the Sand Motor, which is not only the result of technical parameters but also incorporates recreational and cultural practices. Some even suggest a step beyond this paradigm. Meyer (2008) argues that while ecological health, social justice and economic prosperity are the three dominant modes of sustainable landscape development, aesthetic environmental experience is the crucial missing link to effectuate this goal. She observes that 'the performance of a landscape's appearance, and the experience

of beauty, should have as much currency in debates about what a sustainable landscape might, and should be as the performance of its ecological systems' (Meyer, 2008). As such, what may be considered as a purely artistic aspect of installation works such as the aesthetic constellation of hessian screens in the 'Aeolis-Gap the Border' project (and thus removed from the 'real work' of BwN infrastructure), can be viewed as a necessary part of the wider practice of BwN which aims to sustainably address the effects of climate change. In this way BwN projects may also be expected to contribute to public debate on the role of science and its cultural transition in the context of the future of coastal landscape of the Netherlands.

4. Conclusion

BwN is a new approach now being implemented in several pilot projects. The approach is still in an early stage of development and in need of elaboration in terms of its knowledge base and design methodologies. The multi-dimensionality of BwN calls for the incorporation of 'designerly ways of knowing and doing' from other fields involved in this trans-disciplinary approach. As such, the successful evolution of BwN implies a transition away from purely rational design paradigms towards attitudes and procedures in reflective design paradigms employed in related spatial design disciplines. Centring in on the knowledge base and methodologies of BwN, these may be critically expanded by drawing on emerging ways of knowing and doing in spatial design disciplines such as landscape architecture, which presents itself as a potential source through its elaboration of the agency of the term 'landscape', as counterpart to the term 'nature'. Landscape forms a relevant idiom with a set of operative perspectives and related methodologies for spatial design praxis, such as perception, anamnesis, multi-scalar thinking, and process design. These are relevant to BwN as an approach which engages with natural processes, synergizing functions and connecting solutions to the cultural component of coastal environments.

A series of festival projects in the period 2011-2018 elaborate these themes in different ways. The first generation of Oerol projects were directed towards the understanding of landscape as natural and cultural mosaic and the social perception of landscape. Second and third generation projects made the step towards an architectural intervention in the landscape as a result of public dialogue, which also raised awareness for societal challenges such as the vitality of polder landscapes or the threat of sea level rise. A fourth generation project brought the problematique of BwN to the landscape of Terschelling, revealing how a broader elaboration of coastal defence is possible that not only addresses flood safety (and ecology) but also the deeper bio-physical and

human-social characteristics of the territory. Themes emerging from these projects include: 'mapping coastal landscapes as complex natures', 'mapping as design-generative device', 'crowd-mapping', 'people-place relationships', 'co-creation', 'narrating coastal landscapes', 'public interaction' and 'aesthetic experience'. Specific aspects of these projects relevant to the knowledge base and methodologies of BwN, include integration of sites and their contexts through descriptive and projective mappings, understanding the various spatial and temporal scales of a territory as complex natures, and the integration of collective narratives and aesthetic experiences of coastal infrastructures in the design process, via reflective dialogues.

For a further elaboration of BwN it may be productive to examine and develop its epistemological foundations. The landscape epistemes 'landscape as earth-life system', 'landscape as habituated milieu', and 'landscape as experintial scene/setting' are a useful starting point for this work.

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