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The politics of artificial dunes: Sustainable coastal protection measures and contested socio-natural objects

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Abstract

Worldwide, an emerging trend can be observed towards coastal management that works "with nature" – and not against it. A growing "community of practice" (Wenger 1998) is getting involved into projects of so-called "soft" coastal protection. The paper localises the emergence of this "sociotechnical imaginary" (Jasanoff 2015) at the Aotearoa New Zealand coast. It provides an ethnographic analysis of soft coastal protection as a socio-material practice, focusing on coastal dune reshaping. This technique promises a sustainable approach to coastal management that overcomes dualist meanings of coastal protection, understood either as erosion control and property protection, or as nature conservation (Cooper and McKenna 2008). Two examples from the North Island of Aotearoa New Zealand are analysed: a successful project in Whangapoua Beach (Coromandel Peninsula), where dune reshaping has been used by local houseowners as a temporary alternative to a seawall, and the "dune enhancement" part of a contested, Council-commissioned seawall construction project in Waihi Beach (Western Bay of Plenty), which has been perceived as utter failure. The cases show that when soft coastal protection projects are put into practice, the recognition and inclusion of local stakeholders can have manifest material consequences. The paper therefore argues that sustainable coastal protection is not only a technical question, but has a sociomaterial dimension. In order for artificial dunes to "work" as socio-natural objects, local understandings of the rights and responsibilities to care for the coast need to be considered.

Zusammenfassung

Das „Arbeiten mit der Natur" (*Gesing* 2016) – nicht gegen sie – hat sich weltweit zu einem neuen „sociotechnical imaginary" (*Jasanoff* 2015) für nachhaltigen Küstenschutz entwickelt. Vor diesem Hintergrund untersucht der Artikel sogenannte „weiche" Küstenschutzpraktiken in Neuseeland. Im Mittelpunkt der ethnographischen Analyse stehen zwei Projekte zur (Re-)Konstruktion künstlicher Dünen auf der neuseeländischen Nordinsel. In Anlehnung an Methoden der Dünenrenaturierung, die in Neuseeland vornehmlich durch ehrenamtliche „Care Groups" umgesetzt werden, sollen diese Maßnahmen eine Alternative zu „harten" Strukturen bieten. Die künstliche Düne als Küstenschutzobjekt verspricht dabei zugleich einen Ausgleich zwischen den gegensätzlichen Bedeutungen von Küstenschutz als Infrastrukturmaßnahme und Küstenschutz als Naturschutz. Im ersten Fall (Whangapoua Beach, Coromandel Pensinsula) wurde ein bekannter Vertreter der „community of practice" (*Wenger* 1998) weichen Küstenschutzes von örtlichen Hausbesitzer*innen mit der Rekonstruktion einer durch Sturmerosion beschädigten Frontaldüne beauftragt. Im zweiten Fall (Waihi Beach, Western Bay of Plenty) sollte die Maßnahme den umstrittenen, von der Gemeinde in Auftrag gegebenen Neubau eines Steindeiches flankie-

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rend ergänzen. Während beide künstlichen Dünen keinen dauerhaften Erosionsschutz bieten konnten, wurde das erste Projekt – trotz der Notwendigkeit wiederholter Sandaufschüttungen – von den Beteiligten als erfolgreiches Beispiel für weichen Küstenschutz gewertet, während das zweite Projekt als langfristig gescheitert gilt. Die Analyse macht deutlich, dass die soziale Dimension der Anerkennung und des Einbezugs lokaler Akteure materielle Konsequenzen für die Funktion der (künstlichen) Düne als sozionatürliches Küstenschutzobjekt hat. Die Umsetzung solcher Projekte sollte daher berücksichtigen, dass Küstenschutz eine soziomaterielle Praxis ist, bei der die lokale Aushandlung von Verantwortung und Berechtigung zur Sorge für die Küste eine zentrale Dimension darstellt.

Keywords Aotearoa New Zealand, dune reshaping, ethnography, practices, socio-nature, soft coastal protection

1. Soft coastal protection in Aotearoa New Zealand: An emerging sociotechnical imaginary

Coinciding with the increasingly felt effects of anthropogenic climate change and sea-level rise on coastal areas, a remarkable trend has been noted in coastal protection policies over the last two decades. So-called "soft" coastal protection that works "with nature" (and not against it) has become internationally recognised as a viable alternative to the high costs and negative side-effects associated with traditional engineering approaches (*European Parliament and Council* 2002; *Eurosion* 2004; *Trade Publications Ltd.* 2003; *Defra* 2005; *Inman* 2010; *De Vriend* and *Van Koningsveld* 2012). Ongoing erosion in front of seawalls and revetments, for example, can cause "coastal squeeze" (*Dean* and *Dalrymple* 2004: 404f.): the loss of accessible high-tide beaches. As an answer to these challenges, a new "sociotechnical imaginary" (*Jasanoff* and *Kim* 2013; *Jasanoff* and *Kim* 2015; *Gesing* 2016) is emerging in coastal management. It questions the hegemony of structural, hard engineering approaches and provides a growing "community of practice" (*Wenger* 1998) with a shared vision of human-nature relationships at the coast. Coastal restoration, adaptive planning and soft engineering approaches are suggested as possible alternatives to hard structures. "Soft structures" that could be used to protect sandy beaches include dune and wetland restoration or creation and beach nourishment (*UNFCCC* 2006: 13). Coastal scientists *Andrew Cooper* and *John McKenna* (2008: 315) argue that the ambiguity of the concept "coastal protection" can fuel social and political struggles, as the term refers to both the protection of property or human infrastructure against the effects of coastal erosion, and to ecosystem protection. This article focuses on dune reshaping in Aotearoa New Zealand, a technique that claims to combine both these functions, and to therefore provide a sustainable approach to coastal protection.

Cooper and *McKenna* (2008) generally question the framing of coastal protection as "working with natural processes". They argue that soft options such as beach nourishment have negative ecological consequences as well. Instead, the authors define a continuum between an "engineering" and an "ecosystem perspective". Only the latter "permit[s] sufficient space for coastal adjustment to changing natural circumstances" (*Cooper* and *McKenna* 2008: 318). This continuum of natural coastal protection, however, still operates between society and nature defined as two opposed poles. A more-than-human geography perspective (*Whatmore* 2002), in contrast, understands nature and society as inextricably linked. Rather than separating human and non-human coastal spaces, coastal "natureculture" (*Haraway* 2008) is conceptualised as the result of diverse practical entanglements of human and more-than-human actors, objects and forces.

The coast as a space for pure nature is, however, a very powerful idealization. In Aotearoa New Zealand, where being close to the beach is part of the national identity (*Clark* 2004; *Hayward* 2008), the protection of the "natural character" of beaches and coastlines has strong cultural repercussions and also translates into coastal planning strategies (*Froude* et al. 2010). In this context, *Mike Jacobson*, a coastal hazard management expert, argues that seawalls threaten to destroy a coastal nature of nation-building character for Aotearoa New Zealand:

> "Coastal hazards, property protection works and coastline natural character are intimately connected in a story that goes to the heart of a Kiwi icon – holidays at the beach, the beach bach[1], and generally the important part that the coast plays in growing up as a Kiwi. Unfortunately, it is a story that has yet to take root in the national psyche in the same way as the stories related to New Zealand's native forests or endangered species. It is a story that needs to be adopted and acted on by communities before development (and the seawalls built to protect that development) 'kill the golden goose'. The important place of natural beaches and dunes in the lives of most Kiwis is rapidly becoming a thing of the past." (*Jacobson* 2005: 6).

The coastal practices *Jacobson* describes here are part of people's "everyday geographies of coastal experience" observed by geographers *Robin Kearns* and *Damian Collins* (*Kearns* and *Collins* 2012: 948). Coastal practices express emotional attachment to the coast. *Kearns* and *Collins* underline the importance of such attachment to the coast for the sense of community and belonging in Aotearoa New Zealand, adding up to "a conceptualisation of national identity as encompassing a 'birthright' to enjoy undeveloped coastal places" (*Kearns* and *Collins* 2012: 943). This emotional relation to the coast is not limited to a "relatively natural setting"; modified and developed coastal landscapes can also be the object of strong feelings of belonging (*Kearns* and *Collins* 2012: 952). There is, however, a remarkable tension between the desire to experience coastal "wilderness" and the increasing development of remote areas for coastal living.

Adding to this friction, the concept of private land ownership in place since British colonisation implies that property is interminable and subject to clearly defined, stable boundaries. On the coast, such expectations can create conflict. This is evident in discussions about coastal policy measures that territorial agencies design under the guidance of the national New Zealand Coastal Policy Statement (*Department of Conservation* 2010), such as the delineation of coastal hazard zones and set-back lines or the development of "managed retreat" policies. Set-back lines have become a common coastal planning tool in Aotearoa New Zealand, in order to "exclude or restrict beachfront development and land use within areas potential [sic] threatened by coastal hazards or to inform trigger points for the relocation of buildings" (*Ramsey* et al. 2012: 8). "Managed retreat" policies are currently under development for example at the Kāpiti Coast in the Greater Wellington region (*Reisinger* et al. 2015). Conflict also emerges around the question whether hard coastal protection structures for private property should be located on public beaches. Overall, the current New Zealand Coastal Policy Statement provides evidence to a strong political will to transition to soft(er) coastal protection measures, where possible. Regional and district coastal plans and development decisions are required to "discourage hard protection structures and promote the use of alternatives to them, including natural defences" (*Department of Conservation* 2010: 24f.).

In practice, these "natural defences" are first and foremost coastal sand dunes, which makes dune restoration the most prominent soft protection approach in Aotearoa New Zealand. Dune ecosystems have been fundamentally modified throughout Aotearoa New Zealand's short history of European colonization. The introduction of grazing cattle and other mammals had large-scale effects, as had forest removal, wind erosion due to the disruption of stabilising dune vegetation, damage caused by vehicles, grazing stock and pedestrians, coastal subdivision, and, importantly, the displacement of native dune vegetation by exotic species (*Dahm* et al. 2005).

In the following, this paper takes a closer look at the (re)construction and (re)planting of coastal sand dunes for erosion protection purposes. In this bundle of practices, a frontal dune is formed with the help of machinery, using sand that is either locally sourced or transported to the beach from elsewhere. The paper compares two examples from the North Island of Aotearoa New Zealand. In the first case (Whangapoua Beach on the Coromandel Peninsula), the approach has been realised by beachfront property owners aiming to protect houses from recurring storm-cut erosion. The self-funded project is seen as a more "natural" and economical, albeit temporary, alternative to a seawall. In the second case (Waihi Beach in the Western Bay of Plenty), a so-called "dune enhancement" area has been included into a large Council-commissioned coastal protection scheme designed around a controversial seawall reconstruction at a site of long-term erosion. Both artificial dunes have not provided permanent protection, however, the first case is largely seen as a success story, while the latter has been perceived as utter failure.

Conceptually, the following analysis builds upon a coproductive understanding of (coastal) nature (*Hinchliffe* 2007). Rather than assuming an absolute separation between the spheres of society and nature, it looks at the human and more-than-human practices that coproduce coastal naturecultures. The divide between nature and culture is a powerful way of organising reality, yet it is constantly (re)produced in practice. The different expressions for the coastal protection approach discussed here also reflect differing framings in regard to both its purpose and its perceived degree of "naturalness". The notion of "dune reshaping" relates the practice to the restoration of (damaged) coastal nature, whereas "dune enhancement" entails that this dune will be more suitable for coastal protection purposes than the previously existing dunescape. In this paper, I will also use the notion of "artificial dune" in order to emphasise the importance of the material and artefactual aspects of the dune as a socio-natural object.

2. Methodology

This paper uses empirical material produced during long-term, multi-local ethnographic fieldwork conducted in February and March 2010, from November 2010 to October 2011 and from February to April 2015, at a number of coastal sites mainly on the North Island of Aotearoa New Zealand. The overall project has focused on the emerging sociotechnical imaginary of coastal management working with nature in the context of Aotearoa New Zealand's "community of practice" (*Wenger* 1998) of soft coastal protection (*Gesing* 2016). On the one hand, I reconstructed the prominent and decade-long legal and political battle around the Waihi Beach coastal protection scheme through qualitative interviews and document analysis, including reports, expert witness statement and proceedings from an Environment Court appeal case (see also *Gesing* 2017). On the other hand, I focused on current practices and projects of soft protection. Because government-supported volunteer care group schemes such as "Coast Care" and "Beachcare" are responsible for an overwhelming majority of dune restoration projects in Aotearoa New Zealand, my own participation in various such projects helped me to establish contact with volunteers as well as with coastal consultants and restoration professionals. These events took place mainly in the Bay of Plenty region and reached from open planting sessions advertised for the public to specialised events, e.g. with people serving community hours, school children or students. Besides, I have worked as an intern at a marine consultancy specialising in soft engineering structures, especially artificial reefs. Apart from writing fieldnotes documenting this multi-sited participant observation, I have conducted over 50 semi-structured interviews (e.g. with volunteers, house owners, coastal engineers, Māori representatives and Council staff), and analysed media items and grey literature, such as policy documents and guidance material. The data body has been coded according to Grounded Theory principles, with the assistance of MAXQDA qualitative data software. The research project has been conducted in the scope of the International Research Training Group INTERCOAST (Integrated Coastal Zone and Shelf-Sea Research) and was funded by the German Research Council (DFG).

3. Results

3.1 The Coast Care continuum: Using dune reshaping as a soft coastal protection approach

In Aotearoa New Zealand, the use of soft coastal protection approaches is inextricably linked to the prominent role of volunteer dune restoration, organised in so-called "Coast Care" or "Beachcare" programmes. These schemes have been introduced in several regions of the country since the 1990s, and operate with similar structures. The national Department of Conservation as well as territorial government agencies provide funding for the acquisition of plants and further material such as tools, fertiliser, signposts or fences. One or two professional coordinators per region are responsible for allocating these resources, as well as educational material, to local projects and groups of various size and degrees of continuity, internal organisation, and independency in organising events. The earliest of these programmes, Coast Care Bay of Plenty, has been defined as a community-based programme with the goal to "restore the form and function" of coastal sand dunes as buffer zones between land and sea by replanting native sand binding plants (*Bay of Plenty Regional Council* 2018: 10). To this end, the programme uses volunteer labour to provide a simple and effective means of erosion control – besides other goals such as biodiversity conservation and public education. Dune restoration measures rely on ongoing maintenance and care work, such as the regular replacement of coastal vegetation that has been washed away by the sea, ongoing weeding and

pest control activities, and other practices such as fencing off areas to keep out animals and prevent human disturbance.

This do-it-yourself approach to erosion mitigation relies on people accepting that dune restoration often cannot solve erosion issues permanently. Furthermore, there are situations where coastal development and infrastructure can only be maintained with the use of hard protection structures, especially in highly developed urban areas. Under such circumstances, dune restoration my not be a sufficient alternative to the structural approaches favoured under the "engineering paradigm". But in the low-density rural and suburban coastal settlements typical for large parts of Aotearoa New Zealand, the question how to deal with coastal erosion is more open (cf. *Healy* and *Soomere* 2008; *Ministry for the Environment* 2017). In this situation, the popularity of Coast Care opens up material possibilities and discursive spaces for practices of "working with nature". *Jim Dahm*, a longstanding coastal management expert, who has worked both as a Beachcare coordinator, Council employee and independent consultant for public and private clients, explains why Coast Care can open avenues towards using dune restoration techniques in other contexts as well:

> "We sort of work at ground level, with dunes. What we like about the Coast Care thing is you all can see good outcomes very quickly, when you restore a dune […]. And that brings a lot of people into it, and success breeds involvement. And then you can bring a lot of other messages into that environment. So we use Coast Care as an avenue to bring all these messages in. You try to create an environment where everybody feels we are part of this success. And then there are certain messages which are a part of that environment, which come as part of the total package, you know, the [question] 'Why are we here?' We're here for these values, this is more about protecting these values […]. And you're just preaching those messages […]. Coast Care, because it's such a successful thing; you can see that it is – [it brings] visible returns. It's a Trojan horse in which you can bring a lot of these other messages in." (interview with *Jim Dahm*, September 2011).

Dahm here refers to the material as well as symbolic values of coastal environments. These could be jeopardised by the extensive use of structural, hard defences in the future, especially in response to rising sea-levels (interview with *Waikato Council Manager*, February 2011). The success of Coast Care and Beachcare projects, the interviewee argues, might help to turn the attention of volunteers and the general public to the possibilities of using alternative coastal protection approaches.

Dune reshaping with small bulldozers is a promising measure in this portfolio which has both been explored by Coast Care, and applied in commercial protection projects. Coast Care uses the technique to repair storm-cut erosion of frontal dunes, which are subsequently replanted by volunteers to speed up dune recovery. The native species used for this purpose, especially *Spinifex sericeus* and the endemic *Desmoschoenus spiralis* or Pingao, develop stolons which trap windblown sand. While planting impacted dunes is a common Coast Care task, the initial reshaping with heavy machinery can be perceived as inappropriate by members of the Coast Care constituency. The Coast Care Bay of Plenty coordinator is aware that "[i]fwe are on the dune with an excavator, people think we're going back to the 1950s" (fieldnotes, May 2011). He refers here to practices that were common in the construction industry at the time when many coastal settlements in Aotearoa New Zealand were initially developed. Dunes were levelled with bulldozers in order to provide better beach access and seaviews for beachfront houses. The negative impacts of such practices are still felt today. Their effects on coastal dynamics have caused long-standing conflicts over how to protect communities placed too close to changing shorelines. In the context of Coast Care, dune reshapings were therefore carefully framed and explained in detail in the Coast Care Bay of Plenty newsletter (*Coast Care BOP Programme* 2012: 5).

3.2 The Whangapoua Beach dune reshaping – A temporary seawall alternative

As mentioned above, Coast Care is a vital part of Aotearoa New Zealand's community of practice of soft coastal protection. The use of soft methods is promoted mainly in the scope of regional Coast Care and Beachcare programmes, and in the work of the Coastal Restoration Trust of New Zealand, a charitable organization of restoration professionals and volunteers. Dune reshaping as a coastal protection approach has, however, travelled into the realm of commercial coastal protection projects. This has been assisted by

the multiple responsibilities that some members of this community of practice fulfil, as it is the case in a dune reshaping project in Whangapoua Beach on the Coromandel peninsula.

Whangapoua Beach is a small coastal settlement with under 500 dwellings (*Thames-Coromandel District Council* 2017), many of them holiday residences. It is located next to iconic New Chums Beach, a protected beach that has been subject to public controversy over development plans (*Matthews* 2017). Whangapoua itself has experienced the typical replacement of small batches located directly at the beach with valuable second homes. Auckland resident *Susan Kitman*[2], for example, has bought a beachfront property there in 2006 and replaced the existing structures with a new house. She explains that while more recent buyers "definitely got money because the properties are worth a fortune", others had come to Whangapoua under very different circumstances:

> "[Y]ears and years ago, they were just tiny little batches, and there were people who just were prepared to drive down these hideous roads, and go and camp, so they were real lovers of the beach." (interview with *Susan Kitman*, August 2011).

Whangapoua is a compartmentalised pocket beach of about 1.6 km length without net littoral drift or significant sediment exchange with adjacent beaches (*Dahm* and *Gibberd* 2009; *Dahm* 2010). In 2008, a series of storms washed away parts of the frontdune on which the beachfront houses sit. The result was a massive scarp in the dunes close to several houses. The house owners, who are organised in the Whangapoua Beach Residents and Ratepayers Association (WRRA), decided to engage *Jim Dahm* as a private consultant. He came to the conclusion that while the beach was typically experiencing cyclical erosion and accretion periods, the increasing frequency of storm events had impaired dune recovery (see also *Dahm* and *Gibberd* 2009). *Dahm* suggested to implement a dune reshaping and planting scheme. This was a commercial project eventually paid for by the beneficiaries. However, *Dahm* sees the experience of some local residents with caring for the dune in the context of Beachcare as a prerequisite for them considering a soft option at all:

> "The only reason we got a good chance at Whangapoua was because that community had worked for ten years for the dune; they saw that it went backwards and forwards and they saw what you could achieve. That erosion scarp looked awful – three or four metres high and the top was five metres from some houses. Ten years or fifteen years ago that would have been a rock wall; there would have been nothing you could do. I would have been a voice from the wilderness saying, 'we don't need to protect, it's not that serious.' The response would have been: 'rubbish!' and it would have been a rock wall." (interview with *Jim Dahm*, September 2011).

He is convinced that over time, the practices and ethos associated with Beachcare have paved the way towards using dune reshaping as an alternative to a seawall – not only in Whangapoua, but also other coastal locations:

> "I've actually got a few sites now where we've got communities to live with natural processes, where I'd never be able to do that 20 years ago. [Whangapoua is] a relatively simple case [...] but nonetheless we're making progress we wouldn't have made 20 years ago [...]. But hell – prevailing paradigms are enormously difficult to change." (interview with *Jim Dahm*, December 2010).

All beachfront property owners supported the protection works financially and payed a share of the total cost into a fund managed by the WRRA. *Marty Keefe* from the WRRA confirms that trust into the consultant's deep knowledge of the beach had developed over the long term of his engagement in the village (telephone conversation with *Marty Keefe*, October 2011). Consequently, house owners not only agreed to try dune reshaping, but also accepted that the measure could not be applied immediately, and that the necessary scraping of sand from the beach would need to wait until the end of the winter storm. Otherwise, there was a risk that the sand could be lost again before the newly planted dune vegetation could take hold. Another important factor was the cost-effectiveness of the measure – causing only three to four percent of the costs associated with building a seawall (*Dahm* 2010).

In December 2008, Whangapoua beach was scraped and subsequently the new frontdune was planted. In 2010, the site was presented as a best practice example during a fieldtrip for participants in the New Zealand Coastal Society Conference[3], with Regional Council officers and a local resident joining the meet-

ing and reporting on what all sides saw as a positive outcome (fieldnotes, February 2010, see *Photo 1*). But the reshaped dune itself remained subject to dynamic natural cycles. In August 2011, when the dune had fully recovered and was clad again with well-developed native vegetation, it was again severely eroded during a major storm event (*Photo 2*). The WRRA had anticipated this development and understood the dune reshaping as only a temporary measure from the beginning. The resource consent initially acquired for the project therefore included the permission to repeat beach scrapings in the future. After some replanting, however, the dune eventually recovered without further intervention.

Photo 1 *Whangapoua Beach: One of the beachfront houses with rebuilt and planted foredune. Photo credit: F. Gesing, November 2010*

Photo 2 *The same location after another storm event. The dune later recovered without further intervention. Photo credit: M. Flitner, September 2011*

In 2015, I visited Whangapoua Beach once again during a conference fieldtrip with members of the Coastal Restoration Trust of New Zealand (fieldnotes, March 2015). The consultant and one of the beachfront property owners presented the project, this time standing in front of a bare dune without any vegetation. It had just been reshaped from beach scrapings, after being washed out during a series of storms some months earlier. The planting season had not yet started. This meant that the dune would remain vulnerable to new storms until it was again covered with vegetation (*Photo 3*). At this occasion, the consultant was careful to stress that the beach scraping could only be a transitory measure, whereas relocation of the buildings would be advisable in the longer term. His goal, however, was still to prevent the construction of a seawall at Whangapoua Beach. He visited the project now more regularly to discuss with residents and calm down one beachfront resident who had voiced his preference for a seawall (interview with *Jim Dahm*, March 2015). While things remained in flux, the absolute majority of houseowners were still committed to the project, which had now endured several severe storms and recovery phases over the course of more than seven years.

Photo 3 *The same location after repeated scraping. Photo credit: F. Gesing, February 2015*

3.3 "A sop to the greenies": The Waihi Beach dune enhancement

A second example of dune reconstruction for coastal protection purposes has been implemented in Waihi Beach in the Western Bay of Plenty. Compared to Whangapoua Beach, this case shows similarities and differences in regard to the socio-natural context. Waihi Beach is also characterised by low-lying beachfront property severely impacted by erosion, but there is a higher number of houses – about 80 properties – which are directly affected. A sequence of hard protection structures was constructed from the 1950s onwards that further aggravated a chronic erosion situation caused by longshore sediment drift (*Bear* et al. 2009). In the 2000s, the local Council developed plans to continuously protect the houses by replacing the existing derelict structures with a massive new rock wall. This decision in favour of beachfront house owners was taken in spite of organised opposition by other community members and objections by local Māori. The unfolding political and legal battle culminated in two local residents filing an appeal against the protection scheme before the Environment Court of New Zealand. They were supported pro bono by a number of leading coastal scientists who argued that a seawall was no sustainable long-term solution at this site (*Environment Court of New Zealand* 2007). Those involved on the side of the appellants set their hopes into a coastal policy change in the making[4]. The Court, however, rejected the appeal and in 2011, the construction of the seawall was completed. It now measures about 1 kilometre in length, 3.5 metres in height and 3.4 metres in depth and consists of large rock boulders (*Western Bay of Plenty District Council* 2010). As a result of the conflict, a bundle of additional soft measures was included into the overall scheme, such as the use of geotextiles to stabilise beach creeks, and a so-called "dune enhancement" part – the reshaping and planting of a dune bordering the seawalled section of the beach.

After initial critique by beachfront property owners, this dune enhancement part was temporarily abandoned, only to be taken up again to counter cost increases for the overall project, and to address ongoing opposition to the seawall from the wider community. *Robert Cook* of the Waihi Beach Protection Society, representing beachfront property owners in favour of the seawall, argued that the Council's decision was only partly based on cost, and that "it was really a bit of a sop to the greenies, you know: 'look at all this, and then we'll put sand on the end of [it] there or we'll just build a sand dune'" (interview with *Robert Cook*, August 2011). The engineering consultant commissioned by the Council to design the protection scheme confirmed that the dune enhancement was not suggested by his company (interview with employee, July 2011). It seems likely that the dune enhancement area was in fact intended as a conciliatory gesture to ease the widely felt frustration by residents criticising the construction of a hard protection scheme on a public beach (*Gesing* 2017).

Just as *Jim Dahm* did in the previous example, the Council also intended to build upon the successful engagement of volunteers in dune restoration. However, the situation in Waihi Beach turned out to be very different, because many members of the local Coast Care network were also active opponents of the seawall project. A senior Council employee summarised that "all the Coast Care volunteers in Waihi Beach hate the wall and they want nothing to do with it" (interview with *Janet Fields*, August 2011). The Coast Care Bay of Plenty coordinator eventually resigned over the failed Environment Court appeal, arguing that "there was no rush to build a seawall – there was time to restore a dune there" (*King* 2008: without page numbers). A local Coast Care volunteer wrote to the newspaper and repeated the argument that dune restoration could have been an alternative to installing a hard structure: "dunecare is the answer to much of the beachfront erosion at Waihi Beach, and people can do their bit to help with planting at the following times and places" (*Meiklejohn* n.d.: without page numbers).

In the meantime, some local volunteers had already engaged in clandestine plantings. After official Coast Care events, they took home surplus plants, to later sneak back to the beach and secretly plant the area earmarked for the dune enhancement. They were hoping to prove that it could be transformed into a functioning dune system. When the artificial dune was eventually built using imported sand, these newly established plants were covered up, as well as remnant rocks and gabions (wire baskets) from prior hard protection works. Because advice by the (new) Coast Care coordinator to carefully remove and "transplant" the existing vegetation cover was not followed, the stabilization of the new dune required new plantings.

The Council advertised a public volunteer planting day in the fashion of a Coast Care event, hoping to attract the Coast Care constituency as well as the beachfront

property owners (*Photo 4*). This strategy failed: nobody attended. The Coast Carers perceived the project as part of the overall protection scheme which they strongly opposed. *Elise Vanderbek*, a local Coast Carer, on the one hand criticised that the dune was "artificially built in a day or two. It wasn't allowed to build up naturally, like we work with the other dunes, we work with nature" (interview with *Elise Vanderbek*, August 2011). On the other hand, she questions the public interest of the project and thereby the rationale for her volunteer efforts:

> "The public felt, our rates are paying for it; why are we expected to go and to do voluntary work as well? The Council has got a contract for someone to do that work and we're paying for it in our rates, so why do we have to also pay for it with our time and labour? That's what people felt, and also people feel that the people getting the benefit of that dune is the property owners who live next door. But the property owners won't come and help so why should we go and help their properties when they don't – they never come and get involved in Coast Care work." (interview with *Elise Vanderbek*, August 2011).

Photo 4 *Advertisement for a "Community Planting Day" by the local Council, Waihi Beach. Photo credit: F. Gesing, June 2011*

Eventually another planting day was scheduled for a group of school children, who planted half of the dune – with Coast Carers sardonically commenting that this was "slave labour" and a "PR exercise". At a second public planting, Coast Carers continued to "boycott the Council thing" (fieldnotes, June 2011). Only *Elise Vanderbek* took part regardless of her convincing arguments against it. Apart from her and two beachfront property owners, the planting event was attended by the engineer who designed the protection scheme and his family, a subcontractor and his sister, and myself (*Photo 5*). While we were working on the freshly shaped dune, the "boycotters" were walking up and down the beach past the plantings, stopping to watch and discuss what was happening, pointing out their disapproval through non-participation. In practical terms as well, the planting was different from the many Coast Care events I had taken part in before. The artificial dune was very steep and difficult to navigate. I found it hard to move along the slope of loose sand and plant, while *Elise Vanderbek* warned me not to "mess it all up". In contrast to the standard Coast Care practice, no fertiliser was added to the planting holes.

Photo 5 *Planting day at the Waihi Beach dune enhancement. Photo credit: F. Gesing, June 2011*

Eventually, the project turned into a complete socio-technical failure, when only two weeks later the artificial dune was washed out during a storm event. The rocks and gabions, as well as the underlying layer of already existing Coast Care plants were exposed (*Photo 6*). The local newspaper titled: "Dune efforts washed away", adding that "the work to build up the dunes was not supported by the local Dune Care group" (*Tagg* 2011: 1). The Council commissioned a peer review by *John Lumsden*, a leading coastal engineer from Christchurch (*Lumsden* 2011). He confirmed that in

general, dune reshaping "can be considered to be enhancing or working with nature insofar as the sand, given favourable conditions, would eventually end up in the dune" (*Lumsden* 2011: 12). This means that "in the normal hierarchy of coastal management options, dune enhancement is a preferred choice and should always be considered ahead of so-called 'hard' protection works such as a revetment" (*Lumsden* 2011: 13). According to the reviewer, the goal of the particular project was to "build a dune capable of protecting property along the shore" (*Lumsden* 2011: 15). *Lumsden* defines the "design intent" of the scheme as to

> "provide a small dune system matching the existing dunes to the north, with the expectation that dune growth would occur over the longer term due to improved sand binding vegetation based on the experience of the dune growth that had occurred at the central and northern areas [...] without any additional sand nourishment" (*Lumsden* 2011: 8).

Photo 6 *The same area after storm damage. Photo credit: F. Gesing, July 2011*

The dunes further down the beach taken here as a reference point for defining a healthy dune system (functioning or "capable" in the sense of protecting property), however, are the result of ongoing Coast Care work in that location. These dunes are covered by extensive vegetation, which traps sand moved along the beach by wind and water. Furthermore, this part of the beach features sufficient space to allow larger sand movements. Compared to the dune enhancement and seawall sections, houses are further set back at this end of the beach.

In the Waihi Beach case, the dune enhancement was seemingly not understood as a temporary approach by the client – here the Council. This is remarkable, since already during the Environment Court appeal, an expert witness had evaluated the planned project as a "reasonable temporary approach" (*Healy* 2007: 5), given that it would use enough sand and would be regularly repeated. No one seemed willing to invest into the necessary ongoing maintenance of and care work for the artificial dune. The Coast Carers refused to be involved in the project, while the beach fronters did not understand this soft structure as a viable part of the protection scheme. Furthermore, the function of already established plants was compromised, and the dune was squeezed into a tiny zone of transition between people's private lawns and the beach.

Most probably the artificial dune was located too close to the high tide line to work. *Lumsden*, however, eventually narrows down his assessment to the material used to build the dune. He concludes that "the amount of sand provided in the enhanced dune was not sufficient to withstand a major storm and leave enough dune with planting to provide a reasonable prospect that the eroded dune would recover naturally in time" (*Lumsden* 2011: 13). Almost two years after the breakdown of the dune, the Council still claimed that it was "working on a mid to long-term solution acceptable for all affected parties" (Council employee, pers. comm. 25.03.2013), while the area further deteriorated (*Photo 7*). Overall, an enabling socionatural context is lacking in the Waihi Beach case.

Photo 7 *The area four years after the dune enhancement, with geotextile bags as temporary access structures. Photo credit: F. Gesing, February 2015*

4. Conclusion

Framing soft coastal protection that works "with nature" as a temporary approach is counterintuitive only if one expects nature to maintain itself over time without ongoing human assistance. But in regard to dune restoration and reshaping, ongoing human care work is an essential part of the ensemble of socionatural practices that keeps the dune in place. In the Whangapoua case, the residents welcomed (and paid for) the artificial dune, understood as an extension of familiar Coast Care practices into a difficult environment impacted by recurring storm events. The artificial dune in Waihi Beach, on the other hand, was widely criticised by local Coast Carers who perceived the attempted enrolment of volunteer labour as exploitive and not in the public interest. This dune was also seen as not sufficiently "natural". Ironically, the failure of the dune to work as natural protection was partly due to the lack of human maintenance work invested.

In terms of environmental conditions, the places might not be comparable. Whangapoua was seen as a particularly promising location for beach scraping by the consultant, whereas the Waihi Beach dune enhancement plan was criticised for its limited scale by the external reviewer (*Lumsden* 2011). However, both instances of constructing a dune in front of erosion prone sea-front housing proved difficult, whether with the intention to speed up nature (as in Whangapoua) or with the goal to provide natural protection in a location with limited foredune space (as in Waihi Beach). In both cases, the dune was washed away again. Still, the Whangapoua clients remained willing to stay with their decision and to apply the method again, which they perceived as a soft alternative to hard protection measures. In Waihi Beach, where the construction and planting of an artificial dune was part of a larger coastal protection scheme, the dune was not welcomed by the beneficiaries, and the work related to its construction had to be carried out by the Council and its contractor because neither beachfront house owners nor local Coast Care volunteers were ready to participate.

These two examples show that for a specific project to function as soft coastal protection, and to be understood and accepted as "working with nature" – and not against it, the physical environment is not the only factor that needs to be taken into account. Sustainable coastal management is also a function of very localised contexts of implementation, local participation and engagement. This is not always easy to facilitate, but can have manifest material effects. Consequently, a reconstructed sand dune can be different things. On first sight these dunes seem comparable: built with the help of bulldozers, not currents and winds, over a very short time span, they require humans to plant sand binding vegetation for them to function as coastal protection structures. Understood as socio-natural objects however, two totally different objects have emerged. In Whangapoua, the beachfront residents came together and decided to try out dune scraping as an alternative approach to a much more costly seawall, with the intention to keep their beach as natural as possible. In Waihi Beach, the dune enhancement was seen as a politically intended soft add-on to a larger hard protection scheme – by local seawall opponents and supporters alike. As "a sop to the greenies", its promise to provide an alternative, more sustainable approach, combining infrastructure protection with ecological restoration, was not taken seriously. In contrast to the Whangapoua dune, the Waihi Beach dune did not work as a natural protection structure. Understood as a sociomaterial object, a reconstructed dune is therefore only the visible tip of the iceberg of a larger and always socionatural network that may or may not stabilise (*Latour* 1988), and thereby form an example for a successful attempt to "work with nature" – and not against it.

Notes

[1] These do-it-yourself beach huts, often built on farm or public land, have been characteristic for the Aotearoa New Zealand coastal landscape of the mid-20th century. Over the last decades, however, most baches have been converted into much bigger beach houses offering all amenities for permanent coastal living.

[2] All respondents have been anonymised, apart from *Jim Dahm*, who has given consent to be named.

[3] The New Zealand Coastal Society is a technical group of Engineering New Zealand and the professional association for coastal engineers, scientists, management specialists and planners.

[4] The 2010 New Zealand Coastal Policy Statement – although not yet active – had already been under development at the time of the appeal.

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