

Managed Realignment (MR) along the Eastern German Baltic Sea: A Catalyst for Conflict or for a Coastal Zone Management Consensus

Anne Cristina de la Vega-Leinert*, Susanne Stoll-Kleemann, and Elke Wegener

Institute of Geography and Geology
Ernst-Moritz-Arndt University of Greifswald
Greifswald 17489, Germany



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ABSTRACT

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Managed Realignment (MR), which involves the removal of coastal defences or their relocation further inland, is a desirable option for demographically and economically marginal rural areas, from scientific, political and managerial perspectives. In Europe, MR is reshaping coastal landscapes, and, though not directly endangering lives, is affecting people's sense of safety and control over their land and livelihoods. This can elicit conflict, but also foster consensus. In this study, participatory qualitative research methods were used to investigate stakeholders' perceptions and preferences with regard to coastal land management strategies on the eastern German Baltic coast in the state of Mecklenburg–Western Pomerania. MR reflects a change in the way in which coastal land is valued, with supporting and regulating ecosystem services increasingly seen as critical for the resilience, conservation, amenity value and cost-efficient defence of coastal areas. Coastal defence is being redefined as a coastal land(scape) management task. The two contrasting case studies discussed show that, where public land is concerned, MR projects can be negotiated by, and provide benefits for, all parties concerned. Nevertheless, where local populations feel that they will be negatively affected, they may make use of democratic mechanisms to voice their dissent, organise resistance, and lobby to become negotiating parties in decisions concerning MR projects. If there is to be public consensus over the idea that coastal resilience is a common good, then the individual losses that result from such projects should be explicitly acknowledged and compensated for.

ADDITIONAL INDEX WORDS: *Coastal defence, coastal resilience, coastal adaptation, governance, stakeholder analysis, coastal land use strategies, coastal land management.*

INTRODUCTION

This paper considers how managed realignment (MR) can be a source of conflict regarding coastal land use but also promote greater integration between coastal zone policies and land management agendas. MR, as a form of soft coastal defence approach, seeks to work with coastal and marine processes rather than against them. In MR, coastal engineering structures (e.g., dikes, inland drainage infrastructure, coastal armouring devices) are either left to become obsolete (*i.e.* structures are neither repaired, maintained nor upgraded) or actively removed to restore direct land–sea interactions on a clearly defined coastal stretch. The purpose is to reintroduce controlled flexibility and dynamism in coastal systems to enhance resilience (Brooke, 1992; Burd, 1995; Doody, 2013). This can take different forms. For example, by removing coastal armouring structures on eroding coasts, sediment sources can be reactivated, and the material, which is remobilised, can nourish sediment-starved coastal corridors and replenish sediment sinks. Through the removal of dikes, buffers in flood-prone areas can be created, and valuable

ecological habitats (e.g., salt marshes) restored. MR thus constitutes an anticipatory retreat strategy (Nicholls and Klein, 2005), which involves yielding some control to natural coastal processes and yielding some land to the sea (de la Vega and Stoll-Kleemann, 2015).

From scientific, political and managerial perspectives, MR is emerging as a desirable approach to optimise coastal protection budgets, while restoring critical coastal processes and habitats (French, 2006; Turner *et al.*, 2007), although the long-term ecological, economic and societal success of this approach remains difficult to assess (Esteves, 2013; Mossmann *et al.*, 2012; Tinch and Ledoux, 2006). Furthermore, MR elicits a wide range of opinions among the populations affected by it. Public perception of MR is influenced by a range of factors, including knowledge of the coastal environment; aesthetic landscape preferences; perception of coastal risk; public understanding of the rationale, design, implementation and perceived outcomes of MR; as well as availability of appropriate information (Goeldner-Gianella, 2007, 2008; Myatt-Bell *et al.*, 2002). Furthermore, governance-related factors such as the quality of the consultation and decision process, the credibility of the institutions responsible for implementing MR and the financial support and compensation mechanisms in place are critical factors that strongly influence public acceptance of MR (DEFRA Staff, 2002; Ledoux *et al.*, 2005; Milligan and O'Riordan, 2007; Myatt, Scrimshaw, and Lester, 2003; O'Rior-

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*Corresponding author: ac.delavega@uni-greifswald.de

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dan, Gomes, and Schmidt, 2014; Weisner and Schernewski, 2013).

The desirability and legitimacy of MR is strongly contested and a matter of debate between different science, policy and public spheres. MR therefore faces numerous obstacles but also presents interesting opportunities for adaptive, participatory coastal zone management approaches. Further, beyond its direct impact on coastal defence, MR has significant consequences for land and landscape management more broadly. This intersection between coastal and land management is the focus of the present paper, which examines potential socio-ecological synergies and conflicts associated with MR and their implications for coastal land use. The core question of this study is: "To what extent can disparate, or even opposing, societal positions on MR be reconciled to promote a consensual approach to sustainable coastal land use?"

To address this, two methodological avenues were pursued in the present study. First, an analysis of societal perception of MR was performed within the broader framework of the COMTESS project based on stakeholder dialogue activities in the Darß-Zingst Peninsula and the Bodden region on the eastern coast of Mecklenburg-Western Pomerania (COMTESS: "sustainable coastal land management trade-offs in ecosystem services" funded by the Federal Ministry for Education and Research under Module A of the Sustainable Land Management Framework. COMTESS performs state-of-the-art ecosystem service modelling, which draws on experimental ecological data in order to investigate potential synergies and trade-offs in ecosystem service provision in two case study regions [on the North and Baltic Seas, respectively] under different coastal land use scenarios until 2100. See Federal Ministry of Education and Research, 2014). Second, two on-going projects on the eastern German Baltic coast were analysed to identify generic factors and contexts that facilitate or hinder the implementation of MR.

The structure of the paper is as follows. First, broad trends in coastal defence leading to the emergence of MR as a desirable, but contested, alternative are introduced with a focus on NW Europe, Germany and Mecklenburg-Western Pomerania. The context, goals and methodology of the analysis of societal perception of MR are presented. Different opinions on the feasibility and desirability of MR in the east German Baltic coast are discussed to explore MR's potential to foster societal consensus or, on the contrary, exacerbate conflict.

Managed Realignment: An Outcome of Shifting Policy Priorities on the Coast

In NW Europe, low-lying, soft coastal zones have historically been perceived as unstable and inhospitable environments of nevertheless strategic importance (Pethick, 2002; Verger and Goeldner, 1995). Hard defence structures, on the one hand, have straightened and homogenised the coastline and artificially regulated the land-sea water exchange process to limit the impacts of extreme coastal events (French, 1997). On the other hand, land reclamation projects undertaken up until the 1980s have altered coastal areas by converting saline ecosystems to freshwater ones, thereby creating fertile agricultural land and cheap areas for settlement and infrastructural development (Bertrand and Goeldner, 1999a,b). Priorities in

land use have nevertheless substantially changed in recent decades, and this, in turn, has shifted priorities in coastal protection. Postwar agricultural intensification and the all-too-successful European Common Agricultural Policy have led to recurrent overproduction in a context of progressive globalisation and liberalisation of agricultural and food markets (Schuksmith, Thomson, and Roberts, 2005). To remain competitive, agricultural activities in western Europe have often been concentrated on most productive areas, while less profitable ones are increasingly being abandoned. From the 1990s onward, then, although coastal land has retained its strategic importance with regard to settlements and infrastructure, large-scale land reclamation has ceased to be an attractive prospect in NW Europe (Goeldner-Gianella, 2007, 2008). The increasing awareness of the environmental impacts of intensive agriculture and hard coastal defence in a context of climate change has contributed to a shift in policy priorities in low-lying coastal regions of NW Europe and a reassessment of the effectiveness of expensive engineered adaptation (Govarets and Lauwerts, 2009; Henle *et al.*, 2008; Reeder *et al.*, 2010). This is illustrated in a variety of European Union (EU) discussion papers, environmental directives and legal frameworks on coastal habitat conservation, which encourage land use extensification, ecological renaturation and MR (European Commission, 2004, 2007; Halada *et al.*, 2011; Matthews, 2013).

By substantially expanding the areas suitable for human occupation and use, hard defence has contributed to the concentration of large populations and capital in coastal areas (Wong *et al.*, 2014). For Ballinger (2015), this has led to a development-defence cycle, which encourages an over-reliance on protective technology, an expectation of high levels of protection, a low tolerance for disasters and a tendency to ignore residual risk (Thorne *et al.*, 2007; Tol, Klein, and Nicholls, 2008). Land reclamation and coastal protection have created a buffer between the sea and coastal dwellers, who have forgotten the full implications of living in a rich, but continually changing and exposed environment. This has led to a mismatch in priorities and expectations between national states and coastal populations.

Managed Realignment in the German Context

Sterr (2008) summarises key information on the German coastline. It stretches over 3700 km along the North and Baltic Seas and is primarily composed of unconsolidated Quaternary sediments. It is eroding along over *ca.* 2200 km, 1900 km of which have some form of natural or engineered coastal protection. Along the coastal plain, 13,500 km² are located below 5 m above sea level (a.s.l.), 3400 km² of which have been artificially drained, while *ca.* 1000 km² remain flood prone. Much of the German Baltic coast lies in the state of Mecklenburg-Western Pomerania. A typical barrier island-lagoon coast, it is characterised first by an open outer coast, 377 km long, of which *ca.* 240 km are currently eroding and 180 km are under potential flood risk, while 135 km are protected by hard defence structures. Second, its much longer inner coast is sheltered from direct wave erosion and stretches over 1568 km, 1060 km of which are nevertheless flood prone (StALU, 2010). Different sources give different figures for the length of the coastline, depending on the level of detail measured. The

coastal plain covers *ca.* 1000 km² and is home to 182,000 people (StALU, 2011).

Although the federal government has fostered greater integration in coastal defence planning, coastal zone management is in Germany decentralised and a responsibility at state (Länder) level. Coastal defence projects are nevertheless primarily funded by federal budgets, which cover two thirds of the expenses, while the respective Länder complete the remaining third. Coastal policy and management in the four German coastal Länder have been strongly influenced by specific local natural characteristics, settlement history and population density, but also by broader transformations, such as the division and subsequent reunification of Germany and the incorporation of the former German Democratic Republic (GDR) Länder into the European Union (Nordstrom, Lampe, and Jackson, 2007). On the North Sea, coastal management relies on a hard defence strategy involving high protection standards. Although a number of experiments have been conducted since the 1980s, MR is seen as a very costly endeavour and source of strong political controversy (Goeldner, 1999; Rupp-Armstrong and Nicholls, 2007; Sterr, 2008). Explicit discussion of MR tends to be avoided due to its conflict potential, as for example in participatory assessments of future coastal land use strategies (*e.g.*, Karrasch, Klenke, and Woltjerb, 2014).

On the Baltic Sea, by contrast, MR is regarded as an appropriate strategy, since the coastal plain is sparsely inhabited, the tidal range is negligible, many dikes are reaching the end of their lives, flood-prone areas are comparatively small and coastal surges infrequent (Goeldner-Gianella, 2007; Nordstrom, Lampe, and Jackson, 2007; Rupp-Armstrong and Nicholls, 2007; Weisner and Schernewski, 2013). In Mecklenburg–Western Pomerania, coastal policy falls within the remit of the Water Act and explicitly prioritises the protection of settlements (StALU, 2009, 31). The state is responsible for maintaining and upgrading first order dikes (*i.e.* those that protect settlements) but is not legally obliged to maintain second order dikes (*i.e.* those that protect agricultural areas). MR is thus in principle feasible, although it has not yet been explicitly endorsed as a coastal adaptation strategy, as it has been, for example, in the UK (HM Government, 2011). Micro scale ecological renaturation and MR programmes are nevertheless multiplying on the German coast (de la Vega-Leinert and Stoll-Kleemann, 2015; Rupp-Armstrong and Nicholls, 2007; Weisner and Schernewski, 2013), with the OMRReg database (OMRReg, 2017; the OMRReg Database is by no means comprehensive) currently showing 12 active sites covering a total area of 3743 ha on the Baltic Sea coast alone. The projects range in size between 40 and 1750 ha and primarily serve the purpose of habitat creation (particularly salt marshes and transitional grasslands/salt meadows) by means of dike removal, accompanied in place by the reinforcement of inland dikes.

METHODS

Different stakeholders' priorities with regard to coastal/land use/landscape management result in different perceptions of MR and its potential socio-ecological implications. To explore how these societal priorities may be mutually exclusive or potentially reconciled in MR projects, two approaches were

followed. First, a range of opinions on desirable coastal land use management were explored as part of stakeholder dialogue activities embedded in the COMTESS project. This modelled different coastal land use strategies to explore the potential impacts of climate change (including sea-level rise and changes in precipitation regimes) on coastal ecosystem service provision at the regional level (Maier and Kleyer, 2012). COMTESS developed three main land use scenarios, with differing coastal defence implications for the two case study region. On the Baltic coast, the Darß–Zingst Peninsula and the Bodden region, in the eastern coast of Mecklenburg–Western Pomerania, was selected. This barrier island and lagoon system is composed of unconsolidated Quaternary sediments and is still connected to the inland coast *via* the Fischland coastal cordon to the west (Figure 1). Erosion of the dunes and beaches on the outer coast is restricted through hard and soft defence structures, while the barrier island complex of the Darß–Zingst Peninsula forms a natural protection for the inner coast of the Bodden. The COMTESS scenarios build on existing coastal management plans for the region, which involve the reinforcement of first order dikes on the outer coast and around settlements and the gradual out phasing of second order dikes (StAUN, 2009), which effectively amount to implementing MR. Mutually exclusive land use approaches were explored using two “MR” scenarios, based on the removal of agricultural dikes and the confinement of other dikes to settlement areas. These were contrasted to a control “Hold the Line” scenario, which presupposes that coastal dikes and artificial drainage mechanisms will be maintained and upgraded. The three COMTESS scenarios can be described as follows:

- (1) Agricultural land use is abandoned to enable the restoration of a near-natural landscape and encourage CO₂ storage as a contribution to regional climate mitigation goals.
- (2) A mosaic of complementary, extensive land uses is promoted to reconcile agriculture with conservation. This enables the preservation of important cultural landscapes, such as salt meadows, and the exploration of innovative sources of bioenergy (*e.g.*, through harvesting of reed beds).
- (3) In a business-as-usual scenario, land use is maintained as it is, although it may be increasingly restricted by climate change impacts.

Using a participatory approach involving qualitative, empirical social sciences research methods (Corbin and Strauss, 2008), a stakeholder analysis (Reed *et al.*, 2009) was conducted in order to identify key actors, their (conflicting) interests, and their likely positions regarding land use strategies and MR. Seventeen semi-structured, individual and group interviews were conducted with a total of 21 participants out of the 35 parties originally approached (Table 1). The latter were chosen for their expertise on coastal defence and land planning policy, coastal engineering, environmental management and conservation, local policy, flood rescue, and agriculture. These participants were presented with the COMTESS scenarios as a starting point for discussion (on climate change, sustainability, the local economy, land use,

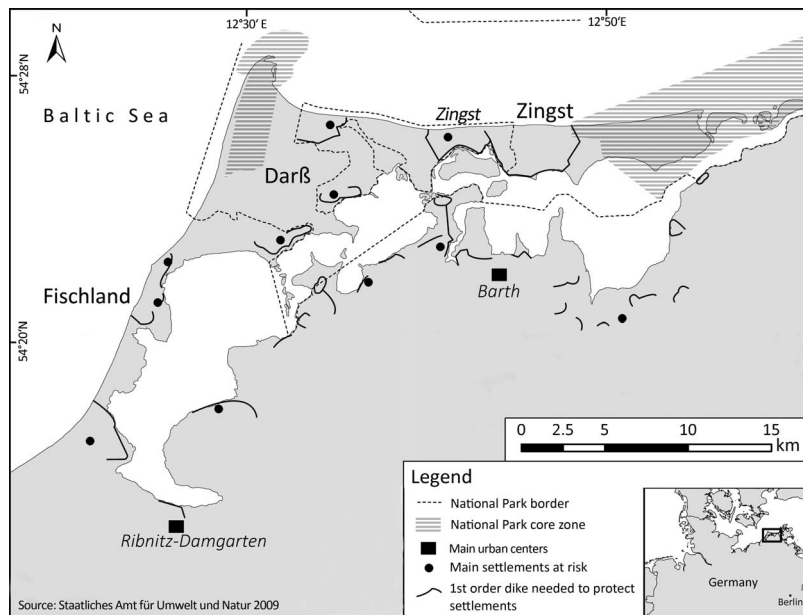


Figure 1. Location map of the Darß–Zingst case study region, the national park border and its core zones and the first order dikes needed to protect the settlements at risk should a coastal surge overtop the Ost Zingst Peninsula.

tourism, energy and coastal adaptation) and were asked to comment on them and formulate alternative coastal land use strategies (for an overview of the interview scripts, see Appendix). These detailed interviews first allowed complementing the COMTESS ecological and economic modelling through the creation of a fourth, “stakeholder-based” scenario (de la Vega-Leinert and Stoll-Kleemann, 2015).

All interviews were recorded digitally, transcribed verbatim, and then coded according to accepted methods in qualitative content analysis (Flick, 2012) using the Atlas.ti program (Atlas.ti, 2017). The coding was iterative and based on two main axes of enquiry: first, the interview transcripts were analysed in order to isolate the interviewees’ perceptions of the desirability and feasibility of MR, using the code list detailed in Table 2. Subsequently, the transcripts were subjected to an

exhaustive content analysis in order to reconstruct the underlying arguments used to support or reject MR. Specific contents were extracted for the analysis below. These are quoted based on the following system (1) the letter indicating the sector the participant belongs to (e.g., C for Conservation), (2) the number of the transcript (e.g., 1), and (3) the paragraph numbers in the Atlas.ti hermeneutic unit (e.g., 10–25). The complete hermeneutic unit is available from the authors.

In a second step, the lines of argumentation identified during the stakeholder dialogue were related to two selected case studies on the eastern German Baltic Coast. On the Ost Zingst peninsula, a large-scale MR project is being implemented, seemingly with widespread local support (Figure 2). This is contrasted with a proposed project close to the Polish border (Figure 3): the Cämmerer See pooled compensation area,

Table 1. Experts interviewed listed by sector, indicating whether they belong to the governmental or nongovernmental sector (NGO). The numbers show how many interviews were conducted, and the numbers in parentheses indicate the number of interviewees.

Area of Expertise	Sector	No. of Interviews (No. of interviewees)	Subtotals by Area of Expertise	Reference No.
Conservation (C)	Gov (state/national park level)	4 (3)	6 (5)	C1, C2, C4, C9 C3, C14
	NGO	2 (2)		
Local authorities (LA)	NGO	3 (5)	3 (5)	LA7, LA11, LA12
Coastal zone management (M)	Gov (state level)	1 (3)	3 (5)	M10 M13 M17
	Regional planning authority	1		
	Fire brigade (flood rescue)	1 (2)		
Agriculture (A)	Gov (state level)	1	5 (6)	A15 A5, A8, A16 A6
	Drainage boards and farmers’ associations	3 (6)		
	Main farmer in the Darß–Zingst case study region	1		
	Total interviews (respondents)	17 (21)		

Table 2. Code families and individual codes used in the content analysis, which was conducted using Atlas.ti. The full hermeneutic unit and the interview transcripts in German are archived by the corresponding author. These provided the basis for an expert-led elaboration of a fourth land use scenario (de la Vega-Leinert and Stoll-Kleemann, 2015).

Code Families	Individual Codes
Expert information	Professional/organisational background, position, sector, responsibilities. This helped identifying and contextualising the general perspectives/opinions of respondents.
Land use/Landscape	Current land use/landscape in the case study area, observed/expected changes. Drivers of change and factors affecting choices, conflicts and alliances concerning land use strategies.
Context	Broader factors related to the political, institutional, economic, social and cultural context of land use.
Perspectives	Perspectives, opinions and beliefs associated with the different sectors: Coastal defence, conservation, agriculture, tourism, local population Public, civil society, private commercial Local, regional, national scale
Land use scenarios	Perspectives, opinions, and beliefs associated with the three COMTESS scenarios: Hold the line—business as usual MR—multiple, adapted land use MR—CO ² storage

located on the Island of Usedom, where local resistance and mobilisation has brought the original MR and renaturation plans to a standstill (by means of the citizens' association, *Gegen Deichrückbau im Inselnorden eingetragener Verein [e.V.] Against MR on the north of the island [authors' translation]; Bürgerinitiative Gegen Deichrückbau im Inselnorden e.V.*, 2017). The Ost Zingst case study was based on the interview data presented above and a literature review, whereas the analysis of the Cämmerer See case was a desktop study based on a detailed review of management plans, public statements, press releases and articles.

RESULTS

The two following narratives, one for MR, the other against it, were developed based on the argumentations made by

interview partners during the stakeholder assessment of the COMTESS land use scenarios and illustrated by the two case studies on MR implementation (Table 3).

MR: A Win-Win Solution for Coastal Land Management

For participants who represented key public authorities responsible for coastal protection, regional planning and environmental management and for nongovernmental actors from the conservation sector, MR presents multiple advantages.

MR Facilitates Coastal Defence and Regional Planning

In keeping with the coastal policy protection mandate in Mecklenburg–Western Pomerania, which is explicitly restricted to inhabited areas (StALU, 2009, 31), the state is currently

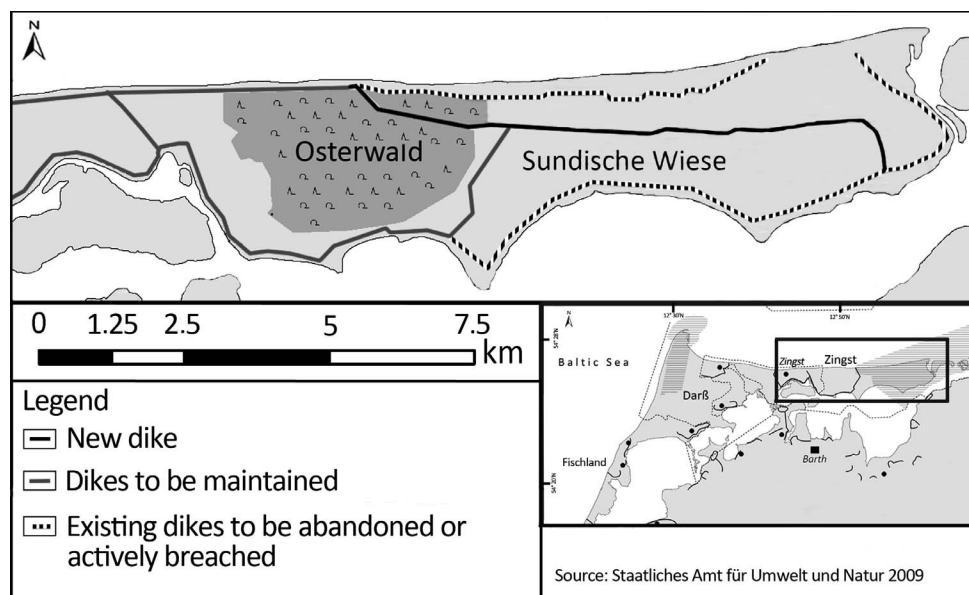


Figure 2. MR and renaturation project on the Ost Zingst Peninsula. This map shows the existing and new dike infrastructure, the dikes to be breached as part of the MR project on the Ost Zingst Peninsula and the renaturation of the Sundische Wiese (Adapted from StaUN, 2009).

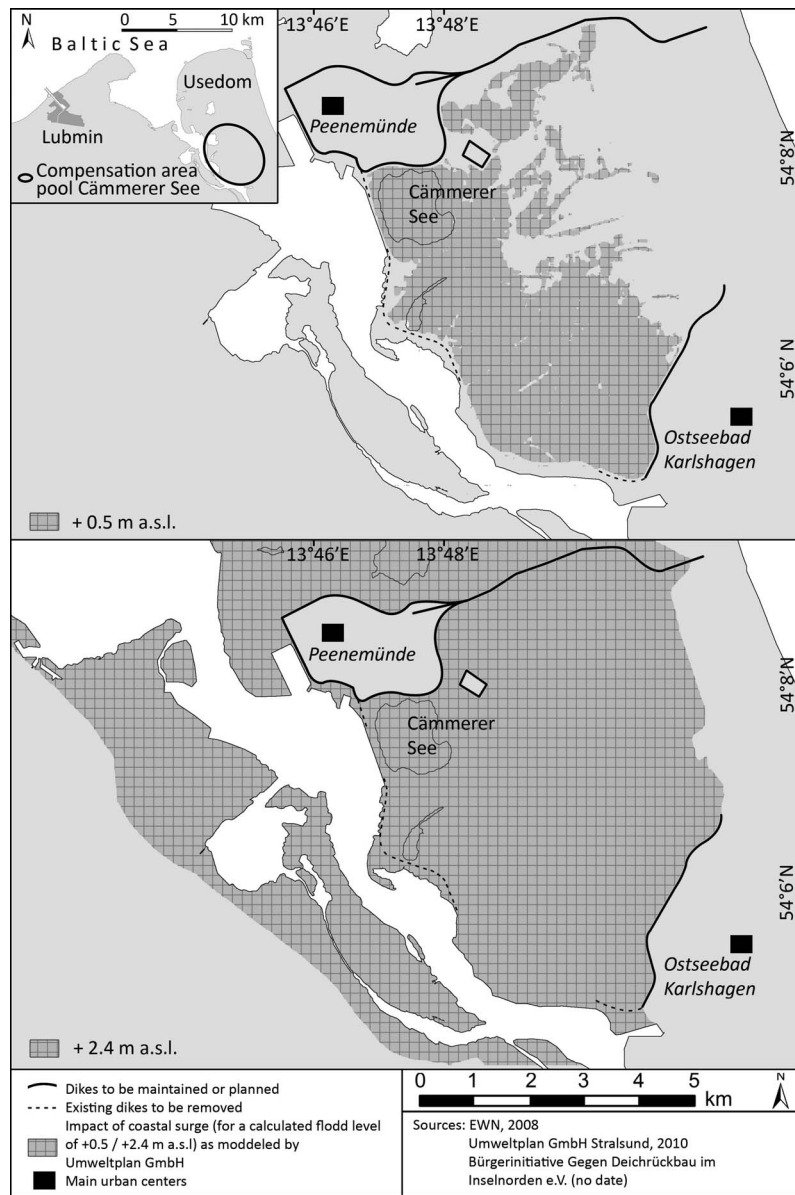


Figure 3. Location map of the proposed Cämmerer See pooled compensation area, Island of Usedom. The illustration is based on the presentation of the managed realignment project by EWN (2008, 2009), Umweltplan GmbH (2010) and documentation published online by the citizens' association "Kein Deichrückbau am Inselnorden." It shows the existing dikes and the contested MR project, as well as the potential inundation area, which would be associated with coastal surges at a flood level of (1) 0.5 m a.s.l. and (2) 2.4 m a.s.l.

transferring responsibility for the maintenance of agricultural dikes to local drainage boards (LA11, 38). MR represents an opportunity to optimise the coastal adaptation budget (C3, 53; C4, 8–13; C9, 127–133) and free up areas to compensate for the environmental impact of development projects (M10, 15; C3, 55–57, 231–271).

MR Improves (Coastal) Resilience and Conservation

From an environmental management and process conservation perspective, MR promotes the restoration and reactivation of critical supporting and regulating ecosystem services and

thus strengthens coastal resilience. MR serves to restore dynamic, biodiversity-rich, semiamphibian habitats. These encourage carbon sinks (C2, 31, 193–204) and natural coastal buffers (C2, 21, 71–79; C4, 8–13), reduce inland flood impacts (A15, 225–231, 241) and are associated with highly valued natural and cultural landscapes (C3, 94–97; C14, 306–316; A15, 6–69). As Bodden dynamics are restored, mudflats, creek systems, reed beds and their specific wildlife will contribute to increase the naturalness of the landscape, while salt meadows will be reestablished on temporarily flooded pasture areas (C1, 15; C3, 55–57).

Table 3. Synthesis of the main arguments used by the participants for or against the COMTESS land use scenarios and the perceived benefits and impacts of MR vs. “Hold the line” strategies, based on three main topic categories: coastal protection, conservation and local communities.

	MR—CO ₂ Storage	MR—Extensive Land Use	Hold the Line
	Perceived as positive		
Coastal defence and regional planning	Reduced coastal protection costs Increased resilience (restoration of natural processes, flood regulation) Compensation areas		High social acceptance
	Perceived as negative		
Coastal defence and regional planning	Low social acceptance of MR		Increased coastal protection costs Environmental impacts of hard protection Increased impacts of inland flooding No compensation areas
	Perceived as positive		
Conservation	Contribution to climate mitigation Process conservation Landscape naturalness	Restoration of habitats and cultural landscape (salt meadow, reed beds) Through vertical accretion land may keep up with increased sea-level rise	Conservation of freshwater habitats and species
	Perceived as negative		
Conservation	Loss of freshwater habitats and species	Loss of freshwater habitats and species Land use in National Park core zone	No compensation areas No contribution to climate mitigation
	Perceived as positive		
Benefits/impacts on local communities	Enhancement of landscape naturalness Nature-based tourism	Enhancement of cultural landscape aesthetics and tourist amenity value Room for alternative land uses and innovation	Protection of agricultural land, food production capacity and current livelihoods Current landscape aesthetics maintained Tourist attractiveness and accessibility (cycle path on dike)
	Perceived as negative		
Benefits/impacts on local communities	Loss of land/access Abandonment of land use affects food production capacity Threat to local livelihoods, economy and community life Wilderness affects cultural landscape aesthetics and attracts unwanted species	Progressive loss of land/access Extensification of land use affects food production capacity Costly adaptation of land use and uncertain viability	Landscape aesthetics affected by monocultures Environmental impacts of intensive agriculture

MR Combines Traditional and Innovative Sustainable Land Uses

A mosaic of natural and cultural landscapes increases amenity value (C2, 279, 287) and has significant economic potential (C3, 53), since an expanded tourism sector can help reactivating local economies (C2, 287; A15, 190, 198). Alongside beach and culture-based tourism (LA12, 86), nature-based tourism stretches the season to spring and autumn and inspires visitors to discover areas beyond the outer coast beaches (*e.g.*, for bird watching) (C2, 147, 227, 235; C3, 5, 94–

97; LA12, 64). This requires minimal additional facilities and infrastructure (*e.g.*, discovery paths and educational information panels; C14, 316–320). MR can further contribute to revive traditional agricultural uses that are adapted to temporarily flooded environments (*e.g.*, salt meadow pasture, reed harvesting; LA11, 140), and to experiment with new types of land uses (*e.g.*, innovative uses of moor vegetation as in the VIP Project; Vorpommersche Initiative für Paludikultur, 2017; P1, 288–298; introduction of water buffaloes, A6, 221–229).

Table 4. Main characteristics of the two MR case studies. The information was compiled primarily from official reports available online (*Bürgerinitiative Gegen Deichrückbau im Inselnorden e.V.*, 2017; *EWN*, 2008, 2009; *Linke*, 2010; *StALU*, 2009; *Umweltplan GmbH*, 2010).

	Ost Zingst (particularly the Sundische Wiese)	Cämmerer See
Area affected	16 km ² , incl. 950 ha comprised by the Sundische Wiese and 600 ha to the north Mean elevation 6.8 cm a.s.l. (8% of the area lies at higher elevation)	940 ha Mean elevation 18.8 cm a.s.l. (32.5% of the area lies at higher elevation)
Expressed goals	Compensation of environmental impact of dike construction Achievement of national park conservation goals Raising of tourist amenity value	Preservation of natural heritage Industrial conversion (decommissioned Lubmin nuclear power station) Promotion of synergies between energy, conservation, sustainable agriculture and tourism
Tenure	Public tenure (National Park, Federal Forestry Authority)	Mainly public tenure (transferred from the Federal Forestry Authority to the German Federal Environmental Foundation; DBU) Some land under communal/private tenure
Land access and use	Ost Zingst: core zone of the national park with restricted tourist access to visitors centre/cycle path Drained land of the Sundische Wiese leased for cattle pasture	Sheep grazing on dikes and cattle pasture in the lower areas Designated conservation areas at national and EU level Tourist and recreational infrastructure Restricted access to the disused military area, except Military Heritage visitors' centre
Coastal defence	Zingst: first order dikes on outer coast	The northern, outer coast is not fully protected, and extreme coastal surges can cause inundations of wide areas near settlements
MR compensation	Bodden population: new dike raises protection standards Construction of first order dike to protect Bodden population	Development of the Lubmin industrial area
MR measures	Dike breaching to the north and south Removal of pumping station/filling in of ditches Dike reinforcement to the west	Construction of first order dike on North Usedom Dike breaching to the west/removal of the pumping station Dike reinforcement around settlements/new pumping stations

Conservation Regulations Turn Farmers into Nature's Stewards

When land is under public tenure, farmers must respect land use restrictions, convert their activities where necessary, although some successfully manage to delay conservation set asides by arguing that this affects their livelihood (C1, 15; 135). Where land is under private tenure, farmers who forfeit land should ideally be remunerated for providing a service to society (C2, 77). This would diminish the potential for conflict and improve the success of negotiations concerning MR proposals on private land (C1, 12). Since public land available for ecological restoration projects is restricted, private land is becoming an asset on an emerging market for compensation areas (Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz, 2010; Nordstrom, Lampe, and Jackson, 2007). This provides land owners, who may become partners in conservation projects, with financial retribution for ecological restoration projects.

Sundische Wiese Case Study

The eastern end of the Darß-Zingst Peninsula is under public tenure and is one of the core zones of the "Nordvorpommersche Boddenlandschaft" National Park (Figure 2; Table 4). In theory, no land use is permitted according to Europarc regulations. The peninsula is, nevertheless, the cornerstone of the local coastal protection project. Indeed, were a coastal surge to overtop it, many settlements on the

inner Bodden coast would be at risk, were they not protected by dikes. For coastal management authorities, the reinforcement of the Ost Zingst natural barrier *via* the construction of a new dike that runs through the Ost Zingst core zone was the most cost-efficient way of securing the Bodden area (StAUN, 2009). To compensate for the environmental impact of dike construction works, all involved public authorities agreed to an interesting compromise. Existing dikes will be breached to allow the reestablishment (1) of natural coastal dynamics to the north and east, in keeping with the national park's process conservation mandate (C1, 61; C2, 7) and (2) of resting areas for migrating birds and salt meadow habitats to the south (C2, 163) (Table 3). Nevertheless, the project was not entirely conflict-free. For a conservation expert the dike primarily serves the purpose of reassuring the population, because in itself the Ost Zingst peninsula offers sufficient protection against coastal surges. However, the importance of the renaturation project made the environmental impacts of the dike's construction acceptable (C14, 290–304). Moreover, the decision to restore a salt meadow, in partnership with the main cattle herder of the region, has been a point of contention between the national park authorities and Euro-parc (C1, 15, 28–29; C9, 207–209; C14, 397, 423). For the residents of the nearby town of Zingst, there is no real reason to contest the project, since (1) the settlements on the open coast are protected by law over the long term, while a state-of-the-art dike protects the Bodden area for decades to come,

and (2) nobody lives in the area affected by MR (LA12, 37–44). Moreover, a new cycle path, which runs along the top of the new dike, deep into the core zone, significantly increases the area's amenity value and its attractiveness to tourists (M10, 125–127). Dikes will be maintained to the west to avoid the salinisation and degradation of the freshwater Osterwald forest to the west. This compromise solution was reached in internal discussions between the relevant authorities (M10, 125–127) to pacify the local population and the public forestry authority (C2, 265), for whom the long-term loss of the forest in the northern part to coastal processes was already an issue.

MR as a Catalyst of Land Use Conflict

The participants, who represented the farming sector and local communities, however, generally took a more critical view of MR. They presented a number of important arguments that explain public support for “Hold the Line” coastal defence and resistance to, or outright rejection of, MR.

Land as an Existential Issue

MR is often negatively perceived by local populations because it questions the still dominant hard defence paradigm and thereby threatens to substantially transform land use and landscape (C3, 145–147). MR is seen as affecting the future viability of current agricultural land use (whether cultivation or pasture) on reclaimed land (C1, 71). It puts local infrastructure at risk (C3, 55–57; A8, 31–49), reduces agricultural productivity (A6, 181–183), endangers agricultural businesses (A5, 61–68; A6, 219–221), local livelihoods (LA11, 33–38) and, for some, agriculture itself (LA12, 37–44). The fear of becoming more exposed to natural processes is mixed with that of losing control over the land. This is a highly sensitive issue, which stirs up deep seated emotions, such as the fear of land dispossession particularly prevalent on account of the area's history. Land ownership has been a critical factor in the turbulent history of the region. A local mayor referred to the authoritarian regimes of the Third Reich and the GDR, but also to the designation process of conservation areas immediately after the German reunification, which occurred with little to no public consultation. In this respect, it is not surprising that relinquishing land might be experienced as a loss of freedom (LA12, 37–44). This legitimises the refusal of land owners or users to forfeit productive land for conservation purposes (LA12, 37–44; A16, 473–481). Farmers, backed by their communities and political lobby groups, will fight with all the means at their disposal to protect their livelihoods (A5, 150–183; A8, 215–237; A16, 421–428) and the local economy against further rural exodus (A5, 61–68; A16, 395–419; LA11, 33–38). Moral arguments are advanced to strengthen this claim on land control and centred on protecting German agriculture as a contribution to global food security (LA7, 7) and to avoid the delocalisation of food production in tropical agricultural frontier regions (A5, 61–68, 111).

Transferring the Responsibility for Coastal Protection

Land reclamation and drainage has long been a cornerstone of agricultural strategies to maximise the land available for food production and security purposes (A8, 197–203; LA12, 56).

Nevertheless, the state of Mecklenburg–Western Pomerania is progressively disengaging itself from the protection of agricultural land and indirectly transferring this responsibility to local communities and land users *via* local drainage boards (Nordstrom, Lampe, and Jackson, 2007). This recent U-turn in coastal protection may be seen as “broadly acceptable and accepted by local authorities” (C3, 179). Interviewees from the conservation, policy, management and farming sector all agreed that, over the long term, agricultural activity will have to adapt to these changes and the most marginal, most exposed and least productive agricultural areas will have to be given back to the sea, even if reluctantly (LA7, 133–139; A6, 153–159, 203–205; LA11, 54, 73–76; LA12, 126; A15, 277–278). However, as long as the most fertile arable land remains profitable, coastal protection should and will be assured by the drainage boards (C9, 183–189, 219–251; LA11, 106–117; A16, 395–419). To this effect, these boards are already improving the technology and cost-efficiency of drainage infrastructure to reduce protection costs on agricultural land (LA7, 45–59; A8, 215–237, 239–261, 301–313, 421–443).

Landscape as an Identity Statement

MR allows the sea to reclaim land and reshape it into a semiamphibious landscape (Goeldner-Gianella, 2007). Aesthetically pleasing freshwater cultural landscapes and biodiversity (*e.g.*, Osterwald, C2, 265, rape-seed fields and cranes, LA12, 61–74) behind dikes will be replaced by temporarily flooded salt meadows, coastal moors and reed beds. This is perceived as implying a degradation in landscape beauty, an impoverishment of desirable biodiversity and the invasion of unwanted wildlife (A6, 203–205; LA11, 38). The careful arrangement of land use, which over the course of many generations has created familiar and praised cultural landscapes, indirectly affects the local population's sense of place and regional identity (Fritz-Vietta, de la Vega-Leinert, and Stoll-Kleemann, 2015). This is endangered by what is understood as letting nature loose (LA11, 54; LA12, 55–60). The public rejection of this proposed landscape transformation can be summarised simply: “Nobody wants a primordial landscape, a natural landscape. We *are* a cultural landscape” (C9, 191–205, our emphasis). In this view, renaturation programmes should be restricted to areas that are unfit for land use (A8, 337–363). Also, though a positive societal perception of landscape naturalness and wildlife in renaturation areas should be promoted (C14, 181), tourist attractiveness of the region, for many interviewees, is mainly related to open, accessible, aesthetically diverse landscapes (LA11, 140–144; A6, 140; C2, 277–279).

Obstacles to Alternative Livelihoods

Typically, agricultural extensification means converting arable land to pasture, because as long as meat plays a prominent role in diets and the current EU subsidy system is maintained, pasture is the easiest and most cost-efficient form of land use on marginal coastal areas (C4, 21; C2, 105–123; A5, 150–183). The development of alternative forms of land use is associated with experimentation and a loss of profitability that brings uncertainty, because it takes some time for a consumer base that is willing to pay higher prices for high-value regional products to form and for returns to be seen (C2, 287; LA12, 52;

A16, 215). Being an adaptive farmer therefore implies developing innovative commercial niches by risking change ahead of others, while at the same time keeping options open (A5, 150–183). Moreover, in spite of the promising preliminary results of the VIP Project that explores possible avenues for the commercial exploitation of moor vegetation (A5, 138–140), all the interviewees largely dismissed reed-based bioenergy as a viable option. The reasons for this were the perceived lack of technical feasibility (C1, 129–141; 288–298), efficiency or economic viability (LA7, 119; A5, 69–85) and the expected negative impact of reed bed monoculture on landscape aesthetics (C3, 132–135; LA11, 140–144). Also, an aversion to using land for energy rather than food production was noted (*e.g.*, LA11, 82) and can be associated to the negative perception of the use of maize monoculture for biogas production in the region, as expressed by several interviewees.

Case Study: the Cämmerer See Pooled Compensation Area

When local residents disapprove of proposed MR projects, they can make use of democratic channels to voice their dissent and contest the legitimacy, credibility and competence of the decision makers responsible for pushing MR forward. This is well illustrated by the conflict over the Cämmerer See pooled compensation area on the island of Usedom (Figure 3; Tables 4 and 5). This project involves the proposed implementation of MR on 940 ha of mainly public land in a sparsely inhabited region on the NW side of the island. The land is currently used for extensive pasture and for tourism, and the area is under a number of conservation and cultural heritage designations. It also contains a vast World War II military zone, the access to which is prohibited (Linke, 2010). The project was initiated in 2008 as an ideal environmental compensation measure for the industrial development of the decommissioned nuclear power station in Lubmin, located to the west of the area on the mainland. Originally, it was to be financed by a conglomerate of fossil fuel (coal and gas) and renewable energy (off shore wind) companies (EWN, 2008, 2009). Conservation gains in the proposed project have been articulated in terms of the restoration of a resilient, near-natural, semiamphibious landscape endowed with high conservation and amenity value (Linke, 2010; Umweltplan, 2010). For the local population, however, the MR project primarily represents an increased risk of flooding. This is because (1) the first order dike line on the outer coast has not yet been completed, (2) the project plan does not fully take into account certain worrying flooding scenarios that might result from coastal surges and future sea-level rise, and (3) flooding would compromise the military heritage area, thereby also increasing the risks posed by residual mines (Bürgerinitiative Gegen Deichrückbau im Inselnorden e.V., 2017). Further, the local residents see themselves as the losers in a project that forces them to bear the costs (*e.g.*, increased flooding risks) of a distant development project that will not benefit them directly.

Spurred on by a very decisive and committed core of activists, local citizens established an association called “Gegen Deichrückbau im Inselnorden e.V.,” which since 2008 has endeavored to:

- (1) inform the community about the project;
- (2) mobilise resistance among community members;
- (3) confront decision makers by occupying accessible political arenas and processes;
- (4) demand transparency and accountability on coastal defence projects;
- (5) appeal to ever higher state and federal authorities; and
- (6) stimulate debate by attracting media attention.

The citizens’ association has gained an important local and regional presence and managed to position itself as a group that could no longer be neglected in the decision-making process on MR on the Island of Usedom. This has prompted the relevant decision makers to publically enter the debate. The confrontation between the two sides has escalated over the years, with each party involving broader circles of society and seeking further alliances within the scientific, political, and public domains. The citizens’ association has continually demanded to be offered a place at the negotiation table. Although this has not yet happened, the association has succeeded in stalling the project: in 2014 the main developer and the financial backers withdrew from the project, which forced decision makers to reconsider their tactics in order to end the conflict. In 2015, the original compensation area project was officially abandoned, although the citizens’ association continues to claim that the project has simply been put on the back burner. The full resolution of this conflict depends on the decision concerning the construction and exact location of the planned first order dike, since some of the proposed dike lines clearly still presuppose the implementation of MR on the Cämmerer See. The citizens’ association therefore continues to the present date its political lobby for the complete abandonment of any MR project in the area.

DISCUSSION

The Sundische Wiese and Cämmerer See MR projects have many similarities. Both primarily involve publicly owned, uninhabited land, under no, or only limited, agricultural use in communities where nature-oriented tourism plays a growing role in the local economy. Although provisions for the protection of the nearby coastal settlements are in planning or have already been implemented, the areas affected by MR would experience more frequent flooding and significant landscape transformations. There was nevertheless a substantial difference in how MR projects were negotiated, decided upon and presented to the local populations and land users, which strongly influenced public response.

The Sundische Wiese case shows that MR projects can be successfully negotiated to bring benefits to all major parties. Although strategic decisions (concerning, for example, dike construction and compensation measures) were made centrally, the relevant public authorities identified potential points of contention concerning the scope and impact of the project and devised a compromise solution, which enabled them to fulfil their mandate. All parties involved, whether public authorities or land owners/users, were prepared to trade some losses for substantial individual and collective gains.

Table 5. Key arguments made by the two main conflicting parties in the Cämmerer See MR case study, along with the strategies each party adopted in order to defend their position and form alliances.

	State Administration	Citizens' Association
Discourse emphasis	The security of the population is the highest priority Adaptation to climate change/ecological restoration are key MR project supports federal energy strategy Industrial revival and tourism development	The security of the population is compromised Inconsistencies in reasons given to legitimate the compensation measures Unfair methods used to divide opposition and violation of democratic rights Invoke the need to re-establish societal peace and reach consensus
Expected project benefits/impact	Ecological benefits Reestablishment of resilient, ecologically adapted vegetation Landscape mosaic of high quality pasture land and land of high amenity value Restoration of habitats for bird conservation Potential niche for the reintroduction of endangered species Societal benefits No damage to infrastructure, cultural heritage or private property Current pasture will be incorporated in the renaturation plan New tourist/cycle paths	Increased risk of flooding of the local population and the historical heritage site Higher risk in the disused military area (buried mines)
Strategy	Argumentation changes to counter lack of acceptance Tourist plan to enhance access and amenity value Exchange with detractors first in written form, then directly through public platforms and media Reformulation of MR project as a compensation measure Bilateral negotiations with local authorities in Peenemünde and private land owners to increase support Transfer tenure from Federal Forestry Authority to Federal Environmental Foundation (DBU) Purchase of land in order to increase control over affected areas After developers withdrew, MR officially abandoned Possibility of reviving pooled compensation area plan in future remains	Creation of the citizens' association (138 members) Website serves as depository of MR project information, media reports, lobby correspondence, discussion platform Petition in 2013: 10,169 signatures collected against the project (3524 from the district (incl. 200 from Peenemünde); 6645 from tourists and other Usedom districts Demonstrations and walks on the dike Direct communication with public authorities/politicians at all levels Establishment of a political platforms (e.g., citizens' assembly) Regular press declarations and media presence Support within public, scientific and formal political arenas Scrutiny of MR project planning documents
Alliances and networks	Conglomerate of fossil fuel/renewable energy developers and sponsors Supporting scientists Local authority (Peenemünde)	Scientists from established institutions, independent experts Important local citizens' associations Local authorities in the affected municipalities (except Peenemünde) and county council voted against the project Representatives of political parties (die Linke, SPD) Public actors (Historical and Technical Information Centre) and authorities (e.g., the lower cultural heritage and forest authorities)

The Cämmerer See case study, by contrast, clearly illustrates MR's potential to cause conflict. Here, the proposed MR project was negotiated in a top-down fashion between the public authorities and a conglomerate of private developers with no involvement of the affected parties. It was only after the local population expressed its opposition to the project and formed the citizens' association that decision makers changed their tactics in order to address this local resistance. Rather than

striving for a consensual solution with the representatives of the local population, public authorities targeted specific local authorities and land owners to divide the opponents of the MR project. This nevertheless sparked further resistance from the conflict parties that were still excluded from the negotiations.

Local resistance to the idea of relinquishing land is related to deeply rooted conceptions of coastal zone occupation and use. It can be understood as a reactionary perception of coastal

defence, which hinders progressive legislation and management practices (Pethick, 2002). But it could also be symptomatic of some degree of refusal to adjust to much broader societal transformations, such as changes in the societal role and economic value of agriculture and land use in policy priorities in coastal zones and in general approaches to coastal defence. In NW Europe, coastal defence has been for decades, if not centuries, a centralised, resource intensive task, particularly geared toward the maximisation of food production on flood-free, productive land. This has strongly structured the way coastal communities perceive settlements' safety, local economies, landscape aesthetics, cultural attachments and regional identity.

In response to growing coastal populations, threats to coastal assets, dwindling state resources and increased environmental awareness, a dual approach to coastal zone management is emerging, which prioritises densely occupied areas where wealth is concentrated, at the expense of economically and demographically marginal areas, which are to be relinquished through controlled MR (Wong *et al.*, 2014). The comparatively recent trend to legitimise the abandonment of marginal and costly agricultural polders at policy level points at important changes in how coastal land uses and landscapes are valued (Granek *et al.*, 2009; Karrasch, Klenke, and Woltjerb, 2014). The productivity and profitability of agriculture on reclaimed land is increasingly contested. Coastal land ceases to be strategic for provisioning ecosystem services (such as agricultural crops). Instead, land for compensation areas, ecological restoration and climate mitigation is increasingly valued at policy level. Supporting and regulating coastal ecosystem services (such as water retention and filtration) become critical assets, and cultural landscapes are being reframed as farmland of high natural value (HM Government, 2011; NABU, 2012; NABU-Schleswig-Holstein, 2017; Nordstrom, Lampe, and Jackson, 2007; Plieninger and Bieling, 2013). Scientific advisers, public authorities and conservation actors all tend to embrace this changing prioritisation of coastal land use and ecosystem services (de la Vega-Leinert and Stoll-Kleemann, 2015). However, local stakeholders and communities have different understandings and preferences regarding coastal land use, landscapes and ecosystem services (Cebrián-Piqueras, Karrasch, and Kleyer, 2017). These discrepancies, if ignored, may significantly hinder the search for consensual coastal land management strategies.

Practically, changes in coastal land use are strongly influenced by the degree of state involvement in coastal protection. Where land users are directly responsible for the protection of agricultural polders (as is the case in southern Europe), the adaptation, conversion and abandonment of the most endangered agricultural areas is already taking place, guided mainly by questions of productivity and market profitability (Goeldner Gianella, 2007, 2008). In contrast, where states have historically been responsible for land reclamation schemes and coastal defence structures (as in northern Europe), they first have to redefine their coastal protection mandate and extricate themselves from their protection duties—which have long been conceived in terms of the hard defence paradigm—

before land can be abandoned. On the German Baltic coast, this is facilitated by the broader context of societal changes that affect the region since the fall of the Berlin Wall. This is characterised by strong migration away from marginal, rural areas and the concentration of an agricultural sector that employs less and less labour, while heavily depending on EU subventions (Haase, Seppelt, and Haase, 2007; Kröhnert, van Olst, and Klingholz, 2004).

In embracing MR as a desirable, and even as a necessary, option coastal protection authorities are effectively allowing erosion and flooding to take place in rural areas that were formerly under their responsibility. In so doing, they are transferring their protection duty to local populations and reframing their mandate under the notion of coastal land management. Bearing this in mind, local resistance to MR can therefore be seen as one expression of the practical and existential concerns of individuals who see their preferences ignored and their livelihoods and assets as being potentially affected (O'Riordan, Gomes, and Schmidt, 2014; O'Riordan and Nicholson-Cole, 2010). Such fears, and the subsequent refusal to comply, cannot simply be overcome by raising awareness of the expected social gains of a resource optimisation policy at a macro level. Social movements against MR rather invite us to reflect on, and discuss, the paths society may wish to follow and how socially sensitive governance and decision-making mechanisms can be developed (O'Riordan, Nicholson-Cole, and Milligan, 2008). A broad societal debate on the extent to which coastal citizens should be able to play a real part in shaping coastal policy is long overdue, although the literature abounds on frameworks and approaches for public participation and stakeholder dialogue in coastal zone management and their implementation (*e.g.*, Few, Brown, and Tompkins, 2007; Fletcher, 2003; Treby and Clark, 2004). The focus of such a debate should move away from specific issues of coastal risk, environmental threats, technical solutions and ecological opportunities. Instead, it should engage a process to collectively decide on which terms coastal occupation, land use and protection is to be conceptualised and how priorities are to be set. In the absence of such a debate, affected coastal populations will continue to fight for their basic right to disagree with, and block, proposed coastal defence strategies that they do not support. If a societal consensus is to be reached on the idea that coastal resilience is a common good, which should be secured even at the cost of individual losses, it becomes important to explicitly acknowledge these losses, rather than to treat them as unavoidable collateral damage. To facilitate the inland relocation of affected populations and their activities, new ways of governing, managing and financing coastal land use need to be established that incorporate mechanisms for negotiation in decision-making and economic incentives for land use conversion (O'Riordan, Gomes, and Schmidt, 2014). For example, agricultural extensification is currently being reframed as a form of environmental stewardship. To foster extensification practically, it needs to be acknowledged as a socially important task, which should be adequately supported and remunerated (Plieninger and Bieling, 2013). For some, this could be facilitated through ecological entrepreneurship (O'Riordan, *personal communication*). The emerging market for compensation areas already

constitutes a step in this direction and is beginning to provide new options for land owners, including financial remuneration (Nordstrom, Lampe, and Jackson, 2007). Nevertheless, as compensation areas become valuable commodities, it is all the more important for clear regulations to be established concerning the conditions of property transfer in order to prevent conflicts between land owners, users and local inhabitants and to negotiate consensual agreements on land conversion and its implications.

CONCLUSIONS

In Europe, MR, although transforming coastal land use and reshaping landscapes, does not literally endanger the lives of populations, but it does very much affect their sense of safety and their sense of control over their land, their livelihoods and by extension, their lives. Our case studies illustrate how different perspectives lead to the construction of different discourses on the advantages and disadvantages of MR and its potential either to foster societal consensus on new forms of designing and using the coast or to polarise views, stimulate social mobilisation and paralyse project implementation. Key discrepancies in societal perspectives on MR reveal strong differences of opinion concerning what is needed *vs.* what is desirable *vs.* what is acceptable. What is at stake is whether a paradigm change in coastal land use can be consensually decided upon. Douglas *et al.* (2012) see coastal adaptation as a creative social process, in which communities re-engage with their cultural attachment to the coast and their needs and aspirations in relation to it. In this task, scientists and politicians, land users, environmental activists and citizens have an important role to play in fostering public debate on sustainable futures and establishing a solid and legal framework oriented toward adaptive, socially just, and democratic coastal zone management (O'Riordan, Gomes, and Schmidt, 2014).

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APPENDIX: OVERVIEW OF INTERVIEW SCRIPTS

General questions:

- What is your expertise and what are your responsibilities?
- What is the focus/aim of your organisation/activity/business?

Land use and possible impact of climate change

- What are the most important economic activities in the region?
- How has land use changed in the region in the last decades?
- Which factor have driven land use changes in the region (EU-Subvention, coastal protection, conservation restrictions, tenure, etc.)
- Which landscapes are characteristic of the region?
- Can you give some information on the land tenure in the region?
 - What role does the national park play in the region/the local economy?
- How would you describe the current agricultural sector in the region?
 - How sustainable is the current land use in the region in your opinion?
 - Which forms of land use are at present less sustainable?
 - What is your opinion about the current EU-agricultural subventions?
 - Which changes in the EU subvention system benefit/affect your business?
 - Is the extensification of the current agriculture desirable in the region?
 - Are farmers today giving up land or adapting their land use to current floods?
 - Which factors make farmers decide to give up land/adapt their land use?
- Which impacts could climate change have on the region?
 - How could this affect land use/the local economy in the region?
 - Which sector could be more impacted?

The COMTESS land use scenarios were presented.

- Which alternative scenario appears to you more desirable/feasible for the region?
- Which sectors may benefit/be affected by these scenarios?
- Can you think of further alternative land uses for the region?
- What does the local population/land users think about possible alternative forms of land uses?
- What would be an ideal/worse scenario for the region in future?

Current coastal protection/future adaptation

- What is your opinion on the current situation of coastal defence in the region?
- How are first order and second order dikes distributed in the region?
- Which areas are under the responsibility of the drainage boards?
- How is the dike and drainage system financed? Who is currently financially responsible?
 - How would this change if the public authority ceased to maintain the second order dikes?
 - Which factors would affect the capacity of the local authorities and drainage boards to maintain the second order dikes? (technical, financial resources)

- If the costs of the maintenance of dike and drainage systems increases significantly, would the local population and land users agree to cover them?
- Is the current dike and drainage system sufficient to protect the local population? Agricultural land?
 - How do floods/extreme events affect the region?
 - Which agricultural areas experience flooding currently?
- How could climate change affect the functioning of the drainage system?
- Are adaptation strategies/measures already being taken? If not, would they be possible?
- Are there disaster preparedness plans for the region?
- How is the awareness of the local population/of tourists in relation to these events?
- Which MR/ecological renaturation projects are being implemented in the region?
- How are MR/renaturation projects developed and implemented?
- Are farmers taking part in compensation areas and renaturation programmes?
- Were these projects discussed with the local land users and land owners?
- How did land users/owners/the local population view these projects (*e.g.*, on Ost Zingst)?
- Which sectors may benefit from/be affected by MR?
 - Would this affect tourism and tourism desirability?

To identify further important stakeholders

- What is your opinion on MR/renaturation?
- Which sector, actor, perspective would be important to include in our project?

Kurzbeschreibung der Arbeit

Deichrückverlegungen oder –entfernungen (DR) sind aus wissenschaftlicher und politischer Sicht eine wünschenswerte Option für benachteiligte marginale ländliche Räume. In Europa verändern DR in Küstennähe die Landschaften und ihre Landnutzung. Obwohl sie nicht direkt das Leben von Menschen betreffen, wird deren Sicherheitsgefühl und das Gefühl, wie sie Land unter diesen Umständen kontrollieren können, angesprochen. Das kann zu Widerstand und Konflikten führen, aber auch ein Weg sein, einen Konsens zu erreichen. In dieser Studie wurden mithilfe partizipativer, qualitativer Methoden die Wahrnehmungen und Präferenzen einer Vielfalt von Akteuren in Bezug auf verschiedene Küstenlandnutzungsstrategien an der Ostseeküste Mecklenburg-Vorpommerns untersucht. Zwei Fallstudien wurden im Rahmen des COMTESS Forschungsprojektes untersucht. Es wurden alternative nachhaltige Küstenlandnutzungsstrategien und die Bereitstellung von Ökosystemdienstleistungen unter einem *Business-as-usual* Szenario (ein Kontrollszenario, welches annimmt, dass Küstendeiche und künstliche Entwässerung erhalten werden) und unter zwei verschiedenen DR Szenarien in der beschriebenen Ostseeküstenregion modelliert. Im ersten DR Szenario wird die landwirtschaftliche Nutzung aufgegeben und naturnahe Landschaften wiederhergestellt, während im zweiten Szenario ein Mosaik aus komplementären extensiven Landnutzungen, (einschließlich Salzwiesen und Schilfnutzung als Bioenergieträger) ermöglicht wird, das mit Naturschutzziele vereinbar ist. Die zwei gegensätzlichen Fallstudien zeigen, dass dort, wo öffentliches Land betroffen ist, über DR Projekte verhandelt werden kann, wenn es Vorteile für alle wesentlichen betroffenen Akteure gibt. Wenn jedoch Bürger ihr Recht auf Mitbestimmung von küstenbezogener Politik wahrnehmen, sollte auch deren Ablehnung respektiert werden. Wenn es einen breiten Konsens über die Idee der Resilienz von Küsten als Allgemeingut gibt, sollten die individuellen Verluste, die aus DR Projekten resultieren können, berücksichtigt und kompensiert werden.

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