The Human Body as a Sensory Design Tool to Advance Understanding of Coastal Landscapes Changes

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As the world's climate changes and becomes warmer, the sea level is rising and affects the coasts globally (Church et al, 2013). One area where its impact is especially evident is southern Sweden, where land uplift is almost absent and where commitment and preparedness among authorities to adapt to these rising sea levels are limited. In a search for complementary strategies to enhance the work for climate adaptation, alternative methods have been tested in collaborative work with a choreographer and groups of Master's students in landscape design, where the students used their bodies to express landscape dynamics, principles for protection or interaction with the sea and their own understanding of a future changed meaning and identity within the coastal landscape. In one of the choreographed, design-driven movement workshops, the students walked the high-water line as it appears on maps and, with other movements, they integrated the dynamics of the sea and its confrontation with coastal life.

The challenging and tentative work, conceptualised as 'reflective motion', ended in a public performance where the students identified and dramatised threats, reconciliation and possibilities for change in relation to future sea-level rise on the site. The performance took place along a 2-kilometre stretch and concluded with a public discussion in the library. The method seemed to be useful and complementary to other methods; by 'blurring' the static high-water line in favour of a more complex understanding; by being an interactive tool between the researcher, the designer, the choreographer and a coastal society (Germundsson and Wingren, 2017); by developing a 'value action' or a common language of environmental awareness (Hirsch, 2016); and by giving space for emotional expressions and mourning related to loss of landscapes, landscape identity and meaning (Cunsolo Willox, 2012). The results indicate that 'reflective motion' is a method that can be investigated further as a platform for better-informed design and as a forum where local people and authorities can meet to share their landscape knowledge.

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As the world's climate changes and becomes warmer, the global sea level is rising (Church et al, 2013). In Sweden, this will mainly affect the southern coast (Scania region), where land uplift is minimal or non-existent (Malmberg Persson et al, 2014). However, local, regional and national authorities seem to have a limited understanding of these accelerating changes, along with a limited commitment and preparedness to adapt to them within planning and design (Länsstyrelsen i Skåne, 2014). Several possible reasons exist for this failure to fully consider coastal dynamics. One is the lack of clarity about how to handle a changing coastline, who is responsible for actions and what the best design measures or strategies are for adapting to this change. Another influential factor is the rather common unwillingness among citizens, and society as a whole, to acknowledge a change where land is eaten up by the sea and where a landscape

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that local residents know, love and identify with is disappearing centimetre by centimetre. A third possible reason is that coastal dynamics are difficult to understand: waves, floods and other coastal dynamics, which affected coastal landscapes even before sea-level rise was an issue, are often hidden in planning documents or maps, which generally represent the coast in a static way as a line, rather than as a zone.

To improve awareness of coastal landscape change and the need to consider it within landscape design, when teaching landscape design Master's studio classes I have covered landscape dynamics, including coastal changes in relation to climate change, as a main theme. During these classes, I observed that students had difficulty in fully integrating the processual thinking required to understand the design challenges and in design proposals. Therefore I sought to devise alternative or complementary design methods to improve processual thinking on landscape change over time. These methods included: comic drawing inspired by Sara Granér; section drawing inspired by Anuradha Mathur and Dilip da Cunha; and dance, movement and choreography in collaboration with Ríonach Ní Neíll. All these methods proved successful in improving students' understanding and my own. Storytelling through comics became important for understanding and showing change over time; sectional drawing clarified how a differentiated coastal area could be transformed not simply with protection walls, but with solutions that involved a more subtle interaction between land and sea (figure 3a and b); and the movement and choreography workshops influenced the students both emotionally and strategically. Overall, through their better understanding of a future changed landscape identity, students came up with the collective idea of 'embracing' the dynamic between land and sea in their design proposals.

In the movement workshops, students were able to map the landscape dynamics, the principles for protection or interaction and their understanding of changes in meaning and identity within the landscape, all at the same time, using their bodies. When provided as one of several initial parts of the design process within the course, this activity seemed to support these students to grasp the complexity of coastal dynamics much more quickly than in former design studio courses. The 'otherness' of the approach compared with more institutionalised methods within the profession and its strength in introducing complex questions and systems for landscape and design knowledge were the main reasons for exploring it further as a strategic tool in more explorative and open-minded landscape design methodology. This work is especially aimed at designing within the frame of changing landscapes processes, such as those associated with climate change.

My movement exploration workshops are design driven or design directed. Their purpose is to improve understanding of the processual, involving both the movement and dynamics that exist within the landscape and their importance in changing landscape identity and meaning. The goal of achieving dynamic understanding as the initiator for the workshops was clear from the outset. The more emotional part, relating to the importance of landscape identity and meaning, became obvious during the workshops and can be seen as a research finding (Germundsson and Wingren, 2017). The role of the designers (students in this case) in these initial workshops was that of storyteller, but during the

activities in one of the workshops involving a physical performance in public, the designers also became place-makers, introducing meaning by their own movements and actions (de Certeau, 2002).

The explorative choreographic work described in this paper can be considered part of the design process and knowledge production process. It can be described or conceptualised as processual design, explorative design or research by design. Using specific methods inherited from choreography makes it possible to reveal alternative knowledge about the site and its processes and about the designers themselves. My approach to making it part of the field of landscape design research is principally through transparency, close description and documentation, as described in my PhD work on artistic practice in landscape architecture (Wingren, 2009). This can be seen as connected to the field of autoethnography (Adams et al, 2015).

This paper is structured as follows. After discussing problems and consequences related to actual representational methods such as drawing maps, I consider how creativity and choice of alternatives can expand understanding. The discussion is then widened by introducing actual and alternative narrative methods using embodied knowledge and considering their importance for influencing action. Next, I present workshops or research-by-design processes that took place in southern Sweden in 2014 and 2015, in collaboration with Master's students in landscape design, where choreography was one of several experimental tools used to improve understanding of the challenges connected to landscape design in a landscape influenced by climate change and sea-level rise. The results of the choreography-based workshops are then analysed, using the concept of 'reflective motion'. Finally, I explore the benefits and limits of using this methodology in the larger context of how it could enrich landscape design for changing landscapes, especially related to climate change and adaptation.

Static representational methods conceal the dynamics of coastal landscapes

Like other coastal cities in the western world, municipalities in southern Sweden (Scania) – the region analysed in this study – tend to represent their actual and future coastline as a static line on a map, thereby hiding temporalities of high and low water levels. Likewise, the expected geographical limit for high tide in 100 years is drawn as a line (only redder and thicker) on top of the landscape inland, where the contour line representing 3 metres above current sea level is situated (figure 1). This line, representing not only sea-level rise but also the high-water line reached during future expected storm surges and high waves driven by strong winds, is a simplified description of probable flooding in the landscape. Thus it provides little space for interpreting and understanding the coast as a changing zone in relation to water and wetness, or in relation to other connected processes, including the lives of humans and animals and the fate of different habitats.

This way of describing contemporary and future coastal areas by static phases and lines, instead of as different parallel processes such as progressing water fronts or a tide changing in relation to other factors such as annual variations or heavy storms, influences understanding and decision making in coastal design and planning. Consequently, authorities may not recognise coastal dynamics like

Figure 1: The red line on the map represents the idea about the future coastline in around 100 years, when the sea is at its highest. The line is static (in the same way as the actual coastline on the map) and does not communicate the dynamics of the coastal landscape. (Map: DHI for Höganäs municipality.)

storms, currents or even human behaviour; instead, topography and height above sea level tend to govern decisions about building sites or protection measures. The static map is less useful as a single tool for communication and could even be seen as negative, as it reinforces the static view and use of the coast in a world that, in reality, is changing. Threatened infrastructure or buildings might never be questioned or thought of as moveable, while preserves for nature and heritage might be regarded as protected geographically in their specific location, instead of as areas that can be maintained only by letting them move geographically in relation to the water line.

The static approach to geographical boundaries and spatial positions still dominates views on the landscape and associated investigation, planning and design, which thus fail to embrace the dynamics of the landscape or the strong change expected in relation to climate change (some land will disappear). In recent years, however, some have criticised the static planning and design approach and the lack of interest in the dynamics of the coastal landscape; at the same time, a more dynamic view of the coastal zone is gaining in importance. A similar change is evident in the growing discourse emphasising the value of 'soft', flexible protection walls compared with strong, static sea walls, for better adaptation of the coast as the sea level rises (Cooper and Pilkey, 2012; de Vriend and van Koningsveld, 2012; Hanson et al, 2006). This could be seen as a loss of terrain for engineering and a gain of terrain for landscape architecture and design. For example, in the aftermath of Hurricane Sandy in the eastern United States of America, a number of university-based architect teams were invited to devise new design strategies to protect the US coast against future storms and erosion (www.structuresofcoastalresilience.org). The design brief was to provide an alternative to the hard-cover protection walls (quays and piers) engineered by the US Army Corps of Engineers, which in many cases had failed to protect the coastline from the effects of the hurricane and instead exacerbated erosion through 'Newjerseyization' (Pilkey and Dixon, 1996).

One of the teams led by landscape architects Mathur and da Cunha, based on their former design work for Indian coastlines, developed a new strategy in which they described the coast not by a line but by multiple overlayered topographical sections. This way of representing and visualising the coast's topography directly on the map developed into a landscape design strategy where the usual protection wall that goes along the coast was turned 90 degrees and by repetition formed a system of 'fingers of high ground' across the coastline (figure 2). This strategy is more accommodating and less confrontational towards the sea, storms and future sea-level rise (Mathur and da Cunha, 2014a, 2014b). The 'fingers of high ground' are intended to function as high-lying areas to which the population can retreat in times of storm and rain, while the water can find its place between the ridges ('fingers'). The simple strategy, of course, needs to be customised to each specific situation and is similar to design strategies developed at the same time by my landscape design students in Sweden. They were highly inspired by Mathur and da Cunha's way of representing the coastline by topographical over-layered sections (figure 3a and b), which indicates the importance of methodologies used for exploring the landscape and landscape change in influencing final design proposals and strategies.

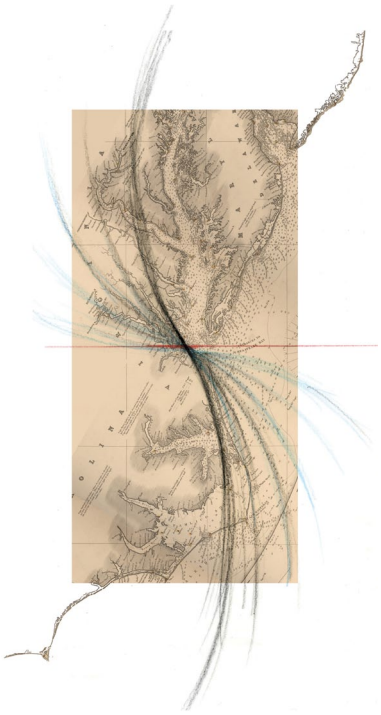

Figure 2: The conventional protective line of demarcation to the sea is turned 90 degrees in Mathur and da Cunha's proposal for Norfolk at Chesapeake Bay, USA, to form 'fingers of high ground' that can be used for safe retreat during floods. (Sketch: Anuradha Mathur and Dilip da Cunha.)

The methodology determines which landscape knowledge and story to tell

To date, researchers and organisations have used a range of methods for communicating the abstract events of climate change and sea-level rise. For example, in documents of the United Nations International Panel on Climate Change and the Swedish Meteorological Institute, maps, graphs and diagrams play a particularly large role as descriptive tools. As a base for these graphical representations, researchers collect particular types of information.

Powerful input comes from describing historically important moments or events or collecting long time-series of data (Hamblyn, 2009; Sörlin, 2009). This information can be interpreted, extrapolated and expressed through describing a probable future scenario that needs to be addressed by planning and design. This much-used and influential scenario technique can be viewed as a form of storytelling to guide politicians, planners, designers or other citizens to make the best possible decisions for adaptation.

However, some narratives of actual events spark a discussion about how to avoid similar situations arising in future. Examples include how the 'Advent Storm' on 27 November 2011 flooded Helsingborg in southern Sweden, and how the city tunnel in Malmö was almost flooded (with only 15 centimetres of margin) on 5 December 2013. Such 'lived' events function in a more direct way as powerful tools for developing new strategies and improving preparedness. Moreover, in communities without a significant written language but with a strong connection to nature, local stories can even be created to communicate important social issues related to landscape change. Such methodology has been highlighted as important for future understanding of climate change and impact (Bravo, 2009).

Storytelling of different kinds appears to be a powerful tool for communicating information about landscape and social change that is difficult to understand for different reasons – for example, it may be unknown, abstract or unwanted.

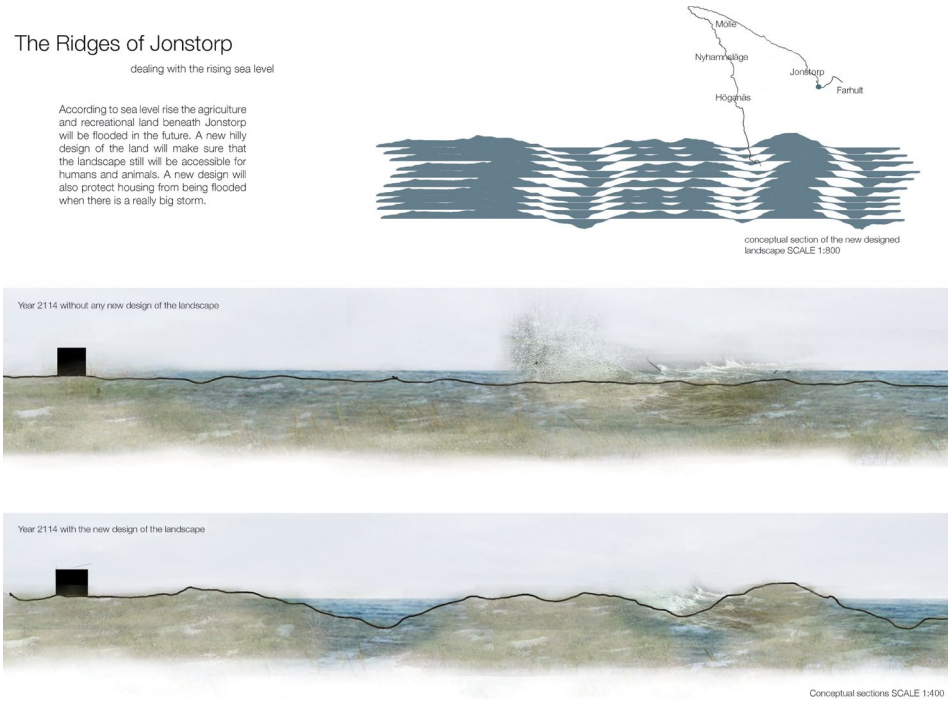

Figure 3a: Using an exaggerated height scale, in 2014 Elise Eriksson, Master's student in landscape architecture at SLU, designed sections along a coastline in Jonstorp and then developed the sectional drawings by moving masses in the landscape to create lower areas for the water to get into the landscape and higher areas for people to move to. (Image: Elise Eriksson.)

Different techniques can be used, of course. One is to develop choreographed stories in relation to landscape and society as 'site-specific performances' (Birch and Tompkins, 2012; Pearson, 2010). These performances can sometimes have a more political or artistic undertone, where the dramatisation not only enriches the understanding of space but also opens the way for necessary interdisciplinary discussion on difficult design and planning issues, in the same way as artistic inquiry of other kinds can inform interdisciplinary research (Rust, 2007).

Within landscape architecture, exploratory design work (namely, research by design) could thus employ complementary artistic methods and focus more strongly on understanding the landscape in all its parts and implications – materiality, topography, plants, life and so on – while also providing a platform for design discussions or collaboration with other researchers, professionals, decision makers and citizens.

Figure 3b: The proposal by Elise Eriksson is based on her previous studies and visualisation of a coastal landscape with sections (see above). Houses are placed on higher ridges in the new landscape, while sea water can find its way in between. The landscape can still be used and the confrontation with the sea is minimised. (Image: Elise Eriksson.)

One example of such broadened landscape design methodology is when the employees at the studio walk through the landscape and investigate it both from a distant view and by engaging with details, experiencing it and taking notes of different kinds to fully understand it through these different perspectives or aspects (Foxley and Vogt, 2010; Schultz, 2014). Another is the symposium 'Let's Walk Urban Landscapes' organised by Studio Urban Landschaften in Hannover in 2015, with the aim of finding new pathways to transform urban landscapes (de Wit, 2016; http://letswalkurbanlandscapes.urbanelandschaften.de). Most important is, of course, the collaborative work of Anna and Lawrence Halprin, which has been highly influential in considering performance and choreography within landscape architecture. Their collaboration had its peak in the 1960s, when they involved local residents and architects in various exploratory works examining landscape within civic and design processes, and where Anna's choreography and Lawrence's notations in relation to space and movement provided input to Lawrence's landscape design works (Halprin, 1986; Merriman, 2010).

Design-driven needs form the method of 'reflective motion' as part of the design process

On the basis of design-driven needs and influenced by some of the above-mentioned works, Master's students in landscape design at the Swedish University of Agricultural Sciences (SLU) in Alnarp explored the interaction between the shallow and sandy coasts of two different coastal towns in collaboration with a choreographer. In the first group project in Höganäs in 2014, the work initially focused on future coastal dynamics embedded within climate change, but eventually became much more complex and challenging in terms of both time and effort (see below). In the next year, with another group of students, the project hosted a smaller two-day workshop in Vellinge that focused only on erosion, in collaboration with a PhD student in engineering. Her knowledge of and interest in the interaction between streams, waves, sandy beaches and dunes were mediated into movement with the help of the choreographer, and the main outcome was embodied knowledge about erosion that influenced each design proposal on a technical level.

The Vellinge work was successful, but did not initiate the same reflective development about overall landscape dynamics, identity and meaning as the more holistic approach of the previous week-long workshop in Höganäs. The Höganäs workshop ended in a public performance that dealt both with coastal processes and with design possibilities for coastal adaptation in a changing climate, in a collaboration involving the choreographer and students along with politicians, municipal employees and local residents. The performance was structured as a storytelling process consisting of different phases, where the first formulated a common story about the threat of rising waters, the second expressed this story and the third performed and discussed the story in front of, and together with, a public audience.

In a limited period of 10 weeks, the students had to gain an understanding of coastal dynamics, including storms, tides, currents and erosion, and of the abstract issue of future sea-level rise. They also had to integrate those processes into design proposals for coastal development and adaptation. One difficulty in

this work was the abstract and static way in which coastline was communicated (see the discussion at the start of this paper). Another was the priority given to visible features when communicating about the landscape, at the expense of other factors that are hidden. One such hidden factor is the porosity within the ground and its materials where water can hide; another is the relational experience that people have with 'their' landscape, which influences the value citizens give to individual landscapes and the extent to which they identify with each one. As already mentioned, several alternative investigatory design methods were tested in week-long workshops in an initial phase of the design course, with the aim of uncovering such hidden aspects or dynamics within coastal design challenges: analogue model making, comic drawing, laboratory exercises investigating the porosity of materials and its relation to water, sectional drawing and, finally, movement or choreography.

The movement workshop provided time for thinking and for a common discussion about coastal dynamics and its implications for local residents and for coastal design strategies, and was conceptualised as 'reflective motion'. It came to act as a platform for better understanding and communication about the future landscape and its changes, and to bring an important knowledge input to students' final design solutions. By introducing these creative and artistic working methods early in the exploratory processes of designing, it also appeared as though a more integrated process of investigation and design could take place, which also meant that creativity and designing of another kind became an important complement to the ordinary drawing design process. This enriched the discussion about design possibilities, where a more dynamic view of alternative solutions emerged. It could be said that the artistic methods opened the way for an earlier, accelerated and more complex emotional approach to the task of designing, already in the investigatory phase, which influenced both the kind of knowledge production that took place in the project and the character of the final design proposals.

'Reflective motion' – dynamics and interaction

> Could you please make the students walk the line and dance the waves, so that they understand what it's all about?

This is what I asked the choreographer commissioned to carry out a week-long 'movement workshop' with the students. The aim was to give them the chance to develop an understanding of what rising sea levels can do to coastal landscapes in future, as a way of preparing them to create better design solutions that could minimise negative effects for people living by the coast. The artistic approach was created to enable the students to gain embodied knowledge about the different coastal dynamics by letting them walk the red line on the map (figure 1) that describes the level the water is expected to reach in 100 years (including sea-level rise, waves and wind pressure on water), and with other movements to integrate the dynamics of the sea and its confrontation with coastal life. In the initial phase, the content of this 'movement work' was vague but, during the workshop and through the collaboration with the choreographer, it developed into a real public performance, where students identified threats and possibilities for this specific site in relation to future sea-level rise and communicated them to its residents.

Because the collaboration between myself as teacher/researcher and the choreographer was new and because the students – as non-dancers – were unprepared for the task, the work began in a tentative and relatively open-minded way. Tasks included: understanding the landscape and its future dynamics and changes; finding out what this means for the landscape; finding the red high-water line in the landscape; changing the line into a walk in the landscape; adding knowledge about waves, storms and other coastal dynamics; and adding the associated movements and making them into a dramatised story about threats, reconciliation or possibilities for change.

In a short session that began the course, students met the choreographer. Together with her, they tested some exercises to understand the future work, as well as to create trust and strong group dynamics. At this stage, the 'movement workshop' that would take place a month later was also presented, and students were informed that they could choose not to participate (and do something else instead). Only three students out of more than 30 made that choice. At the same time, on a conventional site visit students walked the landscape and collected impressions, materials, sounds, objects, sketches and photographs that they displayed and analysed back at the university.

The main work started on a cold Monday in mid-February with a full-day site visit to the coastal town of Höganäs (figure 4b) and continued with four days of full-time work in a large hall at the Department of Landscape Architecture, Planning and Management, SLU, which was chosen to function as a 'dance studio'. The workshop on 'reflective motion' ended on the following Saturday with a performance consisting of a 'movement walk' from Höganäs harbour to the main shopping street and the square in front of the library. A film manager followed, video-recording the work (figure 4a), and then cut and produced the film as one of the outcomes of the project (Varhegyi, 2016). A photographer also followed the work and documented it in 1,600 images. To accompany the performance, a PhD student in landscape architecture and soundscape prepared a sound arrangement involving sounds of water and wind. As teacher/researcher and project leader, my role was very much to facilitate the process but also to choose the props that were then accepted or rejected by the choreographer and the students: these included blue hats and gloves representing water, red warning snow sticks representing forces or movements (like waves or rowing oars) and

Figure 4a and b: The choreographic landscape enquiry in Höganäs with Swedish Master's students in landscape design was led by the Irish choreographer Ríonach Ní Neíll and filmed by Lajos Varhegyi. The work involved long discussions and hard physical work aimed at knowledge production and understanding landscape dynamics. (Photos: John S Webb.)

other paraphernalia representing the historical bathing culture and the wildlife in the area. Several assistant lecturers and researchers also participated in parts of the work and a PhD student in landscape architecture focusing on dance and movement was invited to follow the process.

The 'reflective motion' method finds its form

The tentative work described here as 'reflective motion' started with extensive discussions about what sea-level rise is, how it changes the landscape and what in this knowledge could be interesting to express. In parallel, through discussions and small exercises, ideas developed about how important knowledge, thoughts or values could be expressed and communicated through movement. From the first day on site in Höganäs and continuing in the dance studio back at the university, the project comprised collaborative work of the choreographer and the students, while I as researcher/teacher stepped back and supervised the work from behind (observing researcher position). To find and express the high-water line and the dynamics of the waves in the physical landscape, and to develop a story about threats, challenges, sentiments and possible ways to act, the work also involved building group dynamics and mutual trust among the students, which proved to be positive for the design work that followed.

The students threw themselves into the unknown, experimental and explorative interplay with the choreographer, where the initial aim was to create and understand the physical forces to which landscape in transformation is exposed. During the work, the students and the choreographer transformed this aim, and constructed a story about what can happen in a city that is flooded. The choreographer, coming from the more political background that site-specific performance represents, wanted to dramatise the process of rising waters in a way that could engage citizens by criticising political decisions about building houses in coastal areas and also introducing insurance questions. While the individual students, of course, all had their own ideas, as a group they developed the idea of mitigating the feeling of threat and instead encouraging optimism and revealing new opportunities for developing the coastal landscape together with sea-level rise in a positive way (figure 6a and b). Their motto was 'embrace', which involved embracing the dynamics of the coastal zone, including sea-level rise, and developing the landscape with adapted means.

The work proved to be demanding, both mentally and physically, as the students had to leave their comfort zone by performing in public and by undertaking physical exercise for six to eight hours a day for a whole week. In particular, establishing the necessary trust, knowledge and self-confidence in such a short time was a challenge that I had not anticipated as project leader (teacher), but that could probably have been predicted. Feelings of uncertainty and anxiety affected the group (students and choreographer) in the middle of the week, and I was brought in to manage the situation. A set of talks with the students as a group and individually mostly related to questions and comments such as: 'Why are we doing this? What is it good for? I thought I was attending a design degree, not a dance degree. This seems to be a manifestation (political) and I do not feel comfortable with it. I don't want to perform in front of people as I am not a dancer.' The choreographer and I tried to address the issues in relation to the value of embodied knowledge, and once again offered the students

the option of not participating and of doing something else instead. Finally, all students decided to continue and the work resumed with new vigour.

On Saturday 22 February 2014, the students put on a public performance along a 2-kilometre stretch for half an hour, followed by a public discussion in the library where the challenges of sea-level rise and the need to act became obvious to those who attended. An important component was the 'haka' that began the public performance. This traditional Māori challenge was proposed by a student from New Zealand and was directed towards the sea (figure 5). Some expressions represented the dynamics of the water: the gentle splashing of waves, drops falling or heavy waves rolling in towards houses and buildings, threatening to destroy people's constructions and lives. Other expressions focused on actions using the rising water for positive effects: a flooded square became a place for swimming and recreation (figure 6b); and an imagined protection wall was destroyed by waves (figure 7a–c) but then without it the shopping street was transformed into a canal where people could use boats (figure 7d). In the final dramatic scene in the square in front of the library, the students (accompanied by an increasing level of water sounds) showed how people differ in the pace at which they come to recognise the threat of rising water and what happens to those who do not listen to warnings (figure 8a–c). In the beginning of the scene, only a few were able to save themselves on higher ground (a fountain or a raised flowerbed). However, as the imagined water rose higher and higher, the coastal dwellers, here represented by the students, collaborated and helped each other to safety. Finally, the last person to heed the warnings fell on the ground and 'drowned'.

The performance ended with an invitation to everybody to meet inside the library for a discussion about sea-level rise and the future of Höganäs (figure 8d). A large group followed the performance from the harbour to the library, among them some employees from the municipal authority and politicians. Many of these also followed the students into the library and participated in the discussion, where the students, the choreographer, a research colleague, a representative

Figure 5: The 'haka' started the performance, challenging the sea. (Photo: John S Webb.)

Figure 6a and b: Disaster and happiness in relation to the sea in future, communicated with certain props. (Photos: John S Webb.)

from the municipal authority and I responded to questions. In this session, the students met hesitant and sometimes anxious questions and statements with realistic, but also positive and creative, answers.

The future landscape in relation to sea-level rise was debated for the first time in public in Höganäs, and the feeling of something important happening was obvious not only from the level of engagement of the students and the group of local residents attending, but also from the wider interest that the activity generated. Media interest was demonstrated in news interviews for radio and television and for the local newspaper. The work in the project was presented as part of an exhibition on photography in research in Landskrona Museum, and also as part of an exhibition at the Form Design Center in Malmö (both in southern Sweden), which about 20,000 people visited during a three-month period. A slightly modified exhibition has also been produced in a scientific research environment at the SLU campus in Uppsala during its climate research days, to explore and discuss how artistic or exploring design methods can cope with scientific research and data.

Analysing the findings – what constitutes 'reflective motion'?

This paper describes an attempt to integrate an expanded understanding of landscape processes within a developed design methodology in relation to landscape changes influenced by climate change, with particular focus on coastal adaptation to sea-level rise. The method adopts an artistic and exploring approach deriving from the fields of landscape design and choreography (dance) and could be described as research by design (Seggern and Werner, 2008). The method can complement other methods (such as historical data and modelling) used to capture the features of the coastal landscape and its changes, with the outcomes of the different methodologies together providing a complex description of the coastal situation.

'Reflective motion' – an eclectic method

The method, here referred to as 'reflective motion', can be used as an interactive tool for investigation and communication between the designer (and choreographer) and a coastal society, its politicians, municipal employees and local residents, where the interactive element can expand the understanding of coastal changes, challenges and possibilities for actions, but also open the way for negotiating the landscape and its values (Germundsson and Wingren, 2017; Wingren, 2016a, 2016b). The reflective motion method was developed in an interdisciplinary collaboration between landscape architecture and choreography, with the

Figure: 7a, b, c, d: Arriving in the main street, where the sea level is expected to reach in about 100 years, the students show how it is not worth building a wall, because it will break, and that it is better to think about new ways of transporting people. (Photos: John S Webb.)

aim of better understanding, communicating and working with important and unknown landscape changes. The methodology is eclectic, using methods and discourses from different disciplines. It is principally artistic in its experimental approach, but is also connected to phenomenology, by using the subjective senses of the performer, and to hermeneutics, by transforming maps and diagrams into movement and letting both performers and a possible audience interpret these movements and allow new things to happen from there. The method is therefore multi-layered, and can be discussed and studied as a whole or in relation to each of the research fields identified above.

'Reflective motion' – a method for collective environmental awareness

'Reflective motion' is, as already noted, situated within a landscape architecture tradition of investigating landscapes through walking and explorative design, where methodologies and conceptualisations are continually under development. However, it might to some extent differ from several of these methods in terms of engagement with an actual landscape because 'reflective motion' also involves interpretation of an abstract and overflowing threat of change.

It is possible to draw a parallel to Halprin's 'value action', which indicates a shared experience from which a group can develop a 'common language of environment awareness' and move forward in a collective way (Hirsch, 2016). For example, the week-long movement workshop that ended up in the students' Saturday performance was one such 'value action', which helped them to grasp and conceptualise a strategy for coastal adaptation (in their case, described by 'embrace'). The value of this collaborative initial part of the design process, where shared environmental awareness was developed in a thoughtful and reflective way through discussions and explorative movements involving both understanding the existing and interpreting the unknown, can probably not be overestimated. This process or 'value action' was the moment when the agenda was set out step by step through bodily expressions towards the final expression of the performance, and for which strategic collective decisions were made about how and what to communicate – for example, whether the aim was to calm anxiety or to enhance it, to avoid specific actions or to push other kinds of actions that could give better results in relation to climate adaptation.

These strategic decisions need to be decided as a collective agenda from the beginning of the design process, when 'reflective motion' work starts. Thereafter they should be under the influence of the actual motion investigations in the workshop and modified in relation to emotional findings, which is an important part of the methodology. When coming to the end of the process, it is also important to clarify the final agenda permeating the work, as it may be used for political purposes.

Figure 8a, b, c, d: The final scene in the square in front of the library, where the students show how the water rises slowly, bit by bit, and they save themselves on higher ground. Finally, they go into the library to start discussions with the citizens of Höganäs. (Photos: John S Webb.)

'Reflective motion' – a method for initial design phases

'Reflective motion' proved to be a useful method for initial investigation within the design process, where knowledge can be gained about such diverse subjects as the landscape itself and embedded and approaching landscape processes, and about design possibilities or strategies, but also about the designers themselves and their preferences and strategies. It is therefore a useful but complex methodology for initiating strategies of design, involving different steps of artistic experimentation and dramatisation, phenomenological sensation and hermeneutic interpretation. It is a complex explorative and time-consuming method to use within a design process, with interesting and important outcomes on several levels. Use of 'reflective motion' therefore requires time and space to be allocated between the start of the project (understanding phase) and the final part (decision about design solutions or strategies), in order to process ideas, sensations and emotions relevant for the work.

'Reflective motion' – a method for emotional design

A specific value of 'reflective motion' in relation to landscapes threatened by transformation under climate change is that it gives space for emotional expressions related to such issues as loss of landscapes, landscape identity and meaning. Cunsolo Willox (2012) points out that a time of climate change and associated changes, such as those in the landscape, might bring with it a need to mourn lost values, similar to the mourning following bereavement. In the work described in this paper, the value of 'reflective motion' in this regard was not thoroughly examined, but the emotion that emerged among landscape design students, planners at the municipality and project leaders is an important field to investigate further.

Aims related to design – 'reflective motion' as an interactive tool for intellect, emotion and movement

The investigation through 'reflective motion' that took place in Höganäs had aims related both to design and to design research. As design-related explorative action, the 'reflective motion' undertaken in Höganäs could be described as involving an interaction between intellectual knowledge, emotional expression and expressed movement. It was thus helpful in 'blurring' the high-water line described in the maps and in avoiding a static view of the coast in favour of more complex description, understanding and development of design strategies for coastal zones, considering their full dynamics. During the design-driven movement workshop, this aim was continually modified through ongoing reflection using an open-ended, explorative approach. Consequently, while the initial aim within the teaching process was to create a common understanding of the actual coast,

including its spatiality and dynamics, and to provide a better basis for design decisions, it developed into a more complex approach involving the creation of a platform for communication with others.

Aims related to design research – 'reflective motion' as a platform for research within different fields

Regarding the design research aim on a meta level, the project initially dealt with how methods related to art-making, creativity and designing can complement and expand ways of understanding the coast and its change over time, and how they can be part of constructing a developed platform for discussions about additional alternative design strategies that need to be developed among designers in relation to a changing world. During the movement workshop and associated documentation and analysis, other issues emerged as interesting topics to study, such as the use of 'reflective motion' as a platform for collaborative planning and for developing discussions on changes in landscape identity and meaning as a result of climate change. The latter discussion could give time for acceptance of this (for many people, unacceptable) change, by accommodating anxieties and even mourning between the initial understanding of a landscape challenge and the final phases of a design process.

Conclusions

Awareness about rising sea levels is increasing among citizens, planners and decision makers, partly because of new reports from the International Panel on Climate Change, but also because of lost beaches or more frequent downpours and storm events in recent years. Media reporting of specific storms or catastrophes makes people react instantly, but these events seem to be forgotten rapidly unless people's own bodies or properties have been directly affected. This study has examined how people's and especially designers' awareness of landscape and climate change and preparedness for climate adaptation can be increased.

Time and space are needed for alternative methods and reflective communication

While it is important to act quickly in relation to climate change, the relatively slow pace of sea-level rise allows time for creating a platform for reflection, discussion and communication. The sea level will rise whatever the global community does and whether it manages to stop carbon dioxide emissions immediately or not, but it takes time to understand and accept this inevitability. Simplified representations of the landscape and its change, such as maps, can affect, delay or even obstruct an understanding of the implications of sea-level rise for the landscape, and thus also the ability to develop creative ideas and strategies for future coastal planning.

The results from the project described in this paper using reflective, artistic and design-based explorative methods for investigation and communication (storytelling and choreography) as a complement to established methods (such as maps and diagrams) indicate that 'reflective motion' can enhance coastal planning and design processes by expanding the way future coastal changes are understood and offering complementary possibilities for collaboration and 'value actions' between different groups and disciplines.

Bodily experience and reflective motion give input to strategic actions

Bodily experience is important, as it gives specific knowledge, understanding and presence to different situations (Thrift, 2007). This was valuable in the movement workshop described in this paper. In relation to sea-level rise, the workshop created a bodily experience anticipating real catastrophes, which could be seen as a way to prepare for strategic actions in advance and thereby avoid disasters.

The complementary design method 'reflective motion' created an initial engagement among the design students that better prepared them for the following design phases. Some reasons for this were that the method proved to be forceful in relation to several aims, understandings and agendas; its movement methodology correlated well with the movements and dynamics in the landscape investigated; it allowed the unexpected and the emotional to influence the research and design process; it connected well with how human emotional decisions influence climate change, sea-level rise and decisions made (or not made) for adaptation; and it seemed to be effective for knowledge production and for collaboration between designers and others related to the actual landscape (citizens, politicians and employees).

Further investigation needed

Further research through interviews and analysis of drawings and proposals is needed to prove the creative and strategic value of collaboration between the choreographer and landscape designers described in this paper. In the present case, introduction of alternative methods into the design process gave a better understanding of landscape dynamics and relevant design strategies to handle the threat of rising sea levels than former design courses. The case also achieved better dialogue among the landscape architects themselves and with others (politicians, officials, local residents), especially through sharing time, space and uncertainty. Moreover, it gave reason to believe that this approach is relevant for better-integrated design and planning in relation to future landscape changes of all kinds, where design and planning issues must not be separated as in today's more static approach. By involving multi-layered descriptions and flexible and dynamic methods related to change and including time and space for negotiating landscape values between the authorities and a wider public, the reflective motion offers a useful methodology for future planning and design. It creates a platform for better-informed design and a forum where local residents with their specific landscape knowledge related to memories and emotions can meet with authorities.

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