ECODYNAMIC DESIGN AS A BOUNDARY OBJECT

A case study in Fryslan

Erik van Slobbe[1],
[1] Centre for Water & Climate, Team ESS-CC (Earth System Science-Climate Change),
Wageningen University and Research Centre. +33317484966

Abstract
Consensus in Dutch society is that the existing coastal defence regime is not sustainable. Adaptation is not only a technical challenge, but affects elements like ecology, cultural heritage, recreation, urban development, making the issue complex both from a political and from a scientific point of view. And innovations must cope with the actual system of human beliefs, values and knowledges which constitute the old coastal management regime. One possible new regime is ecodynamic design. This is an approach using interactions between ecological processes and human interventions to create new coastal structures.
The Building with Nature innovation program is implementing ecodynamic experiments along the Dutch coast. One of these is an experiment along the Frisian IJsselmeer coast in the Netherlands. Participating actors (governments, NGO's, private partners) frame it as an adaptive action, potentially providing new flood defence methods to the region.
The aim of this paper is to explore the role this Building with Nature experiment plays in the interactions between actors with different perspectives and how the experiment influences collaborative learning. This case is analysed using the concept of boundary objects.

Keywords
adaptive action, learning, ecosystem engineering, boundary objects

1. Introduction

The setting is a restaurant at the beach, with a view on the Ijsselmeer, near Makkum. The 'Delta commissioner' is paying his introduction visit to the province of Fryslan. The task of this recently appointed powerful authority is to prepare the Netherlands for future climate changes. This is a direct consequence of a new delta strategy following the advise of the so-called second Delta Commission (Delta Commissie, 2008). Regional authorities and stakeholders are invited to discuss the new strategy. Journalists take notes.

"I cannot remember an occasion we agreed more than in our opposition against the advice of the Delta Commission" the provincial depute explains. She refers to the fragmentation of day to day regional politics at one hand and to the unusual consensus among regional authorities against the strategic advise of the Second Delta Commission. This commission analysed the long term impact of climate change to the Dutch water management system. One of its conclusions was that the water level in the IJsselmeer must follow lake level rise to maintain the free flush drainage system of the lake to the North sea and to create a fresh water reservoir. The commission advised to anticipate with a maximum sea level rise of 1.5 meters in the coming hundred years. The Frisian parties were specifically upset about the fresh water reservoir function; why must their coast suffer from the consequences of a 1.5 meters lake level rise in order to provide the Western part of the Netherlands with fresh water in times of scarcity?

The Delta Commissioner explains that decisions on lake levels will only be taken after a careful policy preparation process. In fact four scenario's for adaptation of lake levels in the future are under study and regional stakeholders are involved in studying the impacts of these scenarios. The initial 1,5 meters lake level rise is one of these four scenario's and no preference scenario is selected yet.

Some of the involved stakeholders are gathered round the table in Makkum. Yacht marina owners point at the economic importance of the recreation sector and the threat of higher waters to their investments in marina's, nature conservationists point at the value of nature areas located on former flood plains. A mean lake level rise of 30 cm. will already destroy most habitats. Water management officials point at the need to invest in flood protection and new pumping stations in case of lake level rise.

It is clear that the Delta Commissions aim to formulate strategies for a sustainable future at the national level by creating a fresh water reservoir, with free flow drainage to the North sea, conflicts with ideas of a sustainable future at the regional level, which aims to preserve actual land use functions.

One party present at the meeting seems to escape the atmosphere of conflicting interests and policy debate. The representative of an innovation program called Building with Nature presents an experiment which will take place before the Frisian coast. Time and attention are dedicated to discuss this initiative and both the Delta Commissioner and the regional authorities express their support to this initiative. The 'Building with Nature' experiment is small and has no economic, nor ecological value yet. Considering its size or importance it attracts more attention than one would expect. It is as if the actors at the meeting need something positive, an object which they use to span the controversy and discussion between them. The proposal to do an experiment seems instrumental, during the meeting in Makkum, in connecting actors from different sides of a divide. Actors who need to collaborate to adapt the water management to a changing climate on the one hand but define different sustainable futures on the other hand. Actors who also understand that actual knowledge on the management of lake water levels is not sufficient to deal with the changing climatic environment and who accept the need for learning.
The aim of this paper is to explore the role this Building with Nature experiment plays in the interactions between actors with different perspectives and how the experiment influences collaborative learning. Or in other words: is the experiment instrumental in the process of translation of different perspectives into a new adaptive strategy in the IJsselmeer area?

The next section (2. Building with Nature) introduces the Building with Nature innovation program. After this in section 3. "Boundary Concepts in Water Management" some theoretical insights are presented. Section 4 (The Frisian Ijsselmeer Coast) places the case in its historical and actual land use context. After this in section 5. (Findings and Analysis) the development of the case itself is analysed and the paper closes with section 6. Discussion and Conclusions. In the discussion section the ramifications of the use of boundary objects for social learning processes and sustainable innovations are discussed.

2. Building with Nature.

Building with Nature is the name of a Dutch innovation program (www.ecoshape.nl) and it refers to a new way of approaching coastal engineering (De Vriend & Wesselink, 2009). Engineering of coasts used to be a matter of technical interventions in natural environments. The discussions about the need for the Afsluitdijk in the beginning of the 20th century, for instance, were framed in the old enlightenment paradigm of conquering nature for the benefit of mankind. Since the advent of environmental concerns at the end of last century, new rules emerged to compensate damages of infrastructural works to natural environment. The

practice of building of new nature emerged. Islands and wetland were constructed, for instance, to accommodate birds and other species. 'Building with Nature' is seen as the next step in the line 'building in nature' and 'building of nature'. This new approach searches for, and uses, interactions between human interventions and ecological processes. Active use is made of natural dynamics, like tidal currents, wave energy and bio engineers to realize new coastal infrastructure. This new philosophy has found its way to Dutch water management policies. The National Strategic Water Plan (Ministerie van Verkeer en Waterstaat, 2009) considers the approach a possible strategy to adapt the water systems to climate change. A well known building with nature example is the plan to construct a huge (30 million m^3) sand island before the Dutch North Sea coast and let the water currents transport the sand to the beaches, creating a semi natural sediment transport to the coast. This is an alternative for the yearly sand suppletions right before the coast to mitigate erosion of the dunes and beaches. The mission statement of the Building with Nature innovation consortium is "..to show that sustainable win-win solutions for society and nature are possible and feasible in the realm of large-scale water-related infrastructural and regional development". (De Vriend & Wesselink, 2009, p. 1). And: "Building with Nature conceptualizes the realm in which it operates as a triangle building – nature – society, which spans a continuum of relationships and interactions. The programme therefore includes components on natural sciences, technology development and societal processes, all of course related to building with nature and all interlinked. The BwN activities are organized along three lines:

Basic research to fill knowledge gaps identified by analyzing past projects.

Active involvement in a number of ongoing real-life infrastructural projects with a significant (potential) building with nature-component.

Development of practice-oriented user products, such as a user manual, a portfolio of examples and user tools (models, data, deign tools)." (De Vriend & Wesselink, 2009, p. 5)

The IJsselmeer area is one of four focusing areas for the Building with Nature consortium activities. In this area the consortium executes researches, monitoring (physical and governance). Establishing an actual innovation is part of the program. The Frisian coast experiment is therefore important for the consortium.

The Building with Nature experiment is still in its planning and design phase. Construction works in front of the Workummerwaard on the Frisian coast start in November 2010. In the mean time a two year planning process has passed and different actors have committed themselves to financing the project. A network of innovation, comprising water managers, policy makers, scientists and stakeholders has emerged. The case described and analysed

in this paper is not the physical experiment itself but the emergence of this network of innovation during the process of initiation, planning and creation of a financial arrangement.

The author of this paper has – in his role of case manager IJsselmeer area in the Building with Nature innovation consortium - been coordinating the initiative. The data presented in this paper have been collected through participatory observation, and analysis of meeting and workshop reports. Also a governance monitoring research has been executed (Smit & Lulofs, 2010), the monitoring results have been used to triangulate observations.

3. Boundary objects in water management.

Star and Griesemer (1989) introduced in a famous study of Berkeley's Museum of Vertebrate Zoology the concept of boundary objects. They asked how collaboration among different social worlds result in coherent products, without consensus between these social worlds. How do these social worlds maintain a plurality of points of view and are able to keep identities and targets and are able to carry on its work whilst articulating with others (after Trompette and Vinck, 2009, p. 4). One of the factors leading to translations of different perspectives into a coherent result was the use of boundary objects. "*Boundary objects are objects which are both plastic enough to adapt to local needs and the constraints of the several parties employing them, yet robust enough to maintain a common identity across sites. They are weakly structured in common use, and become strongly structured in individual use. ….They have different meanings in different social worlds but their structure is common enough to more than one world to make them recognizable, a means of translation. The creation and management of boundary objects is a key process in developing and maintaining coherence across intersecting social worlds*." (Star and Giesemer, p. 393). In her reflection on twenty years of experience with the concept in 2010 Star defines: "Boundary objects are a sort of arrangement that allow different groups to work together without consensus" (Star, 2010, p. 602).

Boundary objects are used extensively in water management related research, both in analysis and in practical application (see: Trompette & Vinck, 2009, Mollinga, 2008, Huitema et al. 2006). Molle (2008) analysis the concept of 'integrated water management' as a boundary concept in which the multiple interpretations (or vagueness of the definition) on the one hand merges with the enthusiasm with which the concept is used in science and water management policy on the other hand. Wesselink (2009) describes the use of landscape quality visions in the Meusse river basin in the Netherlands as a boundary object. The

landscape quality visions functioned as a means to integrate the many (often conflicting) perspectives of stakeholders in designing new flood protection infrastructures.

A specific usage of boundary objects is made in social learning studies. Steyart et al. (2007) use the concept in their research on social learning in the integrated management of catchments (see Steyart & Jiggins, 2007). They use the concept in the analysis of, what they call, messy problem situations in contexts of multi stakeholder, multi scale catchment processes where actors who – having interest in the same catchment - depend on each other. Boundary objects help to achieve common goals where "I can score my goals only if I take account of yours" (Steyart & Jiggins, p. 576). Wenger 2000 takes the notion of boundaries as an analytical starting point for the understanding of learning within and among communities of practice[1]. He distinguishes three types of boundary objects, able to facilitate learning among different communities of practice:

1. Artifacts, such as tools, documents, or models.

2. Discourses. Common language that allows people to communicate and negotiate meaning across boundaries.

3. Processes. Shared processes, including explicit routines, and procedures, allow people to coordinate their actions across boundaries. (p. 236)

This paper takes the case of the Building with Nature experiment and it tests the hypothesis that the processes of initiation and planning of the experiment forms a boundary object around which actors interact and create new knowledge on adaptive strategies. We take Wengers understanding of 'processes' as boundary object. And we take a social learning approach. A boundary object does not only provide opportunity for different social worlds to relate to each other, but also facilitates learning of involved actors, it structures the use of individual groups. It is not a static object, but interacts actively with the understanding and valuing of contributing actors and is instrumental in changing the perspectives of actors.

The case is considered an example of a situation in which "heterogeneous problems of technological feasibility, legal regulation, economic prospects and political acceptance can be addressed and integrated" (Van Den Daele & Krohn, 1998, p. 856).

[1] In this paper Wengers understanding of communities of practice (as social learning systems) is used to capture the 'social worlds' Star and Griesemer are referring to.

In order to analyse the case, the three characteristics of boundary objects, defined by Star (2010, p 604-605) form the basis of three research questions:

What ill structured form does the boundary object (residing between communities of practice) gets?

How do communities of practice make the object more specific and more tailored to local use, while maintaining its vague identity in common use?

How do communities of practice, without consensus, tack back and forth the ill structured common and specific individual uses of the object?

4 The Frisian IJsselmeer coast

Before 1932 The IJsselmeer, then called Zuiderzee, was a tidal estuary, which was turned into a fresh water lake with the construction of a 32 km long dam (see map). This dam provides the Netherlands with a fresh water reservoir and with safer flood security conditions, which in its turn made reclamation of large polders possible (see map). The map shows the blue coloured deep gullies were the tides moved in and out and were the river IJssel (one of the delta branches of the Rijn river) water flowed to the North Sea. It also shows the morphological changes after the closure, north of the dam, where sedimentation has pushed the old gullies away from the dam. The brown and yellow zones following the Frisian coast represent former tidal flood plains. Before 1932 these plains would submerge with high water. Nowadays they remain just a little above mean lake water level. The shallow parts and the former flood plains are the habitat for protected Natura 2000 (European Commission, 1992) species and they form a crucial stop over and resting place for migrating birds.

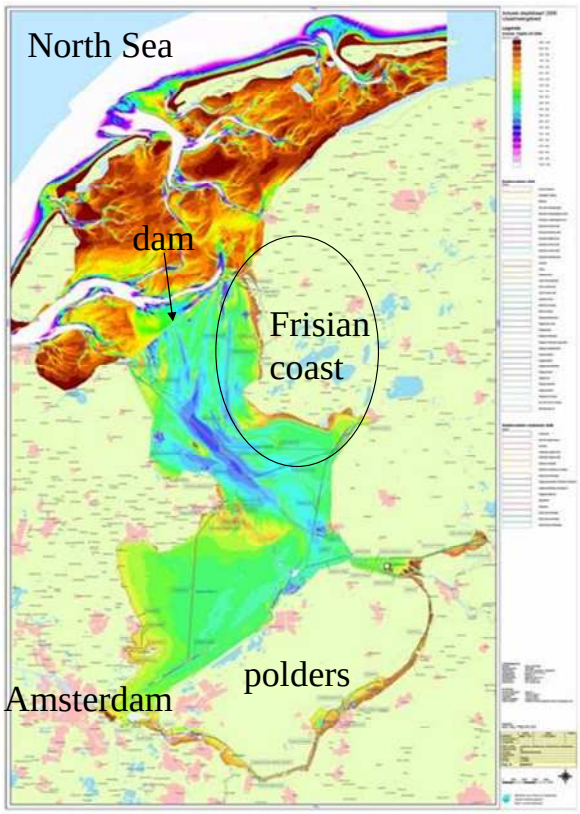

Figure 1; map of the IJsselmeer area. Height in meters in relation to NAP (Dutch topografical reference level). Purple is 10 meters under and brown is on or above. Source: Rijkswaterstaat IJsselmeergebied (not published).

After the damming in 1932 not much has happened at the coast. The actual landscape still shows the elements of the former estuary tidal environment. The sea dikes turned into lake water protection and the flood plains were partly reclaimed by farmers and partly became valuable nature areas. Former sea harbour towns started to accommodate recreation instead of commercial fishery. But the landscape did not change fundamentally.

The lake is managed by Rijkswaterstaat, the Dutch national water management agency and regional governments considered lake management issues in good hands with Rijkswaterstaat and put low priority on policy formulation. The province of Fryslan and some municipalities did, for instance, not develop land use plans for the lake, although this is a legal obligation.

Controversies on development of the coast did exist, but on local scales. These controversies (for instance construction of industrial and/or recreational coastal sites at Makkum and Workum) were fought in municipalities between economic development supporters, nature conservation groups and parties who want to preserve the historical landscape of the coast. Van Zandwijk (2010) describes a coast with five main land use

functions: provision of security against floods, nature protection areas, recreation, farming and working and living (see table 1). He analyses the system using the terminology of Gunderson and Holling (2002) of complex socio ecological systems. He diagnoses that the interdependency among the users is high. The recreation sector for instance depends on a beautiful landscape and high nature values, but risks to kill the goose with the golden eggs by constructing recreational sites and accepting more and more tourists and thus increasing the human pressures on nature and landscape. Land users compete with each other for the scarcely available space. Resilience, understood as the capacity to maintain actual land use patterns under changing environmental conditions, is low.

Table 1; human use at the Frisian coast. Security against floods (dikes) is not included. Source: Van Zandwijk 2010.

Nature	Agriculture	Tourism	Working and Living
Landscape	Dairy farms incl. their live stock	(kite) surfers (and their families)	Industry
Nature for endangered species (Closed nature)	Crop farms	Hikers and day tourists	Tourism related work
'Open' nature		Sailors	Inhabitants

In 2008 the provincial authorities initiated a platform of regional and local governments to develop land use strategies for the future. The platform website (www.atelierfryslan.nl, consulted: Aug. 2010) states: "In provincial policy….. the concept of land use quality is a leading principle. Landscape and space form the capital of Fryslan, now and in the future. Working for an economically strong and at the same time a beautiful Fryslan is therefore a collective responsibility". This platform produced a vision (De Koning & De Vries, 2009) which developed the idea of the creation of new semi natural flood plains. These new flood plains can grow with changing environmental conditions (like rising lake levels) and they reinforce the landscape qualities and land use possibilities along the coast.

Parallel to these platform activities the Delta Commission (2008) published its report on long term safety of the Dutch water systems, with the recommendation to anticipate with a total water level rise of 1.5 meters in hundred years. It is against this advise that all Frisian parties reached the opposition consensus, referred to in the introduction of this paper.

Looking at the situation in the beginning of 2009 the following elements played a role:

Controversy between the national water authorities and the regional authorities on the advice of the delta Commission.

A high level of interdependency in land use along the coast.
A history of little involvement of Frisian parties with lake management issues.
No strategy for the Frisian lake coast as a whole, but only local level developments;
A multi government platform which started discussions on landscape quality and sustainable development in the light of climate change.

5. The planning process

This section describes the process of the initiation and the planning of the Building with Nature experiment on the Frisian Ijsselmeer coast. It uses the three characteristics of boundary objects (Star 2010), presented in section 3 of this paper, as structure and goes back to the research questions:
What ill-structured form does the boundary object (residing between communities of practice) gets?
How do communities of practice make the object more specific and more tailored to local use, while maintaining its vague identity in common use?
How do communities of practice, without consensus, tack back and forth the ill structured common and specific individual uses of the object?

5.1 The emergence of an ill-structured boundary process

The diagram (fig 2) presents a time line of important events during the planning process. For every event a short description of what happened is given.
By using this step by step approach we get a grip on the process of initiation and planning of the experiment.

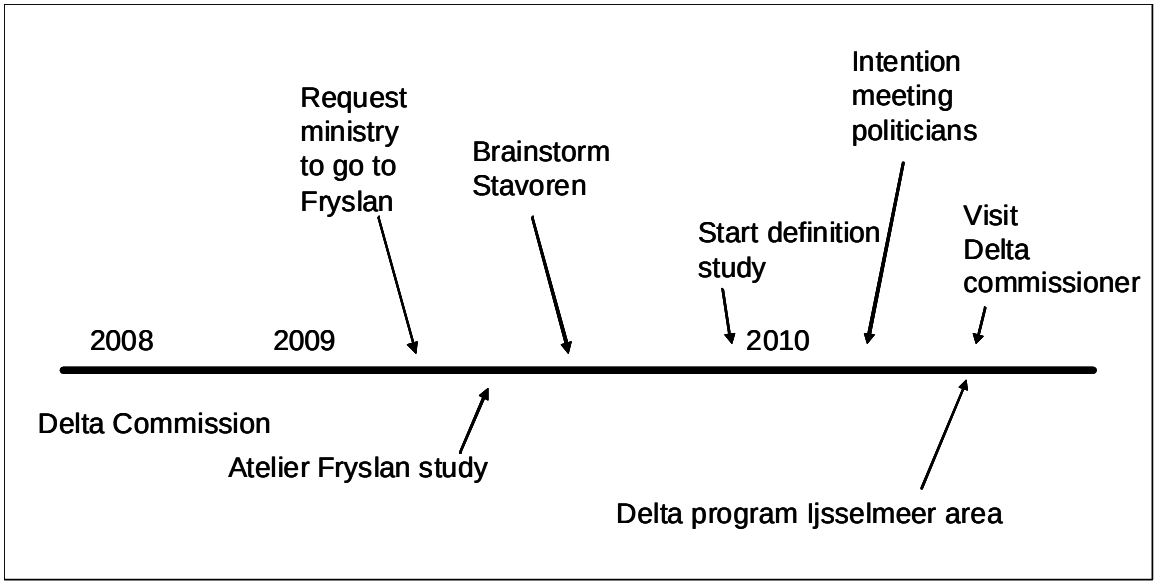

Figure 2. Event diagram, initiation of Building with Nature experiment. Explanation in text.

March 2009. The Ministry of Transport, Public Works and Water Management suggests the Building with Nature consortium to look at the Frisian coast. There is concern about this coast following the advise of the Delta Commission. Relations between Frisian parties and the Ministry are influenced by the controversy on the long term lake level management strategy. One argument of the opponents to the Ministries proposals attracts special attention; raising water levels will destroy valuable habitats which are protected under Natura 2000 legislation. Natura 2000 sets strict rules for protecting habitats and species and it is clear that a possible water level rise conflicts with this legal status. The request therefore is to see whether a building with nature approach might preserve the flood plain habitats while making lake level rises possible.

August 2009. In a small office at the huge pumping facility of Stavoren (which drains excess waters from Fryslan into the lake) a brainstorm meeting is held with the aim to explore possibilities for a building with nature intervention with regional actors.

In the summer the Building with Nature coordinator has contacted the authors of a report for Atelier Fryslan. (De Koning & De Vries, 2008). This report develops the idea of creating semi natural flood plains before the Frisian IJsselmeer coast. Participants at the Stavoren meeting express interest in such a development, though perspectives on the form, design and objectives differ. They all are against the policy intention of raising the lake water level. But they also realize that adaptation to climate change will require measures. And they realize that, after the Delta Commissions advise, they urgently need to start get involved in

discussions and policy preparation on the lake. A Building with Nature experiment provides an opportunity to start this policy involvement and learning process.

The Stavoren meeting concludes that the proposed experiment would serve the interest of participants.

November 2009. The Building with Nature consortium took pains not to present the experiment in technical designs yet. It was decided not to make drawings or pictures and to keep the plan deliberately vague. This strategy was based on experiences with the planning of the sand island in the North Sea before the coast of Holland. In this case seductive visionary drawings were made of a beautiful sand dune in the middle of the sea, with birds, people recreating and nice vegetations in order to motivate stakeholders to participate. The decision taking became victim of these pictures as politicians wanted the final design look like the initial drawings even though the result was, from a hydro-morphological point of view, sub optimal.

The consortium also decided not to take ownership of the experiment. Its interest lay's in initiating innovations and doing research and it does not want to become involved in the engineering and execution of actual works. Therefore an agreement was made with It Fryske Gea that this semi governmental organization would take formal ownership. The Building with Nature consortium would continue to support the initiation and planning process.

The next step was to initiate a definition study to research the possibilities (in terms of hydro morphological conditions, ecological potential, legal impediments). Experts from the Building with Nature consortium executed the study and all stakeholders were involved. In this study scientific theories and model simulations were used to explore the potential for semi natural flood plains. The conclusion was that uncertainties remain (especially on the question whether the wave dynamic would be sufficient to transport sands to the coast), but that enough possibilities were found to justify the implementation of a field experiment.

March 2010. At the office of the provincial board three major decision takers meet (province, water board and It Fryske Gea). The results of the definition study are presented with the conclusion that the creation of semi natural flood plains can work. The idea is to deposit sand 200 meters before the coast in shallow water and let the waves move the sand to the coast. At the coast a process of natural sedimentation takes place in interaction with the emergence of pioneer vegetations. (See diagram in figure 3). The proposal is to implement three experiments: one located before a nature area with the aim to create pioneer nature, one located before a recreational area which creates new beaches and one located before a dike section which creates enhanced security.

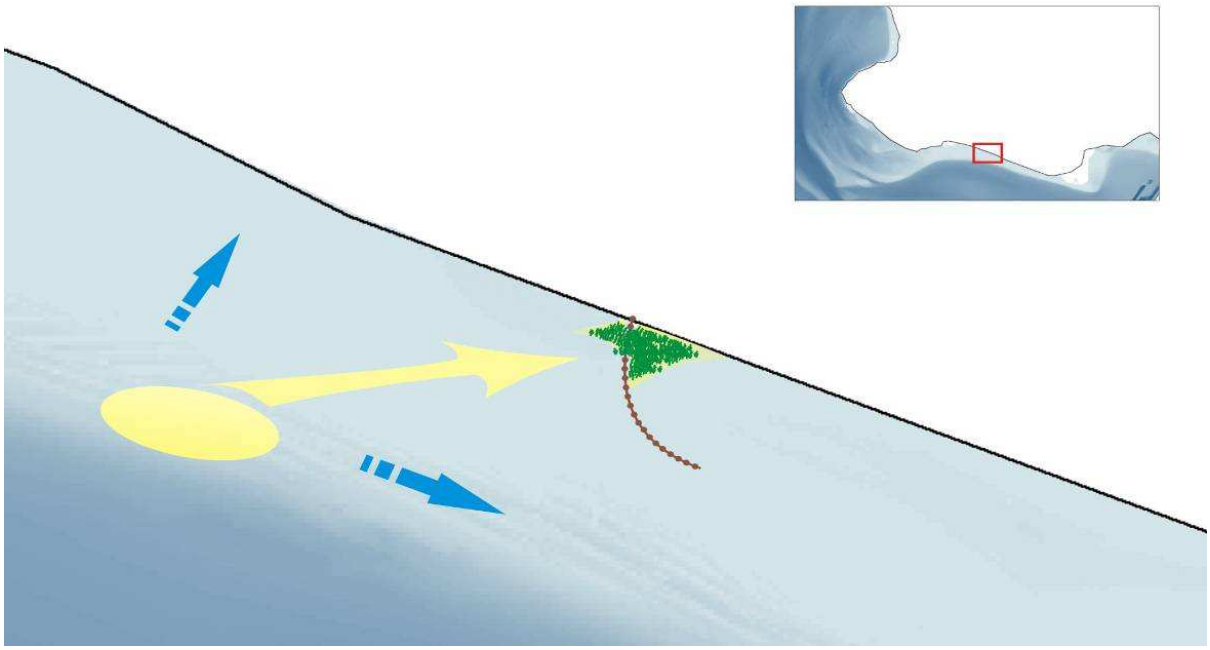

Figure 3; 'soft sand engine'. Proposal to deposit sand in the lake and let the waves transport the sand to the coast where new flood plains emerge. The wooden poles in the picture break the wave energy. Source picture: Project proposal (not published)

The authorities agree with the proposal and promise to search for financial means to cover the cost of the experiment. A condition expressed by the provincial representative is that support for this experiment may not be considered as support for the lake level rise policy.

May 2010. The newly appointed Delta Commissioner pays his formal introduction visit to Fryslan (see introduction). The discussions are influenced by the proposed lake level rise. By now the ministry has softened its proposed lake strategy. In a policy preparation process the impacts of the 1.5 meter lake level rise is studied together with three other possible management strategies. This study is set up as an open multi stakeholder process involving local and regional actors. The final policy decision depends on the outcomes of the study. The regional parties take the opportunity to demonstrate the high impacts of lake level rises to the economy and to nature values, but they also want to show good will and their motivation to collaborate in the policy preparation. After all the need for good climate adaptation strategies is also felt in Fryslan. In the plans for the experiment all participants seem to find enough to cover their own interests and the experiment serves as a motivating and positive example of collaborative action.

In August 2010 enough financial support was guaranteed to start the detailed planning process, which will result in realization of the first experiment in November. An unexpected

but important financial contribution was received from a program called ‘Climate Buffers’. This program is financially backed by the Ministry of Housing, land Use and Environment. The Climate Buffer Program is managed by Dutch nature NGO’s and seeks to find new ways to match security against floods and development of nature values in changing climate conditions.

Conclusion

During the initiation process the design of a ‘soft sand motor’ has been kept deliberately vague. The only pictures which were presented to authorities and potential financers, had the level of abstraction as in figure 3. Participants could translate their own perspectives into the plan and no attempts were made to close definitions.

5.2 Individual uses

During the process five communities of practice (CoP’s) were involved. These communities do not have hard boundaries, there is some overlap between them, but the framing of the Building with Nature experiment in relation to their own practices defined the boundaries. The CoP’s do not coincide with ‘stakeholders’ or ‘interest groups’, because community boundaries usually cross organizational units. Conservation of nature areas, for instance, is a practice which falls under the responsibility of Ministries, provinces, municipalities, and nature organizations. The nature conservation practice is embedded in institutional arrangements (like Natura 2000, or Dutch policies) and in networks of professionals from different scales and locations.

In this section these five CoP’s and their framing of the Building with Nature experiment are described.

The adaptation CoP. The Delta Commissions (2008) advice led to the new practice of searching for adaptive measures in order to prepare the countries water systems for future climate change. The Ministry of Transport Public Works and Water Management established a so-called Delta Program, with a regional branch called Delta Program IJsselmeergebied (DPIJ). DPIJ has initiated a policy preparation process on adaptation of lake water levels. It seeks to involve regional stakeholders in this process. DPIJ and the Ministry are supporting the Building with Nature experiment to see if a soft sand motor can function as a mitigating measure for future lake level rises. The question is whether the sand motor mechanism will succeed in letting beaches and coasts grow together with lake levels. It was agreed that monitoring results of the experiment are used as input in the lake level policy process.

The flood protection CoP is mainly concerned with the state of the dikes. These dikes are essential for the protection of the North of the Netherlands. When lake levels are raised several sections of the dikes do not meet with security standards any more. Semi natural

flood plains before the dikes might form an alternative to reinforcement of the dikes itself, as new flood plains between dikes and the lake break the power of waves. It was agreed that one (of the three locations of the experiment) would be put in front of a dike section which is in need of reinforcement in case of lake level rise.

The nature conservation CoP is concerned with lake level rises, because actual habitats will be destroyed. Their interest for an experiment is twofold. In the fist place they want to learn about developments on the coast and see an experiment as a learning opportunity. In the second place they are concerned about the nature value of the actual flood plains. After closure of the estuary in 1932 these flood plains lost their tidal dynamic and also the dynamic of renewal of habitats. A building with nature experiment might bring much needed new pioneer habitats. Main concern is to create renewal process in habitats for pioneering species. The first experimental location (of three) was selected in front of a valuable nature ares.

The integration CoP (provinces and municipalities) is concerned with managing competing claims on land use. They see the Building with Nature experiment as a means to create new multi functional uses of the coastal area. There is some urgency after the Delta Commission advice. An integrated policy on land use must optimize the use of the coast for flood security, nature conservation, recreation and landscape preservation. Three locations for the experiment are planned for: one in front of nature area, one in front of a recreational zone and one in front of a dike section which is in need of reinforcement after lake level rises.

The Building with Nature CoP is innovating with ecodynamic designs. This CoP frames the soft sand motor as such an ecodynamic design. From the experience lessons on the interactions between governance aspects, ecological processes and coastal engineering may be learned and translated into a professional manual on Building with Nature.

Conclusion

Individual CoP's used the experiment to forward their own interests. The planning of the experiment and more specifically the selection of three experimental locations answers to the needs of the individual CoP's.

5.3 Tacking back and forth

Ownership of the planning process of the Building with Nature experiment has been left un organized up to a certain level.

The experiment is called the 'Building with Nature experiment' and the coordinator has taken initiatives and steps to forward the process. In the beginning the coordinator had the intention to establish a contract among partners, stipulating tasks, responsibilities and the intention of partners to finance the experiment. But this idea was left behind with the

argument that such a contract formulation might lead to unwanted discussions on precise and legal formulations, with the risk of loss of energy and motivation. At a meeting in November 2009 one of the partners requested a sound project organization, with a project team, a steering committee and an expert group. This led to some discussion among partners, but this idea also was left behind. Again the argumentation was that the initiative needed space for development and flexibility and formal arrangement would be felt as a constraint.

Although partners would point at the Building with Nature consortium when asked about ownership of the process there are moments when others took the lead.

The Ministry changed its position during the process. At first they requested BwN to start the experiment. Once the relations between Frisian partiers and the ministry improved (because the 1.5 meter decision was opened to a wider set of possible scenario's) the ministry minimalized its involvement, but after the initiation of the Ijsselmeer branch of the Delta Program interest changed again. Now the monitoring results of the experiment will serve as input to the lake level strategy formation process in 2013.

The water board started its involvement with focus on the operational management of the dikes under its responsibility. New flood plains were seen as a simple means to reinforce the existing dikes. This position evolved into a more abstract involvement, framed as supporting flood defense innovation. The experiment is supported now as long term strategic alternative to flood protection by dikes alone. At several points in the process the Water Board took initiatives to advance this interest.

The Building with Nature consortium wants to realize concrete innovations as soon as possible in order to be able to learn from design experiences and to monitor results. But during the planning process it started to see the value of the planning and deliberations itself as a valuable governance experience. Part of the innovation program's objective is to deepen understanding of the decision taking in coastal engineering projects. It realized that initiating this experiment was in itself a valuable governance case. The experiment became subject of a governance monitoring project, and four MSc. students were facilitated to execute their thesis research in the area.

It Fryske Gea took over final ownership in order to meet with subsidy regulations. But also because It Fryske Gea is responsible for management of large sections of the Frisian coast. Ownership of the experiment fits well in the actual position of the nature organization.

<u>Conclusion</u>

The process partners have tacked back and forth between translations of their own private interests into the process to advance the collaborative process.

6. Discussion and conclusions

The initiative for a building with nature experiment and the decision by partners to collaborate in the formation of an innovation network seems to have come at the right time. Motives to participate were diverse, and were certainly not limited to interest in the potential content results of the experiment. Participants made it clear that they used the process to learn about the coast and about each other.

Did the planning process play a role as a boundary object? To answer this question we must look at the three main characteristics of a boundary object.

The first is that it was flexible enough to adapt to local needs and the constraints of the several parties employing it. The planning process itself was deliberately kept vague; no contracts, no project organization and (almost) no pictures were made. This vagueness was maintained in order to keep the process flexible and open to new influences and inputs.

The second characteristic of a boundary object is that it is robust enough to maintain a common identity across sites. The process analysis shows that partners were able to translate their individual interests into the planning of the experiment. The planning itself became known as the 'Building with Nature experiment' in the region and is being used in communications and presentations of individual partners. Also the planning resulted in the acquisition of enough money to implement the experiment.

The third characteristic is whether there was an interaction between the collaborative and the individual uses of the process. The description of the ownership of the process and the process interventions of the different partners show that these interactions took place.

The subject of the experiment (creating new semi natural flood plains) resonates with the development of a new discourse on flood defense in the Netherlands. This discourse (often called 'Living with Water') is taking shape, but much searching, probing, experimenting and deliberation is needed before it can claim a stable influence on the practice of coastal flood defense. In other words the need for experimentation and collaborative learning for sustainable innovations is there.

The question is what arrangements are effective to facilitate these collaborative learning processes? The Building with Nature consortium itself has an interdisciplinary (De Vriend & Wesselink, 2009) or transdisciplinary (Regeer & Bunders, 2009) setup. Boundaries are there to be crossed in so-called 'co-creation' processes. The Building with Nature program is an example, in which science, policy and practice collaborates. Van den Daele & Krohn analyze science – society interactions and observe that boundaries are blurring. Scientific methods

for instance are becoming part of policy formulation. And in the Frisian coast case this is what seems to have happened. The Building with Nature experiment was framed by all parties as an experiment which might fail, and scientific methods were used for the definition study and for monitoring.

Using the concept of boundary objects to analyze the process of translation of different perspectives into a new adaptive strategy seems to work in the Frisian Ijsselmeer coast. But research on boundary spanning and boundary blurring in the case might reveal other collaborative learning mechanisms.

Acknowledgment; The author thanks Anna Wesselink, Annemarie Groot and Kris Lulofs for useful comments.

The work presented in this paper is carried out as part of the innovation program Building with Nature. The Building with Nature program is funded from several sources, including the Subsidieregeling Innovatieketen Water (SIW, Staatscourant nrs 953 and 17009) sponsored by the Dutch Ministry of Transport, Public Works and Water Management and partner contributions of the participants to the Foundation EcoShape. The program receives co-funding from the European Fund for Regional Development EFRO and the Municipality of Dordrecht.

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