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Local Perceptions and Preferences for Landscape and Land Use in the Fischland-Darß-Zingst Region, German Baltic Sea

edited by
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Contents

Landscape change in the Fischland-Darß-Zingst region (Northern Germany) – Implications for local people's sense of regional belonging

Nadine V.M. Fritz-Vietta, A. Cristina de la Vega-Leinert, Susanne Stoll-Kleemann

SUMMARY

"Landscape" is defined here as comprising both the landforms of a region in the aggregate and the humans who inhabit the region. Furthermore, it embodies a relationship between nature and culture. These concepts are also components of the German term *Heimat*, whose denotation is "homeland" or "where I come from". In German, in some contexts, *Heimat* encompasses the conservation of traditional human-nature relations. It can also be understood to reflect an inner psychological attitude, expressing a quality of life that considers both close social contacts and clear social networks. "Regional belonging" here is used in a narrower sense than *Heimat* and refers specifically to social relations. Hence, social factors are important characteristics of a landscape and thus create a correspondence between region and people. People use landscapes, and landscape changes occur in a variety of ways: The physical landscape alters constantly due to both natural processes such as erosion and floods and because of human interventions e.g. expanding or new settlements and the use of fertilizers. Landscape also changes in a population's mental perception because of changing value systems or political arrangements.

In this context, the aim of the present report is to identify whether changes in land use and landscape change have influenced the local population's sense of regional belonging in the Fischland-Darß-Zingst region. We conducted qualitative social science research by collecting and analyzing records of semi-structured interviews and group discussions carried out with people living in this region, introducing the area's typical elements in order to define the case-study region. In the report, we present results of information gathered on perceived landscape types and landscape elements and show how these elements are valued by the area's inhabitants. In addition, predominant land uses are highlighted and landscape change that has occurred in the region is depicted. Finally, we discuss attributes of regional belonging and how land use and landscape change influence the local population's sense of regional belonging.

As regional belonging is related to emotion, there is a relationship between regional belonging and

landscape aesthetics. The latter describes people's perception of the aesthetic quality of their surrounding landscape. For example, the natural landscape defined as "pristine" is valued and aesthetically admired, with the area's uniqueness being particularly emphasized. Another example is the canola fields, which are valued by almost all interviewees, albeit only when in blossom. If these elements persist, people develop a strong sense of regional belonging with both the landscape and their region. It can hence be assumed that degradation of the pristine natural elements or the disappearance of canola fields would reduce regional belonging. In this report, we give an overview of identity-producing elements that influence regional belonging. These attributes are clustered into nature and natural landscape, cultural factors, social factors, feelings and emotions, as well as how people engage with (become active on behalf of) their region. Land use, land-use change, and landscape change are also clearly related to regional belonging. Changes in these also influence the local peoples' feelings of regional belonging, and thus also constitute input into this report.

People's sense of regional belonging is important to ascertain and evaluate because it helps identify their relation to the landscape and makes it possible to gain better understanding of their landscape perception. As a result, we recommend further research in the field of regional belonging and relations with land-use and landscape change in order to inform policy and decision makers. Furthermore, this sort of research holds potential to address research needs from the perspective of the local population. Actively discussed issues such as the digging of a trench on the Fischland-Darß-Zingst Peninsula to connect the Baltic Sea with the inland bodden[1], as well as the abandonment of agricultural polders in particular need additional elucidation. We recommend further social science research on the aforementioned topics and other important topics discussed in the present report.

[1] "Bodden" are briny bodies of water forming lagoons, along the southwestern shores of the Baltic Sea, primarily in Germany's state of Mecklenburg-Vorpommern...They have a distinctive geological origin and are enclosed by peninsula, spits and islands, leaving only narrow connections to adjacent bodden or the open sea." (Wikipedia, accessed 09 Feb 2015.) This word is used throughout the text rather than, e.g. "lagoon" or "bay".

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1 INTRODUCTION

In the course of time, changes occur in landscapes (Soini, Vaarala, and Pouta 2011). These changes are either environmentally and/or anthropogenically (result of human action) driven. Changes in landscape are physically perceptible and mentally constructed (Meier, Bucher, and Hagenbuch 2010:100). Lanninger and Langarovà (2010) explain that the mentally constructed landscape image is the sum of all sensual impressions of a landscape. Generally, the landscape image is part of one's identity. Identity is a dynamic process that can be gained and lost (Ipsen 1994). Identity signifies a certain bond to an object, place, or region. Thus development processes, in addition to other changes in the landscape, can have an impact on the bond to, and identification with, a region and its landscape (Meier, Bucher, and Hagenbuch 2010). In this respect, the sociological realm called "landscape" plays an important role in the psychology of the residents of a specific region, i.e. how landscape is perceived and what is valued in a landscape. The "landscape" sociological realm means that landscape is constructed in the minds of the people of an area and relates to society, community, and individual (Kühne 2006). The close relation between identity and landscape is conveyed in the terms "sense of place" and "regional belonging" (Soini, Vaarala, and Pouta 2011). They represent the link between space and identity-producing elements. Furthermore, landscape aesthetics, i.e. the aesthetic quality of a region, is of significance to regional belonging (Nohl 2011).

The Fischland-Darß-Zingst region, located on Germany's Baltic Coast, is particularly beautiful. It is characterized by agriculture and tourism as the predominant land uses. These land uses have altered the landscape over the centuries, including more recently, alternative energy production, which is becoming prevalent in the area. A large part of the Zingst Peninsula, which is part of the Fischland-Darß-Zingst region, is designated as a national park, which necessarily has a strong influence on the development of the natural landscape. Changes in the regional landscape are perceptible relating to the natural environment, socio-cultural elements, village structure, and the relationships among the local people. In this context, the aim of the present report is to characterize influences (if existent) of land uses and changes of landscape on the sense of regional belonging of the population of the Fischland-Darß-Zingst region. The main research question is thus: Do prevalent land uses and landscape changes that are occurring or have occurred in the region influence the local population's sense of regional belonging? And if so, how?

Secondary research questions are

1. How can region be defined for the purposes of this case study?
2. Which aspects of the landscape are perceived by the resident population, and how are they valued?
3. Which land uses are predominant in the region?
4. Which changes have occurred in the regional landscape?

This research is embedded in the research project COMTESS (Sustainable coastal land management: Trade-offs in ecosystem services), which investigates land-use options in the face of global change and their socio-environmental consequences from various perspectives. In an interdisciplinary research project, the challenge is to present and communicate disciplinary research results in an interdisciplinary mode. The social sciences in particular have the task of introducing the local people's voice and their points of view so that they can be taken into account in natural-science research.

Therefore, in this report we seek to present the specific perspective of the local population in terms of their relation to the environment/landscape. Based on qualitative data from semi-structured interviews and group discussions, and following a Grounded Theory approach (Corbin and Strauss 2008), aspects of regional belonging in the Fischland-Darß-Zingst region are highlighted. In order to do this, the report is structured into a section on the conceptual framework of the research followed by a description of the methods applied. Subsequently, results of the analysis are presented with reference to secondary research questions. The report continues with a discussion of attributes of regional belonging. This is followed by a discussion of the influences of land use and landscape change on regional belonging. The report concludes with remarks and recommendations.

2 CONCEPTUAL FRAMEWORK

First, we present the theoretical frame of the report. This includes the subjects of landscape, identity, *Heimat*, and regional belonging, which are the basis for the data that was collected and analyzed.

2.1 Landscape

2.1.1 Background

Historically, a sociological definition of "landscape" signified a relatively large settlement area and included the effective social norms that were accepted by the local population. Later, the term developed to a politically-legally defined space. Today, the understanding is closely related to aesthetic and emotional feelings (Kühne 2011). A landscape that is emotionally experienced has a functional and an aesthetic dimension (Lothian 1999). Three aspects of the aesthetic construction of landscape are nature, high diversity, and arrangement. Today, inquiries are made as to how both landscape and space are experienced, how social life is organized within these spaces, and how landscape develops (Kühne 2006).

Landscape is neither identical with nature nor the natural environment; there is, however, a close relation between landscape and nature. Landscape is a term that describes coherence between humans and the environment and that is formed by nature and labor. In a landscape, the relation between nature and culture is perceptible (Kühne 2006; Lothian 1999). Political visions and societal expectations of nature are demonstrated in a landscape network. Pfund (2010) defines landscape as a geographical construct holding biophysical features next to cultural and institutional attributes (Pfund 2010:118). Hence, it has a physical-spatial dimension alongside a sociological realm.

A sociological concept of landscape must consider the reciprocal relations between physical space on the one hand and society, community, and individual on the other (Kühne 2006). Therefore, it is proposed to differentiate the term landscape into, firstly, landscape as a natural or culturally formed physical space and secondly, landscape as culturally conceived imagination (Meier, Bucher, and Hagenbuch 2010; Nogué and Vicente 2004). Natural design factors of natural landscapes are, e.g., water supply, climate, flora and fauna. Cultural landscapes are formed by human beings through, e.g., settlement and the use of fertilizers. An imagined landscape corresponds to an ideal and is a subjective perception of landscape that is articulated in terms of aesthetic, ethical and emotional relations. This is often conveyed in pictures (Meier, Bucher, and Hagenbuch 2010). In other words, an

objectivist and subjectivist perspective of the landscape can be differentiated (Lothian 1999).

2.1.2 Dimensions of landscape experience

Landscape consciousness, or the way landscape is experienced, is described in terms of material, aesthetic, economic, and cultural aspects of landscape, which are generally present in an actor's mindset. Landscape consciousness has three dimensions: (1) it has a cognitive dimension (the knowledge about landscape), (2) it has a sensual, aesthetic dimension (the perception and aesthetic valuation of landscape), and (3) it has an emotional dimension (the relation to space or spatial identity) (Meier, Bucher, and Hagenbuch 2010; Kühne 2006). Landscape consciousness represents a relation between an individual person and the surrounding space. This space is the object of communication, identification, and the development and representation of identity. Human beings and their current needs and memories are constantly space related. Because of this relation to space, landscape is a crucial element of identity (Lanninger and Langarová 2010).

There are different modes of landscape change. On the one hand, the physical landscape alters constantly due to natural processes such as erosion, floods, and settlement, while the mental map of that landscape stays the same. On the other hand, landscape can change mentally due to internal and social construction such as changing value systems, political arrangements, or new scientific insights, whereas the landscape physically remains the same. The perception and the social construction of landscape are some of the main interactions between society and space. Each society develops its own adequate structure of space (Kühne 2006).

2.1.3 Landscape perception

As Bell (1999:64) contends, "Perception is at the heart of the way we understand our environment … Aesthetics is basic to human nature". In general, perception is characterized by a number of factors, which are collected over the years. Human beings are in search of patterns and interrelations, in other words "readable and understandable spaces" (Lanninger and Langarová 2010). Although physical conditions might be the same, the background of people's experience differs for each individual. This has implications for the sensual impressions that people develop and which determine their individual assessment of the world. Meier et al. (2010) present results from an inquiry in the Swiss Alps that demonstrate the positive influence of landscape on people's well-being and feelings, which in turn characterize their perception. One way to explore landscape perceptions is by means of the sense-of-place concept referred to later on (Soini, Vaarala, and Pouta 2011). In people's imagination, landscape consists mainly of natural elements and elements of a traditional cultural landscape. Landscape values play an important role in the perception and emotional relation of the population and its living space (Meier, Bucher, and Hagenbuch 2010). Two questions are important when considering the perception of landscape: (1) Which objects are recognized by a person?, and (2) What value does the perceived object currently have? (Lanninger and Langarová 2010).

2.2 Identity

2.2.1 Characteristics of identity

As used in the current discussion, "identity" is not something we "have". It is something "impermanent", something that comes and goes, and something that can be gained and lost. The development of identity is based on orientation, recognition, and the sense of security in a familiar environment. A further important characteristic is the condition of being recognized and acknowledged (Lanninger and Langarová 2010). Identity is a type of self-assurance, which is not possible to achieve autonomously because it is a social process (Paasi 2003).

Ipsen (1994) differentiates analytically between an inner and an outer perspective. The outer perspective defines certain personal features, whereas the inner perspective relates to psychological handling of cognition and emotions. The perspectives are interrelated and their interaction produces and manifests identity. Because another person is needed to reflect on someone's inner perspective, to a certain degree the outer perspective is converted to the inner one. Both aspects thus exert an influence on the development of identity. This process is continual and means that identity in a person changes from time to time and from culture to culture (Ipsen 1994).

According to Meier et al. (2010), identity results from individual and social perception processes and experiences. Only things that are recognized can be adopted and at the same time these things that are recognized facilitate a process of identification. The development of identity comprises three elements: (1) consideration of the other person's perspective, (2) the transformation into one's own perspective, and (3) the conventionalization (generalization) of this perspective (Meier, Bucher, and Hagenbuch 2010). All this happens in people's minds and determines their activities and experiences (Nohl 2011). However, all identification processes involve establishing a distinction between "I/me-we/us" and "they/them" (Ipsen 1994).

2.2.2 Identity and space

Generally, identity results from the relation between human beings and their spatial and objective surroundings, which can lead to a sense of belonging and familiarity. Identity related to spatial factors captures the emotional-aesthetic relation of perceptions with the environment (Meier, Bucher, and Hagenbuch 2010). The relevance of space for the development of human beings' identity lies in the reciprocal interplay between humans and space and space and humans. Accepting or neglecting space results in a positive or negative spatial belonging. Social relations are the communicative basis of a relation to space, and this relation to space is the basis of identity development. It is possible to develop an identity, which is spatially defined, if the relation between space and people is established and fostered. In other words, because identity fosters identification with land and people and the belonging to that place, it contributes to the quality of life in a region (Nohl 2011). There is a functional relation between landscape and identity, which constitutes *Heimat* (Lanninger and Langarová 2010).

2.3 *Heimat*

Heimat is a German concept whose nearest translation in English is "homeland" or "homescape" (Ratter and Gee 2012). In German, *Heimat* has multiple facets: it signifies an area to which people have

a certain association such as home, place of birth, and the place where the family lives. Furthermore, it describes an emotional connection to an area and where a person's early socialization experiences occur. People almost always ascribe intuitive meanings to the term (Ratter and Gee 2012), and because of these sensitive, intuitive interpretations, we use the German term in the following.

Heimat first appeared in medieval times as an antonym to "outland", but the concept first achieved widespread popularity in the Romanticist period. *Heimat* was the response to the loss of familiar environment due to, e.g., revolution and securalization (Piechocki et al. 2001). Later, during the Nazi regime, the term was used synonymously with nation. In the context of "Blut und Boden" (Blood and Land) ideology, the term *Heimat* was reinterpreted in a racist sense (Blickle 2002), a misused interpretation from which it only slowly recovered. Today, there is a strong relation between *Heimat* and nature and culture. It addresses the conservation of traditional human-nature relations and is thus a cultural phenomenon (Nohl 2006). In earlier times the "law of *Heimat*" included a provision that said people are entitled to a *Heimat*. At the same time, there was also an exclusion principle, which meant that under certain circumstances, people could lose their right to a *Heimat*. Today, *Heimat* can be understood as inner attitude or expresses some sort of quality of life. The term exhibits a prospective horizon of a better world in daily life and concrete spaces. *Heimat* is not bound to a certain place anymore but rather to a group of people. It is a desired solidarity and the product of the feeling to be part of one's own small world. Empirical results presented by Nohl (2006) demonstrate that *Heimat* considers both close social contacts and clear social relations. At the same time, the author states that *Heimat* is visionary by claiming that it encompasses a feeling of freedom. Furthermore, *Heimat* as man-made environment concerns the immediate surroundings. It is not consumable but actively adoptable (Bausinger 1983). Feelings such as security and feeling of security are closely related to *Heimat*. People tend to identify the symbolic meaning of *Heimat* with objects.

Heimat is considered to be the contrary of both outland and globalization (Bausinger 1983; Kühne 2011). Kühne (2011) introduces seven dimensions of *Heimat*: (1) the social dimension – *Heimat* is a specific environment that is well-known to the individual, which accepts the individual, and in which he/she is accepted; (2) the dimension of well-being in which the individual has a feeling of well-being; (3) the dimension of time in the context of comparing the past with today; (4) the dimension of the place/landscape, i.e. the symbolic adoption of physical objectives as *Heimat*, being recognized as place where one feels secure; (5) the dimension of the spiritual *Heimat*, where *Heimat* is socially determined; (6) the dimension of contour and exclusion, which define *Heimat* by means of inclusion and exclusion; and (7) the dimension of reducing complexity of the world, a process of creating stereotypes of the sense of *Heimat* and the foreigner (Kühne 2011:293). Generally, *Heimat* signifies a broader meaning than regional identity, regional identification, and sense of place (Kühne 2008).

2.4 Regional belonging

As Soini et al. (2011) put it, there are "(a) group of concepts … that aim to describe the quality and strength of the embeddedness of people in a place" (Soini, Vaarala, and Pouta 2011:125). These include place identity (Krupat 1983; Dixon and Durrheim 2000; Sarbin 1983; Proshansky, Fabian, and Kaminoff 1983); place attachment (Brown and Raymond 2007; Knez 2005; Lai and Kreuter 2012; Raymond, Brown, and Robinson 2011; Walker and Ryan 2008); *Heimat* (Ratter and Gee 2012; Nohl 2006; Bausinger 1983; Obkircher 2010); regional identity or regional belonging (Paasi 2003; Ipsen 1994); and sense of place (Soini, Vaarala, and Pouta 2011; Rose 1995).

2.4.1 Sense of place

A sense of place is how human beings experience themselves in a particular place. Or in other words, "… (S)ense of place usually refers to the experience of a place, which is gained through the use of, attentiveness to and emotions towards the place" (Soini, Vaarala, and Pouta 2011:125). In this context, sense of place and regional belonging are applied synonymously. However, the concepts have various nuances that are important to consider. For example, spatial considerations are central to sense of place and *Heimat*, in contrast to regional belonging, which mainly refers to social relations. Sense of place can be a premise of regional belonging and *Heimat*, as the concepts have different dimensions of intensity. In the first state, sense of place signifies existing knowledge of regional particularities. In the second, regional belonging indicates a sense of place plus an emotional relation with that place. And in the third state, there is a will of affiliation with an active contribution to the region.

The term "sense of place" encompasses three dimensions that are relevant for its classification. (1) Cognitive dimension concerns the perception of the region, i.e. the perception of physical-spatial objects, the organization of space, e.g. associations and symbols that are used in the region. (2) Affective dimension represents the regional (emotional) relatedness and sense of *Heimat*, i.e. the presence of regional belonging, in particular the personal biography in relation to the region and other emotional relations to specific elements of the region. And (3) conative dimension signifies the regional orientation of action, i.e. the intensity of regional integration of the individual and his/her participation in parties and associations, etc. and his/her regional engagement through activities that are directed to support the region (Blotevogel, Heinritz, and Popp 1989; Stock 2011; Wagner 2013).

2.4.2 Region and space

The region is a space with borders that are definable according to different criteria, e.g. social, cultural, or environmental factors (Ipsen 1994). It is built of institutions, which offer people particular similarities such as names and symbols. These similarities produce a feeling of resemblance and togetherness. Furthermore, region can be defined as experienced space, signifying how people live, share, and communicate about regional factors such as contents of newspapers, etc. Thus, social elements characterize a region. Space, however, is a physical element, is naturally developed, and is also socially constructed. At the same time, it is recognizable as symbol, as a picture and as imagination. Zeitler (2001) speaks about "identity spaces" (Identitätsräume), which can be interpreted as spaces of flow. Spaces of flow are shaped by social, economic, and cultural flows and are flows themselves with changeable borders. These borders are difficult to localize and delimit, which may also spur conflicts between different groups of actors and disputes over borders and territories. There is a close relationship between the cultural signification of space and landscape (Ipsen 1994).

2.4.3 Regional belonging

According to Ipsen (1994), space can foster identity because it corresponds to an image that is valued (Ipsen 1994:238). A stable I-identity consists of balanced individual interests on the one hand and personal social demands on the other hand. It is prerequisite for the development of a regional we-sense. Only if I-identity is prevalent can the identification with a region and the sensing of its natural and cultural particularities be developed (Nohl 2011).

In this context Paasi (2003) states that "regional identity, when understood as identification, often implies the assumption of homology between a portion of space, a group of people, and a 'culture' to form a homogenous community covering a particular bounded territory." (Paasi 2003:480) Homology can be interpreted as commonality between the respective entities. In this context, regional belonging provides an answer to the question "where do I belong?" In other words, regional belonging is the correspondence between region and people and consequently their sense of belonging to that region. Regional belonging is one among many forms of identities of a person. Further, identity categories are national identity (Nogué and Vicente 2004), cultural identity (Novakova and Foltinova 2014), place identity in relation to ethnicity (Panelli et al. 2008), group identity (Grant and Hogg 2012), etc. A person tends to hold multiple identities of which regional belonging is particularly space related. Regional belonging is threatened by the absence of the value of natural beauty, whereas a positive valuation of nature fosters regional belonging. Also, cultural elements that are distinct and typical for a region and that hold identity-producing value strengthen the sense of regional belonging. As Cheng and Kuo (2015) highlight, place bonding, being a prerequisite of regional belonging, is a positive emotion that a person associates with a place. In sum, regional belonging is not a static condition but rather a steady process in which the sense of belonging varies in its intensity (Nohl 2011).

Generally, with respect to regional belonging, various aspects are discussed in the literature, for example, place identity, place attachment, and sense of place. And results indicate that spending a longer time in a place increases the degree of attachment or belonging to that place (Gustafson 2009). Hay (1998) confirms this relationship: "If a person resides in a place for many years, particularly if that person is raised there, then he or she often develops a sense of place, feeling at home and secure there, with feelings of belonging for the place being one anchor for his or her identity." (Hay 1998:6) Here the relation between regional belonging and identity becomes clear, which is related to positive feelings about home.

One basis for regional identities is that they exist as forms of social and cultural practice, discourse, and action. Cultural, ethnic, and social commonalities are relevant aspects in this respect. The construction of community is crucial to the construction of regional belonging, i.e. cooperation is necessary for the development and strengthening of regional belonging. Regional belonging is the relation to the close and known as reaction to globalization processes (Kühne 2006). Moreover, regional belonging results from its reverse trend, the development of national and international spaces and corresponding modernization processes (Ipsen 1994). Due to these developments, people tend back to and romanticize local feelings of security and senses of belonging. Consequently, according to Kühne (2008) the needs for *Heimat*, sense of place, space relatedness, and local and regional identity need to be contemplated together with globalization (Kühne 2008:321). The process of globalization bears a tendency toward re-embedding of a person, which means re-creating a bond to concrete places and physical landscapes (Kühne 2008) next to cultural elements such as values, religion, language, and customs, etc.

As regional belonging is closely related to emotions, and landscape is one of the core areas of regional belonging (Ipsen 1994), there is a close relation between regional belonging and landscape aesthetics. In other words, the aesthetic quality of a landscape is one crucial element of regional belonging and, in turn, to the development process of a region as a cultural spatial entity. Oftentimes, regional belonging is considered as a condition for regional economic development. Ipsen (1994), however, argues for the opposite view: regional development characterizes regional belonging. Therefore, it is

crucial that development programs consider the inhabitants' attitudes towards their region as well as their emotional bond. As Kühne (2008) states, regional belonging is associated with personal engagement. The person who identifies with a certain space will probably engage therein rather than a person who does not identify with that space (Kühne 2008:320).

3 METHODS

3.1 Case study region

The case-study region encompasses the Fischland-Darß-Zingst Peninsula, which is located in the Baltic Sea between Rostock and Stralsund (northern Germany). The Darß-Zingst Peninsula is a barrier island and lagoon system composed of unconsolidated Quaternary sediments still connected to the inland coast through the thin Fischland coastal cordon (STAUN 2009). The Peninsula is a highly dynamic environment. This is especially the case in the Prerow dune systems to the northwest and the wind and mudflats to the northeast, both designated core zones of the Vorpommersche Boddenlandschaft National Park, where natural coastal processes are left unhindered. Elsewhere, current coastal protection prevents the erosion of sandy beaches on the open coast to the north, where most settlements are located and tourism infrastructure and activities are concentrated.

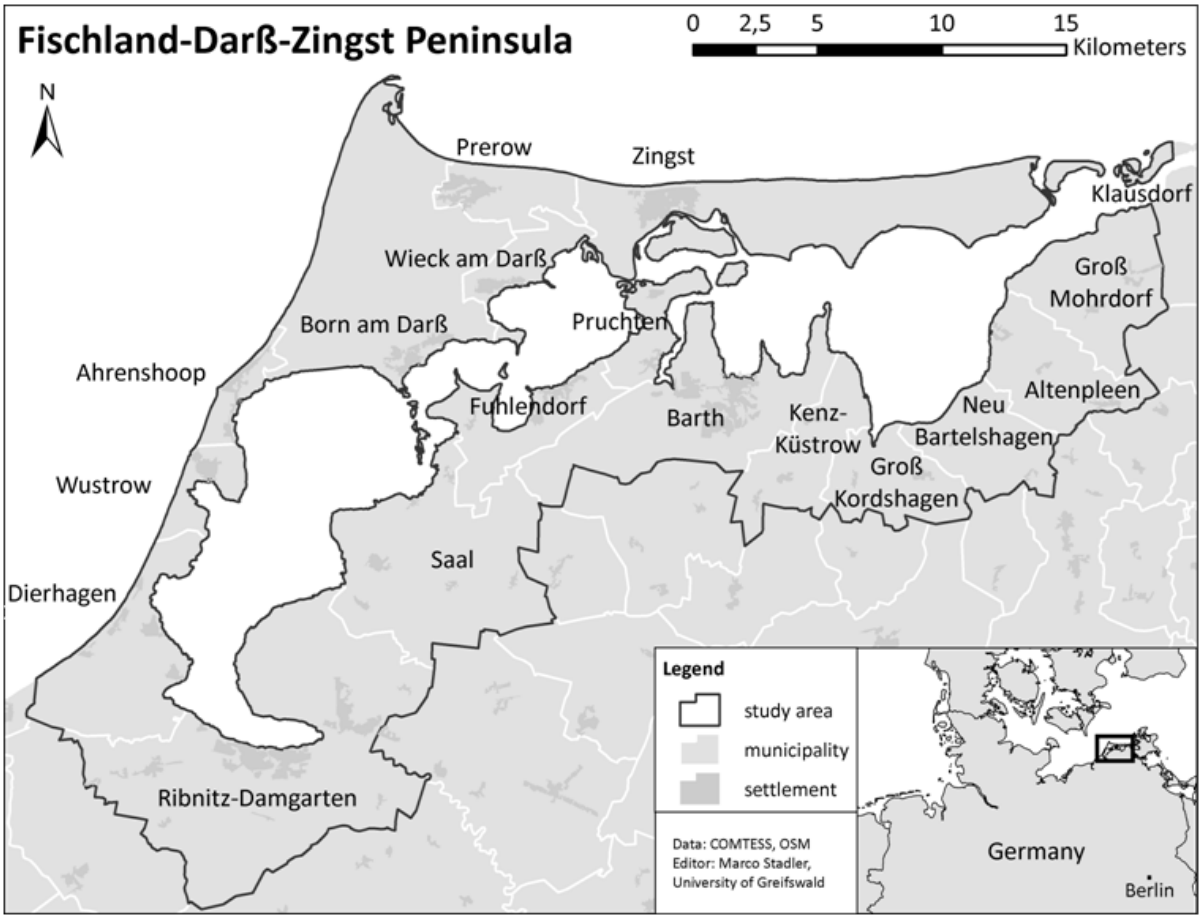

Figure 1: Map of the Fischland-Darß-Zingst region

At present, only a narrow in- and outlet located to the northeast of the Peninsula connects the Baltic Sea with the bodden to the south, although there are active debates on the desirability and feasibility of a trench linking the open Baltic coast and the inland bodden on the Otszingst Peninsula[2].

Besides the Peninsula, the site covers communities on the mainland called Ribnitz-Damgarten in the west and Klausdorf in the east, both located on the bodden (see Figure 1). The region is sparsely populated. More than a half of the total population (40,000) resides in the towns Ribnitz-Damgarten (15,893 inhabitants) and Barth (8,706 inhabitants) near the bay coastline and in the village of Zingst (3,129 inhabitants) on the Baltic Coast (Statistisches Landesamt Mecklenburg-Vorpommern 2012). The Fischland-Darß-Zingst Peninsula and its hinterland are covered by meadows and the Darß and Oster by forest, with reedbeds abounding on the bodden coastline. Agricultural activities primarily encompass extensive pasturing, with intensive arable cultivation being restricted to the southeastern area around Neu Barthelshagen. Agricultural polders characterize the inland coastal of the bodden (i.e. the southern part of the Darß-Zingst Peninsula and the mainland bodden coast), where significant extents of land lie at or near mean sea level. Here, low dikes and intricate drainage systems protect current agricultural land use from coastal surges and inland flooding.

The region is, moreover, important for bird conservation since it is a resting ground for migrating birds, in particular the crane (grus grus). Furthermore, parts of the study site have been designated as national park, which restricts forest and touristic uses of the area. There are, however, pronounced touristic activities, especially on the sandy beaches on the Baltic Coast side of the Peninsula, which constitute the region's main income source. Overall, in 2012, about 440,000 tourists visited the region, which represents 2.2 million guest-nights (Statistisches Bundesamt 2012).

3.2 Methodology used

In the COMTESS project, a participatory approach based on empirical social science research methods made it possible to collect invaluable information on stakeholders' perceptions and preferences regarding landscape and land use and their possible influence on regional belonging. To guarantee involvement of a wide spectrum of relevant actors throughout the project, immediately after the project's launch, COMTESS performed an initial stakeholder analysis, which is complemented in an iterative process throughout the project. The purpose of the stakeholder analysis in COMTESS is to identify who the relevant actors in the study region are; their needs, interests, and positions regarding land-use strategies; and parties who form alliances or are engaged in latent or overt conflicts. This provides a solid base to select and approach particular (groups of) stakeholders to invite them to collaborate in the projects, so as to cover a broad range of perspectives and opinions. We principally considered experts in governmental agencies and public corporations engaged in coastal engineering, landscape planning, agricultural consulting, and nature conservation, but also sectoral representatives, key land-use players, and representatives of the local population. Figure 2 illustrates the iterative and complementary approaches used to develop a stakeholder basis and to engage them in successive activities, as well as the diverse roles stakeholders had in the research.

[2] See, for example http://www.bdzj.de/chronik-alte-straminke/nach-1990/die-geschichte-geht-weiter/ - accessed 30 January 2015.

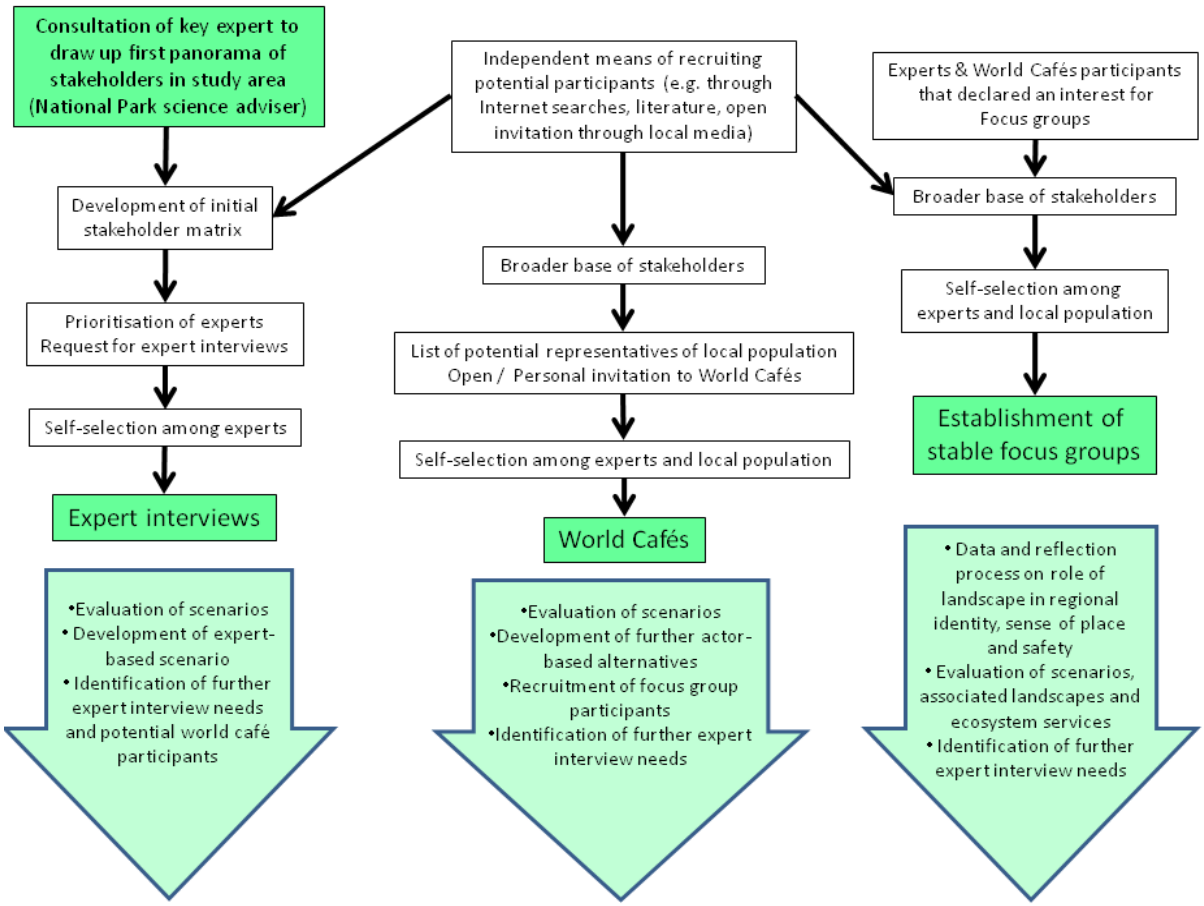

Figure 2: Iterative and complementary approaches used to involve stakeholders

Based on the strategy illustrated above, we secured the participation of a solid network of interested parties who agreed to provide us with interviews (21 interviews with 37 experts), attended one or more meetings (81), or pledged to engage in regular small-group interactions (52). Despite this relatively large number of people for this type of investigation, it is necessary to consider possible bias in stakeholder selection, as well as their actual involvement and contribution in the discursive process. Bias in the selection process was largely avoided by using independent and triangulated methods to identify stakeholders. We drew a comprehensive and systematic list of all potentially interested parties, for which we obtained direct contacts through our initial key expert, the scientific advisor of the Vorpommersche Boddenlandschaft National Park. This list was complemented by exhaustive internet and media searches and recommendations through our interviewed experts. For the world cafés, we drew lists of local civil associations that might have expertise and interest in local land-use issues and invited over 150 potentially interested parties. Moreover, to give lay members of the general public the possibility to participate, we published short articles in the local media with open invitations to attend our meetings. Nevertheless, participation bias is much more complex to avoid, as invited parties or readers of local media decide for themselves whether participation is relevant and worthy of their effort.

In this report, we present data collected first during the aforementioned world café (Brown and Isaacs 2007). This world café served as an introductory event for workshop participants, who discussed different land-use scenarios presented by the research team. Four scenarios were presented with different land-use options and a prospective rise in sea level (see de la Vega-Leinert et al., in the

present issue for a presentation and evaluation of the COMTESS Baltic Sea land-use scenarios).

Additionally, focus group interviews were conducted and records were analyzed (Barbour and Kitzinger 1999; Krueger 1994). Three issues were covered in the focus groups: first, discussing the sense of security (with two groups); second, evaluating landscape images (with four groups); and, third, discussing regional belonging (with four groups). The number of participants varied from two to six people per group, all living in the region; some were originally from the region while others had settled there at some point.

The final group of collected data comprises 28 semi-structured interviews (Denzin and Lincoln 1994) dealing with a landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region. These interviews last between 20 and 85 minutes and were collected at the interviewees' home at six different sites within the research area (see Table 1). All data was collected in 2012 and 2013. The data was processed by transcription of all recorded input, i.e. interviews, group discussions, and the world cafés. This is a necessary step for the further qualitative analysis process with the software ATLAS.ti.

In the analysis process, categories are developed from contents of the text according to a Grounded Theory approach (Strauss and Juliet 1997). The following procedure was followed:

1. Reading the transcribed data, in particular the transcripts of the world cafés. Based on this reading, categories were developed that are prevalent in the data (approx. a number of 21 codes), hence an open coding procedure was applied (Corbin and Strauss 2008).
2. Coding the data with the code list at hand.
3. After having coded twelve interview documents (world cafés and focus group interviews), the third step is to examine codes that are assigned more than a hundred times, also called a selective coding procedure (Strauss and Corbin 1990). New categories are developed and included into the code list.
4. The fourth step is to continue the coding process of the remaining focus-group interviews with the issue of regional belonging and semi-structured interviews with the adapted code list.

A tangible output of the data analysis process was the final code list, which includes 33 codes. These codes represent categories that are relevant for the structuring of the analyzed texts (Flick 2007a). The main categories are land use, landscape, perception of the landscape, changes, nature protection, flood protection, cultural and natural landscape, typical regional landscape elements, belonging to the landscape/region, landscape aesthetics, and population. These codes are defined according to the analyzed data.

The following quality criteria apply to the research process (Flick 2007b):

(1) Altogether, the transcripts of the discussion and interviews were compiled in a total of 44 primary documents (records) and considered in the detailed content-analysis process (see Table 1).

Table 1: List of data records analyzed

Primary document category (number of records)	**Place, where data was collected**	**Issue(s) dealt with**
World café (7)		Land-use scenarios
Group discussion (2)		Sense of security
Group discussion (4)		Regional identity
Focus group (3)		Landscape images
Semi-structured interview (5)	Ahrenshoop	landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region
Semi-structured interview (5)	Barth	landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region
Semi-structured interview (3)	Neu-Bartelshagen	landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region
Semi-structured interview (5)	Prerow	landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region
Semi-structured interview (5)	Ribnitz-Damgarten	landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region
Semi-structured interview (5)	Zingst	landscape definition, landscape perception, regional belonging, sense of security, and typical landscape elements in the region

(2) A variety of people/actors were interviewed, including mayors, representatives from governmental agencies, and members of the local population from various villages in the study region. Through analyzing and relating different opinions of a certain topic, an inter-subjective perspective was developed.

(3) Different data collection methods were applied: a. focus-group interviews (scenario discussion with images, discussion of landscape images); b. group discussions on a specific topic (sense of security and regional belonging); and c. semi-structured interviews.

(4) Data was collected in the study region through personal meetings and face-to-face interviews.

(5) Data collection was conducted by several researcher from various disciplines (geography, economics), who are experts in that field.

(6) Selection of interview partners was accomplished through the snowball-principle, i.e.

recommendation of an interview partner.

(7) Most interviewees grew up in the region, while a small portion has lived in the area for at least ten years. All have profound knowledge about the region.

4 RESULTS

4.1 The Fischland-Darß-Zingst region

In order to circumscribe the investigated region, we present typical elements that characterize it. This chapter is divided into the following three sections: typical physical elements of the region, typical socio-cultural elements of the region, and the prevalent physical element: water. The last-mentioned is particularly highlighted because it is an element of crucial importance to the local population.

4.1.1 Typical physical elements of the region

The Fischland-Darß-Zingst region encompasses both traditional cultural and natural landscapes. In the interviews, people spoke about typical physical and socio-cultural elements that characterize the area. The bodden salt grasslands, marshes, beaches, the sea and dunes, a particular climate, as well as typical plants and animals were mentioned as typical physical landscape elements (for a comprehensive list see Table 2).

Table 2: Typical physical elements mentioned by interviewees

Landscape	*Landscape elements*: The bodden, the sea, beach, dunes, sea gate, reefs, salt grassland, outwash plain, marsh, reed zone, meadows and pastures, pine forest, different kinds of forests, a number of rivers, kettle basin
	Countryside impressions: High sky, big fields, cliff line, flat coast, areas under sea level, end moraine
	Proper nouns (mostly in German): Barther Bodden, Darßwald, Sundischer Berg, Karniner Wald, Prohner Bach, Teerbrenner See, Prerowstrom, Glöwitzer Berg, Oie, Sundische Wiese, Püdnitz Peninsula, high dune of Prerow
Climate	Northeast wind, rain, cyclone, storm flood, high groundwater level, floods on the meadows, changing water levels
Plants	Dry grassland, sphagnum, salt marsh peat, reed, specific endemic trees, species-rich vegetation, old oak tree, chestnut trees, elder, pastoral trees

Animals	House martin, bird of prey, sheep, cows on the salt meadow, wild pig, wolf, crayfish, mussels, cranes, geese, water buffalo, foxes, ground-breeding birds, shorebirds, storks, lesser spotted eagle, bittern, cormorant

Countryside impressions (see Table 2) were mentioned when people were asked for typical landscapes in the region. The proper nouns (see Table 2) indicate a close relation to the region, providing particular elements of recognition. They signify a sort of symbol that is related to the typical landscape found in the region. Climate, and especially floods, can threaten the population and their homes. People spoke about a number of circumstances where floods caused problems, such as flooded houses and flooded meadows on which cattle were found.

4.1.2 Typical socio-cultural elements of the region

Mentions of socio-cultural elements can be grouped into typical regional buildings, infrastructure, flood-protection elements, agriculture and energy generation, historical buildings, and leisure and tourism. Per definition, socio-cultural elements are elements that are built or influenced by human beings and that characterize the existing landscape. Since the region is characterized by tourism, the infrastructure is well developed, with many hiking trails, natural trails, and bicycle lanes. Furthermore, streets are bordered by alleys, and some streets in villages still have cobbled pavements from earlier times. Near the sea and the bodden, there are harbors and log-paved paths. Typical buildings are houses with thatched roofs, silos, farm houses, water towers, light houses, and mills as gears for pumping stations. Traditional historical buildings are old churches/brick-constructed churches, monasteries, manor, and hill forts. Further tourist attractions are bird-watching sites and information booths, e.g. from the National Park. Next to tourism, another source of income is agriculture, and therefore characteristic socio-cultural elements in the area include big fields of monoculture where corn and canola are mainly cultivated. Pine monocultures, salt meadows as pastures for cows, and managed grassland with orchards are also characteristic for the region. With respect to energy generation, the landscape (primarily on the mainland) is marked by wind engines, solar collectors, and biogas plants. The last-mentioned is, among other things, associated with large-scale cultivation in monoculture. Since much agricultural land lies at or near mean sea level, and the coastal plain contains a number of rivers and borders the sea, floods, whether due to coastal surges or extreme precipitation events, are predominant in the region. Therefore, a considerable number of socio-cultural elements mentioned by interviewees relate to flood control. Dikes shape the landscape and protect both settlements and, to a lesser degree, agricultural land. In addition to dikes, there are drainage channels, pumping stations, dunes (as natural protection), flood-control walls, flood barriers, and houses built on stakes.

4.1.3 Prevalent landscape element: water

Water has both a positive and a negative meaning for people. On the one hand, people strongly identify with water, e.g. the sea and the bodden, since this is part of their life. On the other hand, water represents a threat to the population because of floods and storm surges that frequently occur in the region. This may cause flooding of properties, especially those buildings that are built near the

bodden or reed areas and in villages, where most surfaces are sealed. Despite the fact that dikes reduce the impact of coastal storm floods, they do not prevent inland floods caused by extreme precipitation events. Thus ditches and pumping stations are common in the region and help to prevent harmful effects of inland floods. The current drainage system is under debate, especially in view of the recent frequent recurrence of extreme precipitation events in spring and summer, which overwhelmed its capacity for long stretches of time in places. Added to this is the broader context of coastal-protection policy and management in the State of Mecklenburg-Vorpommern, which clearly prioritizes settled areas over agricultural polders, the protection of which has been transferred to local authorities, land users, and drainage (Ministerium für Lanwirtschaft 2009). The existing coastal management administrations encourage the abandonment of marginal summer dikes to enable conservation and habitat re-naturation programs (see de la Vega-Leinert et al., this issue). What is called the "managed realignment strategy" is being discussed for a number of potential areas in the Fischland-Darß-Zingst region, though it is highly controversial. People who are in support of this approach consider that space is needed to allow the restoration of natural processes, as well as to provide buffer areas for flood water to distribute and thus mitigate impacts elsewhere. In contrast, people who are against this strategy criticize the loss of valuable agricultural land to floods. Furthermore, they argue that re-naturation programs encourage the development of marsh and reed areas, which are considered less aesthetic than meadows and pastures.

4.2 Landscape perception and valuation

In this chapter we seek to elucidate what people perceive in the landscape. This is a particularly interesting topic for the later definition of regional belonging. The chapter is divided into perceptions of landscape types, natural elements, human-made landscape elements, and finally climate. Of major importance in this chapter is the evaluation of the issues by the people: Do they accept and appreciate these issues or reject them? We substantiate these statements with citations of interviewed people.

4.2.1 Perceptions of landscape types

A landscape type is a perceived part of the landscape. It is recognizable from the interviews that there are two primary categories of landscape type, the sea and the bodden. Both are very positively assessed by the interviewees and are characteristic of the area. "…and then the wide sea… That is all open. When you are standing on the cliffs, you can see the entire coast and the bodden. There is no end; you see only land and water," (9:18)[3] states an interviewee. In particular, according to the interviewees, the closeness between bodden and sea is remarkable in the region. Furthermore, the mixture of forest, water and beaches was emphasized a number of times. The answers demonstrate that perceptions of landscape types are intricately related to nature and natural areas and their diversity, with only three mentions of types that are created by humans: big gardens, big fields: and cultivated land. Further elements associated with these three main landscape types are detailed in Table 3.

[3] Quotes can be retrieved from the hermeneutic unit (ATLAS.ti) by numbers as indicated in brackets. The first number is the document number and the second represents the number of the quotation. [The quotation or the paragraph of the quotation can be found in the hermeneutic unit called "regional belonging_masterHU".]

Table 3: Perceived landscape types

The sea	Cliff line, typical coastal lowland, wide open space, the open sea, beach, dunes, dune forest and other mixed forests, jungle
The bodden	meadows behind the bay, reed landscape, meadows and pastures, wetlands, salt grassland
Other landscape type	heathlands, big fields, cultivated land, big gardens, small lakes, hilly landscape

4.2.2 Perceptions of natural elements in the landscape

The flora perceived included reeds, wind-bent trees, alders, holly, yew, cedar, pine, ash and oak trees, sunflowers, corn and poppy flowers. Among the fauna were swans, geese, cranes, seagulls, deer, wild pigs, peewit, grey heron, osprey, badger, crossed viper, sea raven, fox, marten, lurch, and rabbits. Almost all natural elements were assessed positively by the interviewees except for reeds and the wild pigs. Reedbeds, if growing in moderation, are valued as beautiful scenery; nevertheless if they are left to expand due to, e.g., mowing prohibitions issued by the National Park, then people emphasize their disadvantages. Indeed, they hinder the view to the bay, reduce biodiversity, and increase abundance of wild pigs. As an interviewee states, "in terms of diversity and aesthetics, the wild pig is part of the region, but at the moment to me the wild pig is a pest." (41:25)

4.2.3 Perceptions of human made landscape elements

The National Park is mainly positively perceived by the interviewees and is considered a valuable element of the region. "If I don't preserve it, then there won't be anything left," (21:27) says an interviewee. The national park is a necessary institution "simply because the flood of new big buildings cannot be dispersed and secondly, the character of the Peninsula is sustained; otherwise the Peninsula changes completely." (34:74) Particularly, with regard to the region's main income source, tourism, the National Park is of significance. As an interviewee states, "I think it is perceptible that our National Park is our capital; it is the reason why the people come here." (23:46) However, there are also opposing voices indicating that "in my opinion the National Park is a little grabby; everywhere there are a few square meters (of space), the park erects a sign indicating this belongs to the National Park." (22:20) Overall, though, quite good collaboration is noted between National Park and communities.

Traditional buildings including farm houses, fishermens' home, and captain's houses are very positively perceived and appreciated. As one interviewee puts it, "Born is a very beautiful village. There are beautiful old houses, which have been modernized. They have these very nice front doors, …" (33:25) and another comments, "The houses are harmonious. They are well balanced in their proportions. The slope of the roof, the windows, everything fits together" (35:31). Especially the traditional reed-covered roofs are highlighted and often romanticized, "... the beautiful, low-built houses and their roofs covered with reed, with their beautiful farm gardens and nice lattice windows." (11:45) Although reed-covered roofs are very expensive nowadays, owners still often choose to thatch

their houses. Horse stables, farms, and silos are also admired if they are preserved in a traditional manner. This is considered an identity-producing element and is furthermore deemed important for tourist attractiveness.

Alleys and fruit trees are part of the region and regarded as traditional element. Characteristic for the region are "alleys, the open spaces, the wide, big fields and the water with the dikes…" (19:14) says an interviewee, while also mentioning the harbors, piers and the "lighthouse Darßer Ort". One interviewee stated that the harbor has become the cultural center of his village (Neubartelshagen). People who sail admire the small regional harbor, where they can anchor and visit. Often mentioned by the interviewees is an emergency harbor in the core zone of the National Park, and they believe access to it should be guaranteed. Dikes, pumping station, and ditches are parts of the region and widely accepted as landscape elements. They represent the necessary flood control and are elements of coast protection, as the following statement points out: "The dike is part of (the landscape). If you go to the water, first, you find the dike, then the reedbeds, and finally the water." (19:30)

Interviewees, moreover, mention drainage, which is evidence of earlier interventions in the environment. Current interventions are wind turbines (including off-shore wind parks) and solar collectors. Opinions about these elements diverge; in many cases they are accepted as a necessary source of alternative energy (generation), but they are aesthetically contested. Monocultures such as canola and corn are typical for the region, especially in the south of the bodden. These fields are vast and not aesthetically appreciated. As an interviewee states, "I don't like canola fields if all space is covered with them." (18:29) However, in an aesthetic sense, canola is often positively perceived. "In spring we like the blooming canola fields", is a very common statement, whereas monocultures as such are mainly negatively perceived, since "the cultural landscape has become so poor in species diversity." (35:24) Some interviewees nevertheless rather see monoculture with indifference. Biogas plants are also perceived as landscape elements. They are, however, disapproved by the majority. Another evidence of earlier times is concrete slab streets in cultivation areas, which were typical in the former "East Germany[4]". In many cases, these streets have been replaced by improved road infrastructure, including cycle paths. The new infrastructure is very much appreciated, especially the cycle paths for tourism. The construction of big, new houses by investors is contested aesthetically. According to interviewees, the area seems to be covered by buildings which reduce the typical character of the region. Since the region is famous for its natural beauty and quiet, interviewees raise concern over the construction of big, new houses that might repel tourists.

4.2.4 Perceptions of climate

Most interviewees believe that the climate has become harsher in recent years. There were always storm floods in the region, but storms get stronger and appear more frequently as two interviewees recognize: "The storm surges appear everywhere in this region lately." (32:58) and "We also noticed that there have been a lot of storms in the last few years." (10:10) Weather extremes are observed, such as floods: "There are always these extreme phases. Two years ago there was water everywhere." (7:62) says an interviewee representing the views of several others. These floods appear if certain conditions are prevalent. An interviewee puts it as follows: "There must be a lot of rain from up there so that the

[4] In this report, the terms East German and East Germany have been used to refer to - depending on the context - the government, territory, or population of the former German Democratic Republic.

soil gets saturated. In 2011 it went on for weeks, and then there must be wind from the northeast that pushes the water into the bodden so that (the water level) rises about 80 centimeters to one meter" (34:58). Thus for a number of interviewees, floods are very much related to specific wind directions.

4.3 Predominant land uses in the Fischland-Darß-Zingst region

Agriculture and tourism are dominant land-use types in the region. Furthermore, the built environment (settlements and construction, new-built infrastructure) and elements associated with the production of renewable energy (wind turbines and solar collectors) are prevalent.

4.3.1 Land use: agriculture

Agriculture is a current form of land use in the region. It is highly concentrated and mechanized, so that it does not need much labor. One interviewee describes the predominance of agriculture in the region saying, "Farmers own most parts of the land indeed but are the absolute minority" (17:17). In earlier times, more people were employed in this sector. Moreover, where soil conditions will allow, there is a strong tendency towards monocultures (e.g. canola, wheat, and, more recently, corn). The intensification of agriculture in the region is tightly related on the one side to the agricultural policy under the former East German regime, and on the other, since the fall of the Berlin Wall, to the incorporation of the region with the European Union and the various EU subsidy programs. In recent years, the latter have increasingly focused on the cultivation of crops towards the production of renewable energy. Interviewees notice that the landscape is formed by cultivation areas, which are mainly vast in their appearance. The utilization of fertilizers is common in the region. An interviewee says, "(Farmers) cultivate in that way; they cultivate the things that produce the highest yield, which often tends to result in monocultures and the use of fertilizers." (17:48) Grazing was more pronounced in earlier years, which had an influence on the vegetation structure with meadows and pastures that are characteristic of the region. An interviewee says, "… salt grassland only remains in existence if grazed; otherwise reed grows." (50:29) Today, areas that are not grazed anymore develop to reed areas, which has become the dominant natural vegetation cover in the bodden area.

While in earlier times beets and rye were cultivated for cattle, next to cereals and potatoes, today the cultivation of canola and corn is predominant. These crops are neither used as food or fodder but for alternative energy production. The trend is that "(a)reas that are still used for food production change over to an energy-political economy. (Producing food) is not considered (the normal goal of agriculture) anymore." (13:23) Most interviewees do not support these cultivation goals and methods from a moral standpoint since food for the population needs to be imported instead of being produced regionally. The same applies for the recent increase in purchases of animal feed, which is becoming a common practice of farmers, who cultivate corn for energy generation and receive EU subsidies to buy the fodder or animal feed.

Interviewees also recognize that in the past crops were more diverse, while agricultural intensification has impoverished the cultural landscape. However, "agriculture is part of the region" (38:80) because "people live in this coastal region, and they need their livelihoods, and agriculture is part of it" (44:19). In this context, people discuss whether existing dikes for meadows and cultivated areas (agricultural dikes) should persist or be reduced in number. The question is whether agriculture is economically efficient and remains necessary for the region. On the one hand, it is argued that it is an enormous

economic effort to have cereal and livestock farming in the region (46:1). On the other, it is claimed that grazing is required for the cultivation system (37:64), and the grazing of the salt grassland is particularly positively viewed. In addition, some people claim that cultivation is necessary to reduce dependence on imports (42:68). However, according to an interviewee, there are currently no regional sales of products and no regional products available (11:60). Since, nevertheless, the Darß region is also well known for its organic beef, the latter opinion may be more related to the issue of availability or prohibitive cost of regional products, rather than their actual absence. In any case, if agricultural dikes are reduced, farmers worry about their lands, which may be lost to floods.

4.3.2 Land use: tourism

According to many interviewees, tourism is the main income source in the region. "I would say that tourism is the most important economic factor (in the region), and this is due to the fact that the landscape is so beautiful." (16:1) Tourism is widely accepted by villagers because "… without tourism you cannot live here." (32:94) Furthermore, tourism has a long tradition says another interviewee: "To the villages, tourism is essential for survival. In the end almost everyone lives from tourism, and this has been the case since the nineteenth century." (21:42) Another says, "The tourist is part of it. Over centuries, I would say, we are characterized by tourism that is predominant here." (35:58)

Tourists are attracted by the natural landscape, the quietness, and the uniqueness of the area. In particular, tourist attractions are the beach, forest (the National Park), the combination of sea and bodden, and traditional buildings. "To many (tourists) the Baltic Sea is the point of attraction. The beach, the Baltic Sea and the sun attract most of them. …" (7:76) and the interviewee goes on, "many (tourists) seek the wide space. Not the narrow space that every front garden is under a roof, but that you can find orchards and meadows instead. They (the tourists) seek the natural and original state." (7:77) Tourism is concentrated in the summer months, with conditions similar to mass tourism. However, there are a number of tourists who seek quietness in autumn, for example as an interviewee mentions, "Guests who wish to find quietness and tranquility. (I speak about) tourists who walk in autumn at the beach for twenty minutes without seeing another person. ... Here you still find quietness if you look for it." (9:8) Generally, people interviewed perceive that many visitors have a long visiting tradition and return every year to the same place. Tourists like cycling and walking on the beach.

In some villages, the village demographic structure has changed since young people continue to leave the region, while (residential/pension) tourism continues to grow, and more and more tourist accommodation is built. "Now there is only tourism. There are almost no local people nowadays." (11:3) claims an interviewee. According to interviewed people, tourism also imposes pressures to the landscape due to the construction of new buildings and an overload of hotels and tourist apartments. In this respect, an interviewee expresses a certain apprehension about a possible development: "The number of visitors does not increase, while many apartments have been built each year, and the utilized capacity suffers. Not all apartments are used to full capacity. Consequently, landlords often do not earn enough money and thus fire employees." (23:24)

4.3.3 Land use: built environment

People are worried about the development of settlements in the region. In many cases they perceive

the house construction as oversized, as an interviewee states, "I am often worried about the new house construction projects and that some nice small buildings are pulled down. Two to three new holiday houses replace the old building. But three times bigger." (7:4) A number of interviewees explained that several houses are built on one plot. "Not one, but three buildings arise on the rest of the land and then each with five holiday residences. They are built so close together that people can barely park their cars." (20:41)

As villages expand and become touristic destinations, open land becomes built with public paths and meadows disappear (14:23). This has especially been the trend after the German reunification. (24:54) An interviewee says, "Even though I consider Zingst a wonderful village, (there is) in the meantime so much (more) concrete, from my perspective the kind of buildings they construct is not nice anymore." (28:6) In fact there are many new houses and most of them are vacant two-thirds of the year (7:17). They are second homes for people who only spend weekends or their holiday on the Peninsula. From experience "in particular when people build (houses), it is mainly people from Berlin or from Southern Germany who construct their holiday houses." (17:65) says an interviewee. Also, many new buildings are investment objects (21:59), which drive the land prices up excessively. People thus fear that villages will lose their identity and character if every corner is built up in this way (26:18). However, some interviewed people explained that in their village the traditional architectural style of the Darß region is maintained to the greatest possible extent (10:27; 36:30): i.e. low thatched houses, which fit well in the landscape.

A further problem associated with widespread construction is the loss of permeable surfaces to concrete: "You should not construct too many buildings and seal the area. This is another problem – that many houses are flooded because everything is sealed." (24:67) There have even been some cases of villages remaining flooded for weeks.

4.3.4 Land use: infrastructure

The regional infrastructure is well developed. "We were given streets that are paved, and we were given paved cycle and walking paths." (10:24) Residents appreciate the well-developed infrastructure, especially for bicycles: "With regard to bicycle lanes, they only developed after reunification, but this is really nice." (28:36) says an interviewee. Another one says, "You can reach everything by bicycle. You can cycle to Zingst or even Stralsund." (18:5)

4.3.5 Land use: alternative reed use, alternative energy production

Interviewed people appreciate the use of reed for construction material, insulation, and roofs (13:32). Reed forms part of regional identity since it has always been used as a construction material: "I like the houses that are finished with reed-covered roofs. Here at our place, they cut the reed in the meadows, and this belongs to the region." (28:31) says an interviewee. Till recent times, reed use had rapidly declined, but the possibility to diversify and intensify its use is reviving interest. Thus one of the alternative land uses considered in the COMTESS project, within a framework of managed realignment, is the targeted and expanded use of reed not only as a construction material but as a source of renewable energy in the form of biogas pellets. Though the production of reed-fuel pellets is concretely being developed (i.e. within the VIP Project), the production of biogas from reeds remains largely in the laboratory experimental phase. If renewable energy from reed is in its infancy and seems

farfetched for many participants, other forms have become a common sight in the region. In the south of the bodden in particular, there are huge fields of wind turbines and solar collectors, which thus constitute another land use in the region. Because of their appearance and noise, large wind parks are especially disliked by the people interviewed.

4.4 Occurring changes in the regional landscape

With regard to the topic of the report, it is essential to highlight the major changes that have occurred in the region. This chapter has been divided into changes in the landscape and land use, according to answers of interviewees.

4.4.1 Changes in the landscape

Interviewees perceive changes in the landscape. In their memories "…there was more wilderness. Now everything is straight." (7:70) "… The village Born was a big heathland, with dwarf pine trees and pine shrubs. Everything disappeared. It used to be a landscape for partridges or other animals, which cannot be found anymore." (7:67) Most changes occurred because of human interventions and are closely related to cultural-landscape management and the designation of the National Park. The latter set aside areas previously under intensive land use. For example, "The forest has changed. In earlier times there was forest management, nowadays there is the National Park." (22:17) says an interviewee. Furthermore, according to another interviewee, the landscape and vegetation composition changed: "All these trees didn't exist, and there were no reedbeds. These (areas) were pastures before." (9:26)

On the coast another change is perceptible: "Everybody knows that the cliffs are eroding, 'marching backwards' from the sea" (9:41). This changes the general appearance of the landscape considerably. An interviewee refers to a number of elements that changed in the natural landscape: "The beach has changed, dunes became broader, dikes are higher … and the forest has changed in parts as well" (34:16). It is interesting to note that dikes are mentions along with natural landscape elements. It can be postulated in keeping with the literature elsewhere (e.g. Tunstall and Penning-Rowsell 1998), that since structures such as dikes allows a closer and more direct access to nature, they do not seem to affect the perception of naturalness of the landscape.

Because the landscape changed, many fish stocks decreased or even disappeared, as an interviewee states: "Areas of shallow water served as spawning ground. Some fishes adore these flat, warm waters. But (the fish) disappeared" (7:54). Consequently, the fisheries, which were typical for the region and played an important role in former times, vanished as well (20:60).

The bodden has changed, too. People speak about an increased natural reed cover leading to a process of silt and mud accumulation. Perceptions about the water quality diverge. According to some interviewees, water quality has declined, whereas others say that the bodden is not so dirty anymore. Interviewed people also speak about an increase of small lakes in the fields. This is due to more rainfall, more water accumulating in the rivers, a higher groundwater level, and the absorption of water being prevented by the sealed ground. According to interviewees, the climate has changed, too: winters are milder and more humid, springs and summer drier. At the same time, there are more weather extremes, with increasing coastal surges, storms, and heavy rainfall.

Interviewees claim that the relationships between people have also changed over the years. In earlier

times, “People helped each other, but this was in the past. Today people only help in a small circle, in their own clique. In the past, the village was one family. People joined forces, helped each other and celebrated together.” (7:27) says an interviewee. He goes on, “The village is dying. The number of inhabitants is decreasing rapidly. You feel foreign here. In earlier times you could say hello to everyone. You knew everybody.” (7:80) Today many people move away because of work (29:10) leading either to villages becoming empty or being increasingly inhabited by older people or residential tourists, who rarely stay the whole year. Furthermore, a change of the general pace is perceptible. “In earlier times it was quieter, it was not as fast paced. … But it has become so fast, which is neither good for us nor for the village.” (11:35) Because of this fast pace, the character of the people has changed (24:28) “Everybody tries to get money, which is understandable. A return to more community (feeling) in Prerow cannot be anticipated.” (21:44) says another interviewed person.

4.4.2 Changes of land use

Agricultural systems, which were once more diverse (e.g. potatoes, beets, and different types of cereals), have become monocultures (especially rape seed and corn). In earlier times a rotation system including fallow was practiced, while today fields are under constant cultivation. ‘’In the former East Germany, agricultural surface and intensity were increased through land claim, dike construction, and drainage “Farmers … cut a roadside ditch and built dikes in order to make the meadows usable for grazing (or cultivation)” (11:74) says an interviewee. This mainly happened at the bodden side. Overall since reunification, both the length of agricultural dikes and its associated drainage have decreased, as marginal land was given up. Consequently, as temporary flooding increased, former areas of improved and drained pasture declined. Salt meadows, which are a highly valued cultural landscape, may then have the possibility to develop if extensive pasture is maintained despite temporary flooding. Where pasture was discontinued, though, reedbeds expand unhindered. People perceive this development of the landscape as monotonous.

Further, in the former East Germany in particular, the utilization of chemical fertilizers increased, leading to a decrease in the local biodiversity. A further significant change in animal husbandry is perceptible: “In the past there was an infinite number (of cows) … and now everything is so organic. You see a small number of herds of cows these days” (23:19) and another respondent says: “In the past there were meadows used to produce hay and for pasture: nowadays due to the change in agriculture, this is not needed anymore” (28:11). According to interviewees generally, land use has changed from agriculture to the investment in tourism. “There was dairy farming, but this does not exist anymore. The barn was either pulled down or transformed into a holiday home. Everything is focused on tourism nowadays” (7:34). Cranes now attract many tourists and extend the tourist season into autumn. Nevertheless, a reverse effect of tourism is “that (the village) becomes more and more polished … and you have the feeling that it is not authentic anymore, but everything corresponds to touristic criteria” (8:7).

Furthermore, villages have grown and are of a different character nowadays, not least due to the tourism sector. An interviewee says, “After the reunification, so many things have changed so rapidly. This meadow disappeared and that meadow as well, and everything I adored became occupied in front of my eyes, became covered with buildings and is strange to me now” (8:10). Villages like Prerow are particular cases: “Prerow lives on its big properties. The tourists loved them. They said that Prerow is so beautiful, a place where you can breathe because of the space (between the houses)”

(20:44). These, however, are increasingly disappearing. "There were not so many people (tourists), and there were not so many houses" (11:44) says another interviewee. "In the villages everything has become more modern" (18:18). House construction has changed: "In earlier times the fisher houses were low-rise, low buildings. Today we speak about three-storey buildings with high roofs" (21:58). Furthermore, house prices are rising, and according to interviewees "No one is able to afford this landscape and the village. The locals will need to move away (11:93). Another one states "But there are many people who cannot afford the high rent here (in Zingst) anymore. They moved to Barth for example" (32:32).

With respect to infrastructure, many changes occurred. New streets and bicycle lanes have been built, many roads have been tarred, canalization has improved, new water lines have been built, and natural gas is now available. And "... for example, the alleys were removed. This is due to the building of streets. The streets were broadened and the alleys stood in the way" (7:32). The number of wind turbines and solar collectors has increased in the past few years and is recognized as human intervention by the local people.

5 DISCUSSION

This chapter is divided into two sections. First, we present attributes that play a role in regional belonging. In doing so, we depict relevant topics of regional belonging in the Fischland-Darß-Zingst region. Second, we discuss the influences of land use and landscape change on regional belonging through highlighting specific examples of land use and landscape change.

5.1 Attributes of regional belonging in the Fischland-Darß-Zingst region

Three dimensions of the way landscape is experienced are prevalent: 1. a cognitive dimension, 2. a sensual, aesthetic dimension, and 3. an emotional dimension. Considering the latter two dimensions especially, the following section of this chapter deals with landscape aesthetics and includes a summary of statements by interviewees. Thus we take into account the sociological concept of landscape, which describes landscape as "culturally conceived imagination" (Kühne 2006).

5.1.1 Landscape aesthetics in the Fischland-Darß-Zingst region

In order to elucidate factors that are crucial to the development of regional belonging, it is necessary to consider whether landscape elements are valued or rejected in an aesthetic sense. Interviewees easily get into rhapsodies when talking about the regional landscape. The natural landscape, often referred to when speaking about the National Park, and especially its core zone, is defined as pristine landscape and qualified as beautiful and quiet in many statements. Statements like, "The whole coastline is just incredibly stunning because it remains so unspoiled and relatively natural." (8:5) and "There the landscape is really, really magnificent because nature is intact. There is the beach and also the forest" (33:21) represent the opinion of most of interviewees. The nearness to the sea and the bodden in particular is valued aesthetically: "It is magnificent to look, to look at the Baltic Sea and the bodden at the same time. It is possible to look to the other side" (10:11). Further features mentioned in an aesthetic sense are the beach, the cliffs, forests, wetlands, and the cranes. "And then the beach. I

don't know if you know the west beach, and this is even much nicer. The trees lie there …all the trees in the water there and you have to climb across them. It is very quaint and unique. It is very inspiring" (30:5) says an interviewee, underlining the uniqueness of the region. Another one refers to the forest: "The forest is a rest area. It is beautiful. It is consistently diverse" (7:22).

Next to the natural landscape, the cultural landscape is emphasized a number of times - in particular, the canola fields: "Canola is absolutely beautiful when it blossoms" (22:33). They are regarded as an essential part of the regional landscape. Cultural landscape is defined as landscape having been shaped by human beings. In this respect landscapes that are tidied up, such as salt grassland, alleys, planted hedges, and cereal fields are aesthetically valued by interviewees. Furthermore, people consider socio-cultural elements, such as traditionally built buildings, big properties, dikes, harbors, and farm houses, beautiful and part of the region.

However, not all interviewees value the natural landscape. One says "It looks so untidy. The trees lie crisscross and go to seed" (22:18). The majority of people interviewed reject human-made elements (of the cultural landscape), such as new buildings because of their massive appearance in the region. According to the interviewees, they tend to degrade the natural settings and the vastness of the area.

Furthermore, wind turbines and solar collectors are negatively evaluated in an aesthetic sense, as are big monocultures (except for canola) and barren soils. "I think it would be a horrible development if I drove on the Peninsula and there were hundreds of these turbines to the left and to the right. That is ugly; they (wind turbines) are really ugly" (34:40), and "I think they (solar collectors) look silly. And particularly, there is no landscape anymore. There are only these panels that are assembled everywhere." (32:56) Both quotations represent several statements in this sense. Generally, monotony is considered rather unaesthetic. Another important issue as highlighted in the interviews is the digging of a trench on the Fischland-Darß-Zingst Peninsula to connect Baltic Sea with the inland bodden, which is envisaged to enable a direct passage to harbors at the bodden, which for a number of interviewees would negatively impact the aesthetics of the whole area. For a summary of all mentioned elements that are aesthetically valued or rejected see Table 4.

Table 4: Overview of perceived landscape aesthetics by people interviewed

	Positively evaluated	**Negatively evaluated**
Natural landscape	pristine natural landscape, quietness, uniqueness of the area, National Park – core zone, nearness to sea and bay, beach, cliffs, forest, wetlands, cranes	untidiness of the landscape
Cultural landscape	canola fields, salt grassland, alleys, planted hedges, cereal fields	monocultures, barren soils of cultivated land, digging of a trench
Socio-cultural elements	traditional buildings, big properties, dikes, harbors, farm houses	new buildings (massive appearance), wind turbines , solar collectors

5.1.2 Regional belonging in the Fischland-Darß-Zingst region

In the following section, we take into consideration an intersubjective conception of people's attitude towards their region and their emotional bond. We, therefore, refer to the concept of regional

belonging that consists of three dimensions: 1. a cognitive dimension (perception of the region), 2. an affective dimension (regional emotional relatedness and sense of *Heimat*) and 3. a conative dimension (regional orientation of action) (Jordan 1996). Consequently, the section on attributes of regional belonging is structured accordingly into nature and natural landscape, cultural factors, social factors, feelings and emotions, and people's commitment to the region. In examining these attitudes, it has to be kept in mind that regional belonging depends on the duration a person has actually lived in a region, on the phase of life a person is in, and on the kind of experiences and of knowledge a person adopts in the course of time (Rohrbach 1999; Jordan 1996). All these factors determine how regional belonging is perceived.

Both ***nature and natural landscape*** play an important role in regional belonging. People feel close to nature and enjoy its fascinating beauty. Many different natural elements are mentioned when talking about identity-producing elements such as the forest, the bodden, the coast (incl. cliffs and beach), and water. The wide open space, wide sky, and flat landscape are particularly characteristic of the region and therefore valued. Comparable results exist for mountainous areas where, for example, mountains are considered as the meeting point between earth and heaven and are therefore valued (Nogué and Vicente 2004; Meier, Bucher, and Hagenbuch 2010). People speak about the outstanding diversity and unique landscape of which they are proud. Further identity-producing elements of nature and the natural landscape are reeds, green meadows, animals such as the stork and crane, water courses and bank slopes, and the clean air in the region. The National Park, which holds the natural beauty in protected areas, is also mentioned.

Next to nature and the natural landscape, ***cultural factors*** are valued for their existence and thus contribute to regional belonging. Cultural features shape cultural identity, i.e. they "(establish) a basis for communication and (create) incentives for cooperation" (Novakova and Foltinova 2014:115). Interviewees speak about nice old buildings, fisher houses, the appearance of the small villages, traditional architecture, historical buildings such as brick-lined churches and monasteries, and big gardens as producing or reflecting identity. Infrastructure and elements of flood protection, such as cycling and walking lanes, dikes, spur dike, and pumping station, are also valued and mentioned as crucial elements of the region. Even agricultural land such as canola fields - and agriculture in general - belong to identity-producing cultural elements according to interviewees. Further mentioned elements are sailing boats, wind turbines, the harbors, and alleys. Moreover, both the history of the region and the history of the village are important to the people and are of identity-producing value. In rural areas in particular, cultural traditions and social contacts shape the individual regional feeling (Zeitler 2001). Besides these community cultural elements, people have a particular attachment to the elements they own, such as their houses and courtyards.

Social factors are very crucial and are mentioned as identity-producing elements. These include social relations, social network, and family and kin. The place where people have grown up fosters regional belonging. Particularly when people have spent most of their life time in a particular village, in the region, as an interviewee states, "I've spent all my life in this place" (10:13). A special bond can also grow to the parents' house. Furthermore, village life, people's mentality, and the bond with the people in the village are mentioned as identity-producing social elements. Also both the work and the suitable environment are relevant to identity of the people. Interviewees mention that the protection and the continuity of tradition are important to them (10:16). Next to social relations, social activities in the community, the practice of hobbies, and more generally savoir vivre are valued as crucial to the

identity of the people. People interviewed like the idea that villagers know each other. Another interesting fact is the perceptible boundary towards other villages (9:5) that fosters identity of the people with their own village. Finally, it was mentioned that language (Low German) produces identity of the people. All these social factors are crucial to the development of regional belonging in the Fischland-Darß-Zingst region. In his summary of recent German research on space-related attachments, Jordan (1996) cites studies that confirm the importance of social factors in developing regional belonging.

Feelings and emotions are especially characteristic of the definition of regional belonging. People speak about a feeling of *Heimat* and the feeling of "our" landscape, which demonstrate a close relation to the region. Furthermore, feelings of being deep rooted, quietness, and recreation are mentioned as contributing to a regional bond. It is important to the people that they feel comfortable, have a feeling of security, and consider their living space as a place of a (safe) haven. Positive memories of the region also release a bond with it. Furthermore, experiences of leisure in nature, the consideration of nature as having recreational value, and nature as an inspiration are characteristic in the region and shape people's emotional identity and mentality. To maintain the region's typical nature and the sense of being at home, in addition to a sense of nativeness constitute important emotions of the people and their relation with the region. Furthermore, people speak about a positive attitude toward life and their childhood memories as being emotion-based identity-producing elements. All the factors mentioned are very positive in their nature. This can be explained through the bonding to the locality, which thus constitutes people's identity and lets them point to particularly positive aspects of their surrounding (Jordan 1996).

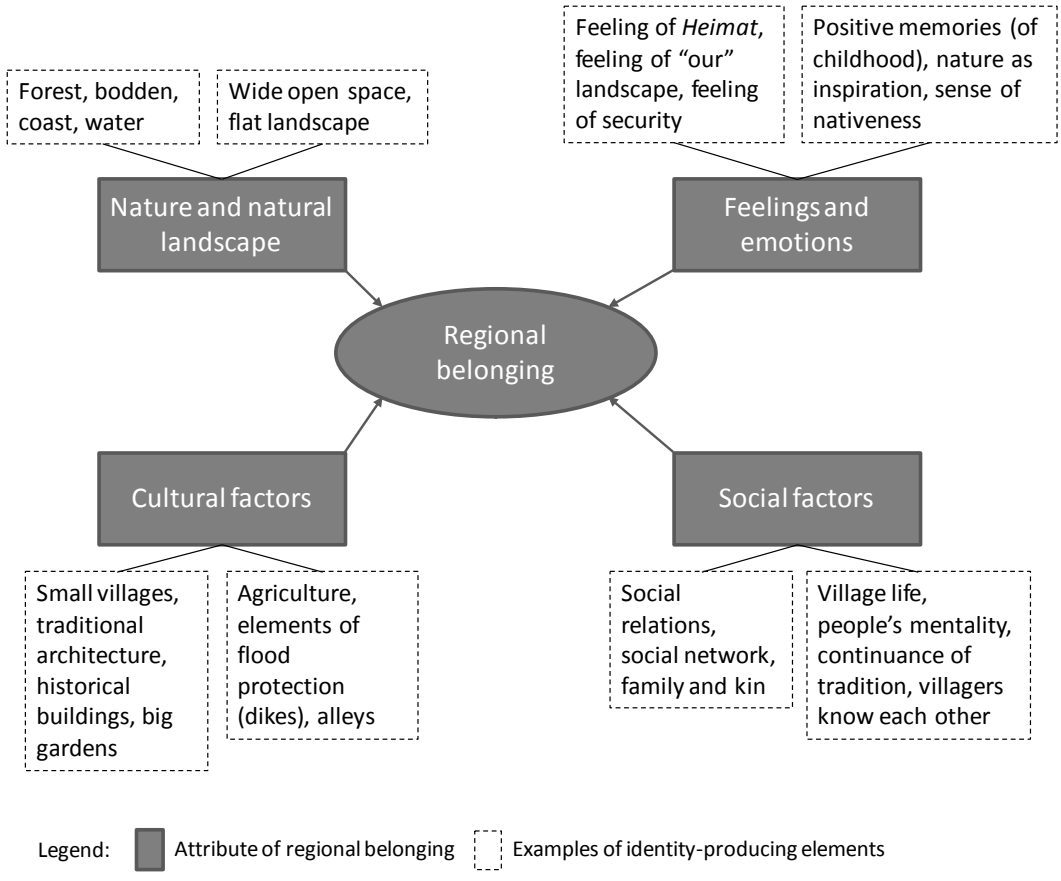

Figure 3: Summary of attributes of regional belonging in the Fischland-Darß-Zingst region

The active engagement for regional issues such as protests against off-shore wind turbines, for example, also demonstrates regional belonging. This idea is captured in the following statement: "(I think) that you always need to try to support the region and that you need to think in regions. You should try to help as a citizen so that the region can function (better) as region" (42:101). Another interviewee speaks about the special bonding that is necessary to get something going: "All the people that you know ... it is nice when you get something going together with them, and this is only possible when there is this particular bonding" (34:6). Figure 3 shows an overview of the attributes of regional belonging mentioned, including examples of identity-producing elements.

5.2 Influences of land use and landscape change on regional belonging

Regional belonging is generally focused on a region, which holds certain characteristics (landscape, history, etc.). These characteristics define coherence within that space and a demarcation from other spaces (Zeitler 2001). Based on the previous chapter where we characterized regional belonging in the Fischland-Darß-Zingst region accordingly, we now take a look at influences on regional belonging. As Kerscher (1992) summarizes, regional belonging is a population's spatial consciousness and concerns space-related activities. In our case, these space-related activities include regional land use, which shapes people's action space (Aktionsraum). In this context, the identity concept of regional belonging is similar to the concept of *Heimat* because both describe an individual-collective-space continuum (Pohl 1993), which is relevant for consequences of landscape change. Influences of both, land use and landscape change, are discussed in the following.

5.2.1 Land use and land-use change: agriculture

Agriculture is an essential part of the landscape in the Fischland-Darß-Zingst region and considered as a needed livelihood for the inhabitants (see Table 5). Agriculture thus plays an important role to the population and their sense of regional belonging. This is in accordance with the conclusion of the previous section on regional belonging. The interviewees find canola fields to be an essential part of the regional landscape, and they are aesthetically appreciated. Their appearance has a positive effect on people's regional belonging, as does a tidy landscape, grassland, and cereal fields, which are aesthetically valued. Consequently, the continued existence of these features, or even their expansion, can have positive effects on regional belonging.

Table 5: Evaluations of agricultural land use in the Fischland-Darß-Zingst region

Positive evaluation	Negative evaluation	Neutral evaluation
agriculture is needed for livelihood	monocultures for energy production, changes from diverse seeds to monocultures	vast appearance of fields
canola fields are an essential part of the regional landscape (aesthetically valued)	barren stretches of cultivated land (aesthetically contested)	farmers own most of the land
a tidy landscape, grassland, and cereal fields (aesthetically valued)	increase in the utilization of fertilizers – decrease of biodiversity	

Positive evaluation	Negative evaluation	Neutral evaluation
	decrease in grazing	
	abandonment of claimed land	
	the transformation from agriculture to tourism	

Monocultures for energy production (except for canola) and the occurring changes from rotational polyculture to monocultures are negatively evaluated. The reasons given include reduced diversity of species and the increasing use of agricultural crops for energy production instead of food. Furthermore, barren stretches of cultivated land are aesthetically contested. The increased use of fertilizers and the consequential decrease of biodiversity are also negatively evaluated. Because of a decrease in grazing, the landscape is changing from meadows and pastures to reed areas or areas covered with shrubs, which are not perceived as aesthetically pleasing. From these examples, it is noticeable that agriculture exerts a significant influence on the appearance of the landscape. In interviews people asserted that there is a relation between valued landscape and regional belonging. Hence, it can be concluded that a changed look of the landscape due to agricultural activities can have an influence on regional belonging. Concerning the negatively evaluated aspects, an increase of monocultures (except for canola), barren soils, the use of fertilizers, and a further decrease of grazing and the abandonment of claimed land would signify a degraded sense of regional belonging. This can consequently lead to reduced identification with the landscape. Furthermore, people stated that a development from agriculture to tourism is perceptible, which is negatively evaluated by a number of people because of the massive appearance of new guesthouses. However, tourism is also considered a useful income source. For more detailed implications of tourism on regional belonging, see the section below. Further aspects are neutrally evaluated, such as the vast appearance of fields and that farmers own most of the land (see Table 5). These aspects relating to agriculture are neutrally evaluated and thus do not influence regional belonging.

5.2.2 Land use and land-use change: tourism

Tourism is one of the main income sources in the region, and according to interviewees it has been an important element of the region for a while. Work (a social aspect of regional belonging) is considered to be relevant for regional belonging, so tourism has an influence on it. There is a close relation between landscape and tourists being attracted, so the landscape is particularly important for tourism, as confirmed by Lothian (1999). Many tourists feel close to nature; they seek the nature experience such as watching cranes and having access to a unique, pristine landscape. A suitable environment (another social aspect of regional belonging) is relevant for tourism and thus exerts an influence on regional belonging. A negative effect of tourism is the changes in village structure. People leave the area and tourist apartments are built. Consequently, tourism imposes pressure on the landscape because of the construction of new buildings, which can have a negative effect on regional belonging.

5.2.3 Land use and land-use change: house construction

House construction is closely related to tourism activities in the region. According to interviewees, small villages turn into tourist destinations, with many new, big buildings. The character of the

villages changes to a more modern look, where houses are narrowly built, and the ground becomes more and more sealed. Gaps disappear and the region's vast appearance is lost. Several houses are built on one plot; consequently, plots become smaller. People fear that this massive appearance of new houses degrades the natural setting, and villages lose their character. This is in contrast to cultural aspects of regional belonging. Interviewees particularly mentioned old buildings, the appearance of the small villages, and traditional architecture as identity-producing elements. Furthermore, big gardens are valued and considered relevant for the development of regional belonging; hence, house construction as it is practiced at the moment has a negative effect on it.

The fact that houses are vacant two-thirds of the year signifies a less pronounced and more fragmented village life, which can have drastic consequences for the development of regional belonging. New buildings are, in many cases, constructed by investors who are not native to the region and consequently have different construction priorities than long-term residents might have. Another problem is the land and house prices, which have increased due to the construction of a great number of buildings. This can result in people leaving the region because they can no longer afford to live there. For these people in particular, this is a reverse development of regional belonging. Although most aspects of house construction seem to have a negative effect on regional belonging, interviewees stated that in some villages the architectural style is maintained. Because a traditional construction culture is maintained in these villages, identity-producing elements such as reed-covered roofs persist and regional belonging can evolve positively.

5.2.4 Land use and land-use change: infrastructure

Generally, infrastructure has changed a lot, with new walking and cycle paths and paved streets becoming common. Interviewees are positive about the well-developed infrastructure. In this respect, cycling seems to contribute to furthering regional belonging since people can explore and enjoy the landscape in a more direct and personal way on a bicycle. However, due to the broadening of streets, avenues - and the trees that line them - are removed. Generally, avenues constitute an identity-producing element according to interviewees, and their removal may negatively affect regional belonging.

5.2.5 Land use and land-use change: alternative energy production

Reed as a construction and insulation material and for roofs is widely accepted and contributes to regional belonging since it is associated with images of authenticity and regional architectural specificities. Nevertheless, its use for alternative energy production is controversial. The number of wind turbines and solar collectors has increased in the recent past. Generally, they are aesthetically contested, especially wind-turbine and solar-collector parks are rejected, especially near settlements, and this can lead to a decrease in regional belonging. While the majority accepts wind turbines and solar collectors as alternative energy production, wind turbines are in some cases even considered as an identity-producing element.

5.2.6 Changes in the landscape

People speak about changes in the landscape such as the reduction of wildlife and disappearing

heathlands. A continued transformation of the natural landscape can have a negative impact on regional belonging as people repeatedly emphasized the importance of the natural landscape and its identity-producing value. At the same time, due to the National Park, areas that were previously used for cultivation or grazing are being set aside, so that significant changes in the vegetation and landscape composition occur. These changes, including the growth of small wood, shrubs, and reed, are controversial. Some interviewees accept these landscape changes, while others are generally against wilderness and complain about the loss of agricultural land. In particular, because of the prohibition against reed mowing, reed can grow unchecked and consequently hinders the view of the bodden, meaning that landscape diversity is reduced. Moreover, this is seen as attracting what are seen as plagues by most participants: in particular the significant increase in the number of wild pigs. Another negative result - due to the reduction of drainage - is the formation of permanent pools of water, which encourage the multiplication of mosquitoes. All these occurrences are negatively evaluated and can have a negative impact on regional belonging if aesthetically contested by the people.

In contrast, several advantages of the National Park were mentioned by people interviewed, such as its limiting the construction of new buildings, its being a point of attraction for tourists, and the fact that it represents areas of natural landscape and is thus aesthetically valued. All these points have a positive influence on regional belonging since they keep the area pristine and hinder the spread of settlements everywhere. In addition, as a point of attraction for tourists the Park relates to the main sources of income of the local economy. The Park also contributes to natural and aesthetic beauty, which is valued by people and has implications for identity formation. Interviewees spoke about the emergency harbor, which is given great importance despite its location in the core zone of the National Park. All in all, harbors appear to be important socio-cultural elements in regional identity and belonging because of the traditional background of local fisheries and the positive image tourists have of harbors and fishermen.

The removal of agricultural dikes and the elimination of drainage is a further feature that strongly changes the landscape composition. Not only is the agricultural land use transformed significantly, but water, including standing and circulating water, becomes a more predominant element of the landscape and leads to semi-amphibious landscapes (see Goeldner-Gianella 2008). The abandonment of some types of land use and the re-naturation of the landscape (e.g. through the expansion of reedbeds) is aesthetically contested by a number of people, whereas other interviewees value the need for water-retention areas to reduce the risk of floods. However, traditional agricultural land is being lost, and this has become a controversially discussed topic. A relation to regional belonging can be seen when considering the aesthetic consequences of dikes or their removal. The existence of dikes is widely accepted because in the mind of the people, they always existed. They are considered as part of the landscape and thus contribute to regional belonging.

Another clear phenomenon is that cliffs are being eroded, moving ever further from the sea and threatening some houses. People discuss coastal-protection measures, but no solution has been found. Cliffs are an important identity-producing element, and therefore their further existence influences regional belonging.

Many inhabitants speak about a close relation to the bodden, and it is very positively evaluated as place of recreation, in addition to having aesthetic value. Opinions about water quality diverge, though the water quality of the bodden appears to be improving since the extension of agriculture

after reunification. People, moreover, recognize that the accumulation of mud and silt at the bottom of the bodden raises a number of critical issues. Due to little water exchange between the open Baltic Sea and the bodden, the latter is gradually silting up and would require dredging to secure the circulation of boats and ships. Nevertheless, since the deposited mud and silt remain considerably contaminated from the chemical inputs that were intensively used during the "East German" period, dredging of the bodden is an environmental hazard that would require complex and expensive procedures. Since the 1990s, the issue of the rehabilitation of the bodden has been extensively debated, and strategies and feasibility studies have been developed. Nonetheless, the completion of the envisaged measures will still take some time (e.g. Bachor, von Weber, and Carstels 2014). Overall, this landscape type is valued by the people. Its appearance can be considered an identity-producing element that has an influence on regional belonging. There are more humid parts of the region, and an increase in the number of small lakes in the fields is perceptible. These are neutrally evaluated by interviewees, and thus do not influence regional belonging; it is rather considered a natural condition.

Another proposition that has been widely discussed but has not yet been implemented is the possible digging of trench through the Fischland-Darß-Zingst Peninsula to enable a direct passage to harbors on the bodden. Inhabitants of villages near the bodden in particular support the idea in order to attract more tourists. However, local people living on the Baltic Coast oppose this plan because in their opinion this would have dramatic consequences for the ecosystem. People particularly fear that the channel would have unaesthetic consequences for the whole area, and thus the endeavor has an impact on regional belonging. Although an increase of tourists can improve the financial situation of the people living at the bodden, the change of the landscape can reduce the sense of regional belonging of the people living at the coast because it is aesthetically contested.

In the course of population changes in village structure (younger people leaving the region and the number of tourist apartments increasing), according to interviewees, the relationship between the people has changed. Consequences are reduced social cohesion and a change in people's mentality. Since the bond with the people in the village is mentioned as an identity-producing social element, these changes negatively influence regional belonging. This corresponds with results from studies on territorial belonging, which indicate an association between regional belonging and the involvement in community life and social cohesion (Gustafson 2009).

Place attachment is defined as "the desire of a person of free will to stay in the present place of residence" (Jordan 1996:100). Generally, newcomers with a high degree of place attachment are often engaged people who become active for their region, whereas residents with a low feeling of place attachment make minimal contributions to village life (Brown, Brown, and Perkins 2004). Newcomers in the Fischland-Darß-Zingst region can be considered to have high place attachment since they voluntarily chose this place as their domicile. Regarding data interpretation, it has to be noted that overall, responses are subject to a certain bias because participants in group discussions were mainly newcomers to the region, while interview partner were mainly life-long residents.

In summary, as the findings of our study show that it is important to consider the physical environment, cultural, and social factors, as well as feelings and emotions and the associated identity-producing elements. If regional belonging is allowed to fully develop, it can contribute positively to feelings of security and stability (Hay 1998).

6 CONCLUSION

The aim of the report has been to characterize influences (if existent) of land uses and landscape change on the inhabitants' sense of regional belonging in the Fischland-Darß-Zingst region. Based on the results of this research, we believe that both factors definitely have influence. The persistence, the increase, or the decrease of certain identity-producing elements can have positive or negative influences on regional belonging. Major land uses in the region are agriculture, tourism, construction, and alternative-energy production. While all these land uses help form the landscape, not everything that is newly built is positively perceived. For example, the massive appearance of newly built houses is clearly perceptible, but not valued by many interviewees. Each feature requires separate reflection in order to identify its relevance for and its impact on the sense of regional belonging.

Results demonstrate that there is a relation between landscape perception and regional belonging. Elements that are perceived are in people's mind and can be considered important for people's decision making, as well as their understanding of their landscape. Consequentially, further research is needed on issues that influence regional belonging in order to determine whether regional belonging is positively and/or negatively influenced. It is important to consider regional belonging of the local population because the relation with the landscape can be demonstrated and possible impacts of land use and landscape change can be elucidated. Moreover, this is particularly significant because regional belonging has an effect on people's identity and the question of whether people can identify with the region or not.

Landscape change; the National Park; the reduction of agricultural dikes; the situation regarding the cliffs; the bodden (and the eventuality of digging a trench related to it); and changes in village structures are only some of the issues that have an influence on regional belonging of the local population. We recommend further research on the local population's sense of regional belonging, especially topics that are controversial such as reduction of agricultural dikes and the digging of trench to the bodden. Furthermore, we see the need to inform decision makers about the research results and to advertise the plans and activities adapted based upon them in order to gain the support of the local population. And we consider it important to inform natural scientists and their research agenda so that research can go hand in hand with the regional needs of the local people.

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Identifying gaps between science, policy and societal perspectives on coastal land use: The case of managed realignment in Darß – Zingst region, Mecklenburg Western Pomerania, Eastern German Baltic coast

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ABSTRACT

Through state-of-the art ecosystem modelling supported by ecological experimental data, the COMTESS Project (funded by the German Federal Ministry of Education and Research) investigates potential trade offs in ecosystem service provision under different climate impact and land-use scenarios in two German coastal areas till 2100. Land-use scenarios were developed within the project for two study regions on the Baltic and North Sea coasts to contrast a control Business-as-usual scenario. In this paper we focus on the Baltic case study region. The premise of COMTESS alternative coastal land use scenario is the managed realignment of current dikes inland for: 1) Carbon Storage (and wetland re-naturation) or 2) Multiple Land Use (incl. biomass harvesting for energetic purposes). Managed Realignment is assumed to lower long-term costs of hard coastal defence, restore critical carbon sinks and liberate much needed areas to compensate ecological destruction elsewhere. Though politically highly controversial and facing much public antagonism, Managed Realignment is effectively embedded in the current coastal management policy of the state of Mecklenburg West Pomerania. Implementation, nevertheless, faces many obstacles.

The goal of this paper is to explore consistencies and discrepancies in the views of policy, management practitioners and sectoral representatives with respect to the COMTESS coastal land-use strategies for the Darß-Zingst region on the eastern German Baltic coast. Based on participatory, empirical qualitative social science research methods we analyse stakeholder opinions, perspectives and argumentations regarding coastal land use and Managed Realignment. This contributes to evaluate and complement the rationale of the ecological and economic modelling embedded in the project through the formulation of a fourth, "expert-based", land-use scenario.

A growing consensus on the necessity in future for localised land abandonment and some form of

coastal land-use adaptation is emerging in science, policy, regional planning and coastal land management arenas. Nevertheless, locally affected land users and inhabitants continue to show a very vocal resistance to Managed Realignment and a strong attachment to the traditional "Hold the Line" coastal defence paradigm. Interviewed experts representing potentially affected parties confirm that: 1) Managed Realignment and coastal re-naturation is polemic and can only be envisaged in specific circumstances, while 2) coastal defence should prioritize not only the protection of populations but also of their productive resources and activities. Our work points at key discrepancies between science, policy and societal views on Managed Realignment and in existing rationalisations, positions and legitimisation of coastal defence and land use. These are indirectly related to different perceptions and prioritisations of what is needed vs. what is desirable vs. what is acceptable. More complex modelling frameworks, which incorporate critical factors and processes that affect societal vs. individual adaptation in coastal land are needed to address societal reactions towards controversial strategies, such as Managed Realignment, and develop acceptable consensual approaches towards their implementation.

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1 INTRODUCTION

Since the 1970s the dominant hard coastal defence paradigm, based on an engineered armouring of the coast, has been challenged from a number of perspectives. This resulted in the emergence of softer management approaches, including managed realignment (Hanson et al. 2002). Managed Realignment presupposes the removal or relocation of coastal defences inland to re-establish natural intertidal buffers and has the potential to restore critical natural buffers and lower long-term costs of hard coastal defence (Brook 1992; Burd 1995). Though politically highly controversial and facing much public antagonism, Managed Realignment is since the 1990s being experimented with in several European countries (Goeldner-Gianella 2007; Rupp-Amstrong and Nicholls 2007). Managed Realignment is increasingly being considered at scientific, policy and management levels as a valid coastal adaptation option, which indicates a major departure from traditional approaches (Nicholls and Klein 2005).

The goal of this paper is to explore consistencies and discrepancies in the views of policy, management practitioners and sectoral representatives with respect to coastal land-use strategies based on the premise of Managed Realignment applied to a case study region in the State of Mecklenburg – Western Pomerania. We thereby wish to contribute to a more contrasting and differentiated panorama of views on future coastal adaptation to climate change on the German Baltic coast. After introducing the emergence of the Managed Realignment approach and trends in German coastal zone management, we present our work within the COMTESS Project: "Sustainable Coastal Land Management Trade-Offs in Ecosystem Services" funded by the Federal Ministry for Education and Research[1].

1.1 Managed realignment (MR): a contested though desirable option in coastal protection?

10% of world population live in low elevated coastal zones (areas under 10 m mean sea level), which cumulatively cover 2% of global land area (Wong et al. 2014). Historically populations have demonstrated a great ability to adapt to the coasts' dynamic nature (Tol et al. 2008). Soft coastal systems are, however, seen as particularly sensitive to climate change and sea-level rise (SLR), which significantly exacerbate current trends in coastal surges and flooding, salinisation and erosion (Wong et al. 2014). Three generic coastal adaptation strategies have been identified (IPCC CZMS 1990), namely: protection (i.e. coastal defence), accommodation (i.e. adjustments in occupation and use) and retreat (i.e. inland relocation of settlements and activities). Though accommodation and retreat constitute traditional coastal adaptation strategies, hard defence has with time progressively straightened and homogenised the coastline, thereby making it easier to protect (French 1997). Where land was scarce and technology appropriate, land claim has historically secured fertile land for the production of food and tradable goods, water reservoirs and cheap new land for infrastructural,

[1] COMTESS: "Sustainable Coastal Land Management Trade-Offs in Ecosystem Services" (http://www.comtess.uni-oldenburg.de/en/). Project Grant Number: 01LL0911A-G funded by the Federal Ministry for Education and Research (Bundes Ministerium für Bildung und Forschung) under Module A of the Sustainable Land Management Framework. http://modul-a.nachhaltiges-landmanagement.de/en/modul-a/ - Accessed 09.02.2015

residential, touristic and commercial activities (Bertrand and Goeldner 1999a and b). Land claim and coastal defence encapsulate a historically hard-won battle against the sea. Extreme coastal surges (e.g. 1953 in the North Sea, 1962 in northwest Germany, 1976 in Denmark) have indeed been traumatic for coastal populations, who often perceive the sea as a destructive force, which can only be harnessed via higher, stronger engineering structures. This spurred a recrudescence of vast land claim projects in northern Europe between the 1950s and the 1990s, even if these were not necessarily implemented (Verger and Goeldner 1995, Goeldner-Gianella 1999). At the same time, awareness of pervasive negative ecological impacts of hard coastal defence (i.e. disappearance of intertidal habitats and buffers through coastal squeeze, displacement of coastal erosion) has grown since the 1970s and led to the progressive emergence of softer approaches (Hanson et al. 2002; Doody 2012).

Managed Realignment is an anticipatory retreat strategy, which seeks to increase coastal resilience by restoring healthy (semi)natural coastal dynamics, buffers and habitats through the re-establishment of tidal flooding via (partial) breaching or removal of existing defences, gates or pumping (Burd 1995; French 2006). It involves two major changes in coastal zone management perspective, since it implies:

1. yielding some control to natural coastal processes (i.e. working with rather than against nature), and
2. yielding some land to the sea.

Both requirements run against a deeply engraved positivist, engineer-dominated conceptualisation of the relationship between humans and the coast. For some authors, more progressive coastal legislation and management practice are often hindered by a reactionary framing of coastal defence as a national crusade against the sea (Pethick 2002). Originally restricted to localised experiments in a dominant "Hold the Line" discourse, Managed Realignment projects nevertheless multiply in northern Europe since the 1990s, especially in the UK, France, the Netherlands and Germany (French 2006; Goeldner-Gianella 2007, Rupp-Amstrong and Nicholls 2007). Managed Realignment is increasingly being envisaged for sparely populated, economically marginal areas that are highly exposed and where hard defence would imply a costly long-term commitment. It constitutes a paradigmatic change in coastal management, and emerges as a viable and desirable strategy at ecological (e.g. restoration of key coastal buffers and habitats), economic (e.g. optimisation of coastal defence budget) and societal level (e.g. prioritisation on vulnerable areas) (Nicholls and Klein 2005; Turner et al. 2007). Managed Realignment is arguably being mainstreamed in coastal adaptation research, conservation, land-use planning and coastal policy (Holman et al. 2002; NABU 2012; HM Government 2011). In practice, however, implementation runs against serious legal, institutional, financing obstacles, while significant uncertainties remain, which are related to the feasibility, viability and ecological success of MR over the long term (Pethick 2002; Wolters et al. 2005; Ledoux et al. 2005; Tinch and Ledoux 2006; O'Riordan et al. 2008; Mossmann et al. 2012, Esteves 2013).

Managed Realignment provokes a wide spectrum of opinions among lay and affected populations. A range of explanatory elements has been proposed in the literature, which point at obstacles to be overcome and offer possible levee points on which to anchor this new strategy and, more broadly, adaptive, participatory coastal zone management approaches. Some factors identified include societal levels of understanding of coastal environment, landscape aesthetics preferences and perception of coastal risk (e.g. Goeldner-Gianella 2007, 2008). Others relate to public understanding of the underlying rationale, design, implementation and perceived outcomes of Managed Realignment (e.g. Myatt-Bell et al. 2002). Moreover, the availability of appropriate information and compensation

mechanisms, quality of consultation and decision process, credibility of the implementing institutions critically influence public perception and acceptance of Managed Realignment (Myatt et al. 2003; Ledoux et al. 2005; Milligan and O'Riordan 2007). This disparity of views between science, policy and society points at a significant gap between preferred options and clearly raises issues related to governance and decision making (O'Riordan et al. 2014). Indeed, since in place the legitimacy of Managed Realignment is strongly contested, the question is whether disparate or even opposite positions can be reconciled.

1.2 German coast and approaches to coastal zone management

Sterr (2008) provide an exhaustive overview of the key characteristics of the German coast. Divided into the North and Baltic Sea, the German coast is 3,700 km long. It is primarily composed of unconsolidated quaternary sediments and is eroding over 61% of its length. It is moreover predominantly low lying, with 13,500 km² of coastal plain below 5 m above mean sea level, 3,400 km² of its coastal plain being artificially drained, of which 30% is flood prone. Around 1,900 km of the German coast has some form of coastal protection (whether engineered or natural buffers). 1,900 km² of the German Baltic coast lie in Mecklenburg Western Pomerania, with 377 km of open outer coast and 1,568 km of inner coast, the latter been generally sheltered through barrier and island systems (Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern 2010). In 2011 the State of Mecklenburg Western Pomerania estimated that 65% of its outer coast was actively eroding whereas 22% was accreting and 13% remained stable. Moreover, 1,000 km² of the coastal plain, home for 180,000 people, was flood prone and was protected by 135 km of hard defence along the outer coast (Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern 2011).

Though the federal government pushes towards greater integration and finances coastal defence for the most part (to a ratio of 70% federal funds: 30%: state funds), coastal zone management remains decentralized, being embedded in Mecklenburg Western Pomerania under the Water Act (Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern 2009). Differences in approaches across the five German coastal states relate to distinct natural contexts, history of settlement and density of occupation of the North and Baltic Sea coasts, but also to changes in coastal policies and institutional frameworks associated with the German partition, subsequent reunification and incorporation into the European Union (Nordstrom et al. 2007). On the North Sea, despite a number of experiments since the 1980s, coastal management remains primarily based on a "Hold the Line" strategy, with coastal defence infrastructure having high protection standards: here Managed Realignment would not only be highly unpopular but very costly (Sterr 2008; Rupp-Amstrong and Nicholls 2007). In contrast on the Baltic Sea, Managed Realignment is seen appropriate, since its coastal plain is sparsely inhabited, tidal range is negligible, dikes are often reaching their end-life, flood-prone areas comparatively small and coastal surges infrequent (Goeldner 1999; Goeldner-Gianella 2007; Rupp-Amstrong and Nicholls 2007; Nordstrom et al. 2007).

In the state of Mecklenburg Western Pomerania coastal defence policy centres on the protection of settlements and population (Ministerium für Landwirtschaft, Umwelt und Verbraucherschutz Mecklenburg-Vorpommern 2009: 31). To reduce public coastal defence costs the responsibility for

[2] Different sources mention different lengths of the coast depending on the level of detail being measured.

maintenance of so-called second order dikes (which protect agricultural polders) is progressively being transferred to local drainage boards (Nordstorm et al. 2007) and thus indirectly to communities and land users. Managed Realignment is thus in principle feasible, though not yet explicitly endorsed as coastal adaptation strategy, as it is for example in the UK (HM Government 2011). Implementation, however, faces many obstacles, also due to overt opposition from affected land users. This is illustrated by the civil association "Hände weg vom Deich" ("take your hands off our dike")[3], which since 2009 strongly opposes a Managed Realignment measure to compensate for the industrial development associated with the reconversion of the Lubminer nuclear plant.

Nevertheless, a number of micro-scale ecological re-naturation and Managed Realignment programmes are on-going. The OMReg database[4] updates the detailed inventory of Managed Realignment projects in German from Rupp-Amstrong and Nicholls (2007) – (See Table 1 for the Baltic Sea).

Table 1: Managed Realignment on the German Baltic Sea coast

Name	Location	Region	Size (ha)	Year	Aim					Method					Habitat				
					Habitat	Natural shoreline	Protection costs	Compensation	Other	Sewall breach	Seawall removal	Regulated tidal exchange	Reinforced / new dike inland	Other	Lagoon	Mudflat	Saltmarsh	Reed beds	Transitional grassland
Strandseenlandschaft Schmoel	Kiel Bay	Schleswig-Holstein	40	1989				X		X				X	X	X			X
Polder Roggow	Salzhaff	Mecklenburg Vorpommerania	40	2002	X					X		X					X	X	
Pepelower/Tessmansdorfer Wiesen			120	2002	X					X		X					X	X	
Sundische Wiese	East Zingst		940	2014	X	X	X			X	X		X	X					X
Polder Neuensien	Island of Rügen		40	2002		X		X		X		X					X		
Polder Freetz			180	2002		X		X			X						X		
Karrendorfer Wiesen	Greifswald Bodden		350	1993	X		X	X	X		X						X		X
Polder Friedrichshagen			90	1999	X		X		X		X						X		
Polder Wehrland	Peenestrom		113	2004				X			X				X		X		X
Teilpolder Waschow			66	2004				X			X				X		X		X
Anklamer Stadtbruch	Oderhaff		1750	2004	X		X			X					X				X
Total: 12 Sites			3743	1989 2014	7	3	4	6	3	7	6	4	1	2	5	1	8	2	6

Although there have been so far more projects on the North Sea (18) than on the Baltic Sea (12), the surface affected is substantially larger on the Baltic Sea (with 3,743 ha from a total of reported 5,983 ha[5]). On the North Sea, projects have generally been initiated earlier, range in size between 1 and 853 ha and were mostly undertaken to compensate for environmental impacts elsewhere. On the Baltic Sea, projects range in size between 40 and 1,750 ha and the prime goal is habitat creation. Overall, habitat creation / enhancement goals primarily focus on saltmarsh, but also intertidal mudflats (North Sea) and transitional grasslands / salt meadows (Baltic Sea). Managed Realignment in Germany is generally performed through dike removal, in place accompanied by the construction / reinforcement of inland dikes. The OMReg Database is by no means comprehensive and further projects are in discussion, in progress or have failed. In particular, the largest project in Mecklenburg Western Pomerania, the re-naturation of the Sundische Meadow on the East Zingst Peninsula (See below), has

[3] "Hände Weg vom Deich" - http://www.kein-deichrueckbau-usedom.de/ - accessed 23.09.2014

[4] http://www.omreg.net/– accessed on 22.09.2014

[5] This difference primarily relates to one site: Anklamer Stadtbruch, where, following dike overtopping in 1995, drainage was discontinued and coastal protection was not reconstructed (Rupp-Amstrong and Nicholls 2007).

not yet been included in the database[6].

1.3 Goals and approach within COMTESS

Sterr (2008) in his national vulnerability assessment summarises expected impacts of sea-level rise on the German coasts, which include: increasing beach and dune erosion, changes in storminess and coastal surge patterns and salinisation of coastal freshwater lenses. Associated impacts (in terms of people / economic assets at risk) are expected to be low in comparison with highly vulnerable coastal areas of the world. The author thus argues that with adequate and timely coastal adaptation, climate change and sea-level rise impacts on the German coast should be restricted, coastal protection should be technologically and economically feasible and manageable, despite significant increases in costs. Nevertheless, through coastal squeeze hard defence are expected to cause significant loss of valuable intertidal wetlands (Sterr 2008).

This is the starting point of the COMTESS project, which through state-of-the art ecosystem service modelling supported by ecological experimental data, investigates potential synergies and trade-offs in ecosystem service provision in two case study regions under different coastal land-use scenarios on the German coast till 2100. The overall goal is to explore alternative sustainable land-use strategies to best adapt to climate change. To this end, specific aspects of climate change have been used as boundary conditions (Table 2). Moreover, currently protected areas under 2 m a.s.l. are considered to be potentially at risk of inland flooding / coastal surge through climate change impacts.

Table 2: Boundary conditions for COMTESS land-use scenarios in the Baltic Sea sites

	Optimistic	**Intermediate**	**Worst Case**
Sea level rise	+ 25 cm / 100 years	+80 cm / 100 years	+ 1.5 m / 100 years
Rainfall	+ 20% in winter - 20% in summer	See optimistic	+ 20% in winter - 40% in summer

We focus here on the two coastal land-use scenarios developed for the Baltic coast to contrast a Business-as-usual scenario. Effectively, out of the three generic coastal adaptation options envisaged in the IPCC Common Methodology (IPCC CZMS 1990), two are considered within COMTESS: namely "Hold the Line" and "Managed Retreat" (here termed "Managed Realignment") (See Figure 1).

[6] Information on the Sundische Meadow Project is available under http://www.regierung-mv.de/cms2/Regierungsportal_prod/Regierungsportal/de/lm/?&pid=27384 – accessed on 22.09.2014.

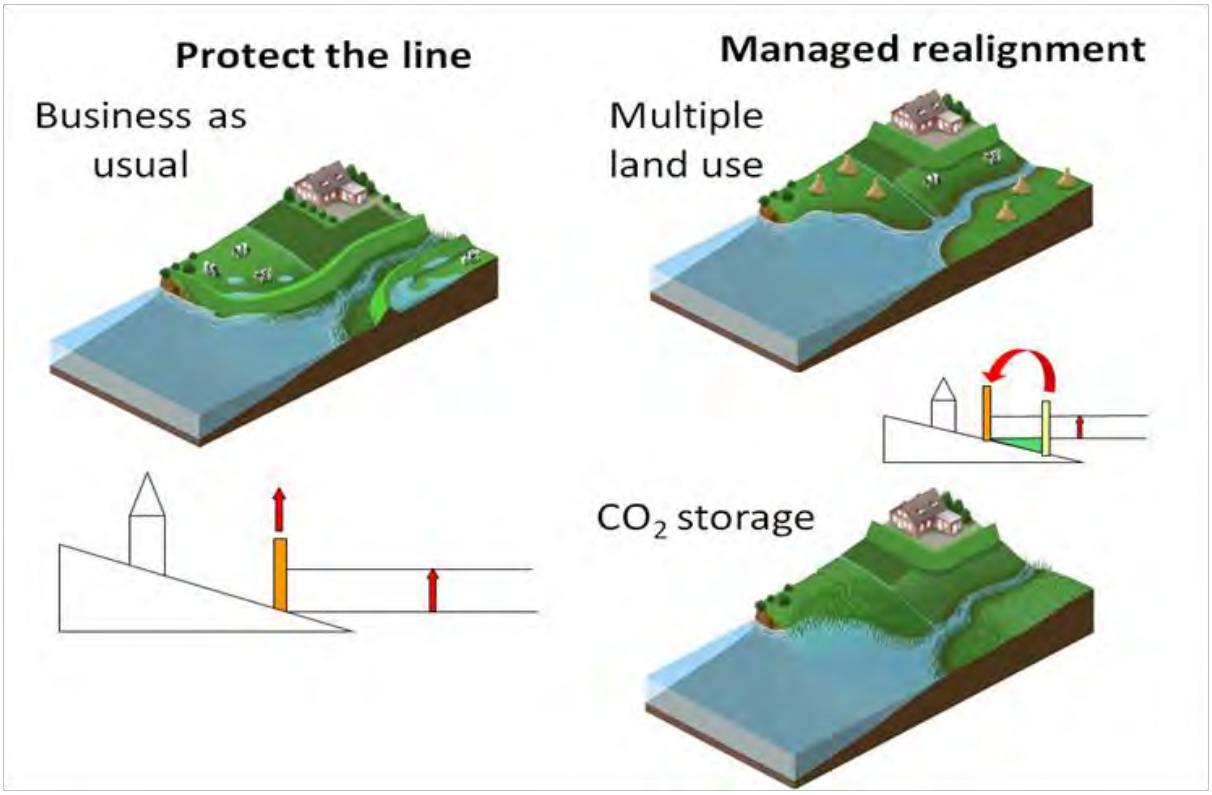

Figure 1: Two generic coastal adaptation options considered in COMTESS for the Baltic Sea

1. The *Business-as-usual– Hold the Line scenario* is a control scenario that presupposes the continuation of the present coastal defence strategy: i.e. the upgrading and maintenance of coastal dikes and the artificial drainage of inland freshwater. This choice clearly departs from traditional coastal vulnerability assessments, for which the control scenario is "Do nothing" (no upgrade / maintenance of dikes) (Nicholls et al. 1999).
2. COMTESS envisages Managed Realignment broadly based on the provision of the coastal zone policy of the State of Mecklenburg Western Pomerania that prioritises the protection of the coastal population over the protection of agricultural area. Accordingly, dikes in the COMTESS scenarios are relocated inland to secure settlements, while dikes which protect current low-lying agricultural land are removed. Managed Realignment is assumed to contribute to recreate an amphibious landscape that would be more resilient to future impacts of sea-level rise. It serves two mutually exclusive strategies:
    a. *CO_2 storage* for climate mitigation. Here, land use is abandoned to allow the expansion of reed vegetation and the restoration of wetlands in areas under 2 m a.s.l. As wetland surface elevation increases, coasts may keep up with sea-level rise.
    b. *Multiple land use*. Here, land use is adapted to cope with potential climate change impacts. Envisaged land uses include salt meadows, which have high biodiversity value, and the harvesting of reed biomass for energetic purposes. Effectively, when focusing on land use only this scenario may also be seen as a version of the IPCC Common Methodology "Accommodate" adaptation option.

2 METHODOLOGY

Our specific contribution within the COMTESS project is to investigate the congruence and plausibility of COMTESS land-use scenarios for stakeholders in the Baltic Sea case study region. The underlying hypothesis is that different stakeholders have distinct perceptions, priorities, and preferences for coastal / land-use management, which may coincide with the COMTESS science-based land-use scenarios, but not necessarily. Our aims are thus:

1. to identify and collect stakeholder opinions, perspectives and argumentation regarding coastal land use and Managed Realignment, and
2. to complement the ecological and economic modelling embedded in the project through the formulation of a fourth, "expert-based", land-use scenario.

To this end we followed a participatory approach based on empirical qualitative social science research methods (Flick 2012; Corbin and Strauss 2008). Figure 2 depicts the different steps carried out.

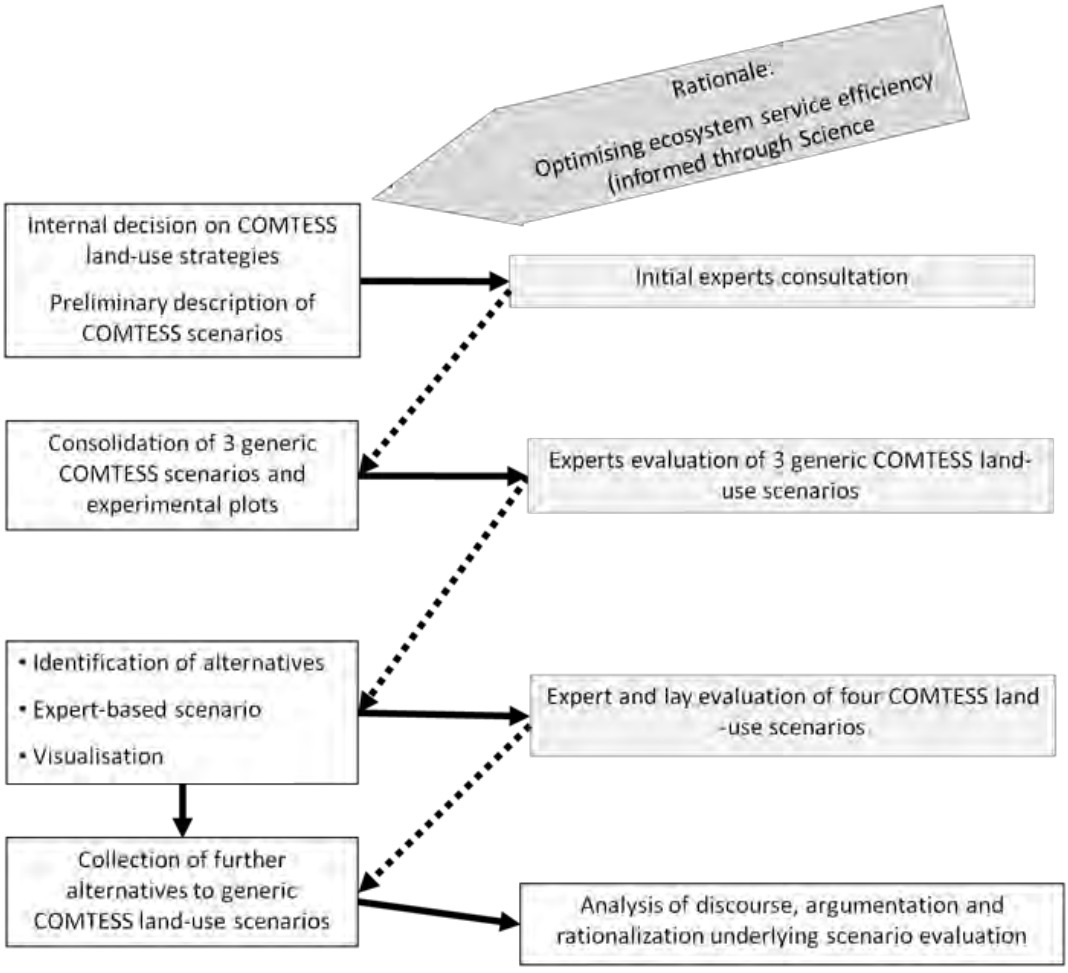

Figure 2: Participative evaluation of the COMTESS Baltic Sea scenarios

We first performed a stakeholder analysis (Reed et al. 2009) to identify key actors in the study region, their (conflicting) interests and probable positions regarding land-use strategies and Managed Realignment. This was guided by one main partner (from the National Park Vorpommersche

Boddenlandschaft) complemented by exhaustive internet searches and further recommendations from interview partners. We originally approached around 35 potential participants conducted 17 interviews with 21 experts from regional administrations, local authorities, drainage boards, farmers' representatives, non-governmental, private organizations and a local voluntary fire brigade (Table 3). Experts were chosen to depict different perspectives on coastal defence and land planning policy, natural resource management, flood hazard rescue, conservation, agriculture, and tourism issues. Although the approached representatives of the tourism, energy and transport sectors declined to participate, these topics were discussed in detail with stakeholders involved. Moreover if the project also explored broader public perceptions through world cafés and focus group approaches (Figure 2), in this paper we present the results of detailed interviews performed with our "expert stakeholders".

Table 3: Interviewed experts

Sector		Interviews	Reference Nb.
Conservation (2 interviews of 1 interview partner)		**6**	
	Gov (State / National Park level)	4	P1, P2, P4, P8
	Non Gov	2	P3, P14
Local authorities		3	P6, 10, 12
Coastal zone management (Group interview – 3 interview partners) Regional planning administration	Gov (State level)	**2**	P9 P13
Soil & Water associations (2 Group interviews - 5 interview partners)	Non Gov	**2**	P5, P7
Agriculture		**3**	
	Gov (State level)	1	P15
	Non Gov	1	P16
	Private	1	P11
Fire brigade (flood hazard rescue) (Group interview – 2 interview partners)		**1**	P17
Total: Interviews / Interview partners		**17 / 21**	

Interviewed experts were introduced to the COMTESS rationale, scenarios and the areas to be sampled and modelled in detail. A template questionnaire was adapted for each interview partner. This contained open questions on the responsibilities experts had within their business / organisations and general views on climate change, sustainability, land use and coastal adaptation. They were further asked to evaluate the three COMTESS land-use scenarios and to formulate alternatives coastal land-use paths. Interviews were transcribed verbatim and coded following accepted methods in qualitative content analysis using the Atlas.ti software. Coding occurred iteratively based on two main axes of enquiry: first, transcripts were analysed to isolate perceptions on the desirability and feasibility of "Hold the Line" vs. Managed Realignment and implications for these two contrasting strategies. Subsequently, the obtained statements were revisited in detail to draw lines of argumentation used to support or reject these strategies. Interview statements are referred to within

brackets, as follows: Transcript reference number; paragraph numbers in the Altas.ti hermeneutic unit (e.g.: P1: 10-25). The complete hermeneutic unit is available from the authors.

2.1 COMTESS Baltic coast case study area: the Darß – Zingst region

The Darß - Zingst Peninsula and Bodden on the eastern German Baltic coast is a barrier island and lagoon system composed of unconsolidated Quaternary sediments still connected to the inland coast through the thin Fischland coastal cordon to the west (StAUN, 2009 – Figure 3). Erosion of the Darß and Zingst dunes and beaches on the open coast to the north are prevented through hard and soft defences, while the barrier island complex is a natural protection for the backing inland coasts of the Bodden. At present only a narrow in- and outlet located to the east of the Zingst peninsula connects the Baltic Sea with the Bodden lagoon to the south.

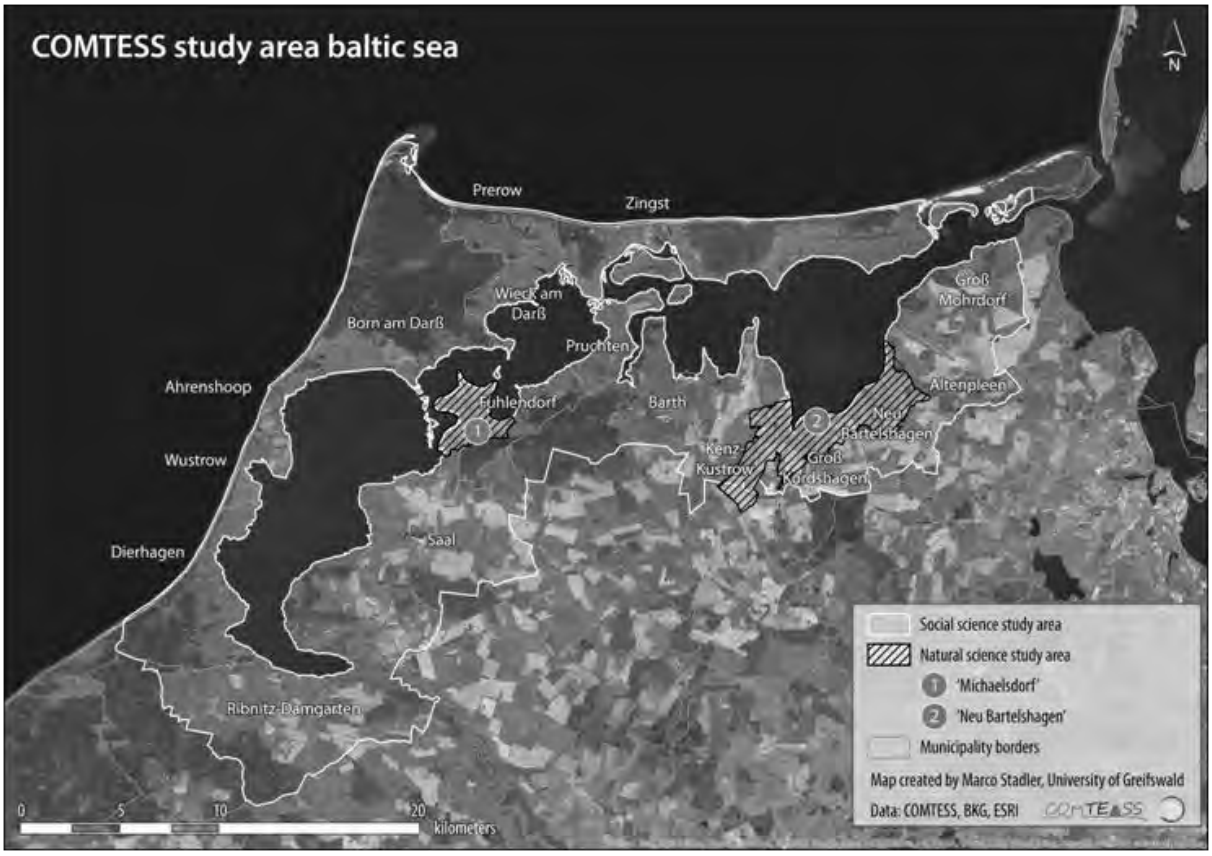

Figure 3: Location map of the Darß – Zingst case study region

In the case study region, different legal frameworks conflict in principle with each other. Indeed, on the one hand, the East Zingst Peninsula is a core zone of the National Park "Nordvorpommersche Boddenlandschaft" so that neither construction nor land use should be permitted. At the same time, the Darß – Zingst Peninsula is the cornerstone of the local coastal protection concept for the inland Bodden coast. To optimise coastal defence costs, rather than strengthen the dikes around each settlement of the Bodden coast, it was decided in recent years to reinforce the East Zingst Peninsula. Starting 2004 a new dike was constructed, which ironically runs in the middle of the National Park core zone (StAUN 2009). A vast re-naturation programme should compensate for the ecological damages of dike construction after its completion in 2014. This implies the abandonment and / or active breaching of existing dikes, which currently surround the East Zingst Peninsula with the

exception of the western dikes that protect the settlement of Zingst and the highly valued freshwater forest of Osterwald.

Two specific areas on the Bodden coast were chosen for the modelling assessment within the COMTESS project (Figure 3): 1) the Michaelsdorf Peninsula by Fuhlendorf and the depression area around Neu Bartelshagen described in Table 4 below. Although East Zingst was not included in the modelling exercise, we consider it here, since it is the largest current Managed Realignment site in the region.

Table 4: COMTESS case study sites in the Darß – Zingst Region

	1	**2**	
Name	**Michaelsdorf**	**Neu Bartelshagen**	**East Zingst**
Present coastal defence	Agricultural 2nd order dikes	1st Order Dike over most of the area, though to the west, 2nd order dikes	New 1st Order Dike is the cornerstone of the current coastal protection strategy Existing dikes to the north and south will be breached / removed to allow restoration of natural processes and the renaturation of the Sundische Meadow
Responsibility	Local land users and population under Soil and Water Association	1st Order Dike under state responsibility, though attempts to transfer responsibility to Soil and Water Association, which already caters for 2nd Order dikes	State of Mecklenburg- Western Pomerania National Park Vorpommersche Bodden Landschaft
Dominant land use	Pasture (sheep)	Arable land Pasture (cattle)	To the north and west forest under conservation (Osterwald), to the south (Sundische Meadow), pasture Expected impacts through re-naturation: • on the Sundische Meadow: salt meadows to be restored through pasture • to the north, progressive degradation of the woodland through salinisation from dike overtopping. • to the west, the Osterwald remains protected and is not affected by the re-naturation
Land tenure	National Park / Private	Private	National Park

3 RESULTS

The three original COMTESS scenarios have been organized along two axes (Figure 4). The first pictures the coastal defence option ("Hold the Line" vs. Managed Realignment), while the second represents the land use vs. conservation focus. Current / plausible implications of the COMTESS scenarios for the cases study sites as identified from project documentation and statements from our interviewed experts have been re-organised along this matrix, (Table 5). Synergies as well as incompatibilities emerge in different combinations of coastal protection and land-use strategies as envisaged by COMTESS.

For example, migratory cranes can feed on harvest remains from maize cultivation under Business as usual (P12: 61-74). Sheep grazing on dikes combine pasture with low cost maintenance of protective structures, while dike tops used as cycle paths are an important infrastructure that raises touristic attractiveness (P10: 125-127). Similarly, under Managed realignment carbon storage in coastal moors may also fulfil specific conservation goals (P2: 193-204). A range of alternative land uses that may be compatible with Managed Realignment are already being experimented with in the region. For example, if current cattle breeds can pasture on wet salt meadows, water buffaloes may be better adapted to semi-permanently flooded pasture conditions (P6: 221-229). Also, potential applications of reed, a traditional resource for roofs (P11: 140), and other moor vegetation are been explored and tested upon in the Project VIP[7] (P1: 288-298). However, specific strategies and goals are clearly mutually exclusive. For instance, moor re-naturation is incompatible with reed harvesting, while process-based conservation (e.g. wetland growth in pace with sea-level rise) that could be fostered with Managed Realignment, cannot be reconciled with the conservation of specific freshwater / terrestrial biotopes. The latter influenced the decision to maintain and upgrade coastal defence structures to protect the Osterwald on the East Zingst Peninsula from salinisation / flooding (StAUN 2009).

Table 5: Positive elements associated with the COMTESS land-use scenarios and synergies

	Managed Realignment	**Hold the line**
Conservation	• Climate mitigation • Restoration of natural processes / buffers (process conservation) • Landscape naturalness (nature tourism)	• Freshwater biotope conservation
Both	• Optimisation of adaptation costs • Improvement of inland drainage • Release of compensation areas	• Feeding grounds for migrating birds (species conservation)
Land use	• Preserving cultural landscapes and diversity • Alternative sustainable income sources • Renewable energy through reed	• Maintaining agricultural productivity, local economy and tourist attractiveness • Fostering food security • Renewable energy through arable crops

[7] Vorpommersche Initiative für Paludikultur - http://www.paludiculture.com/index.php?id=35 (29.09.12)

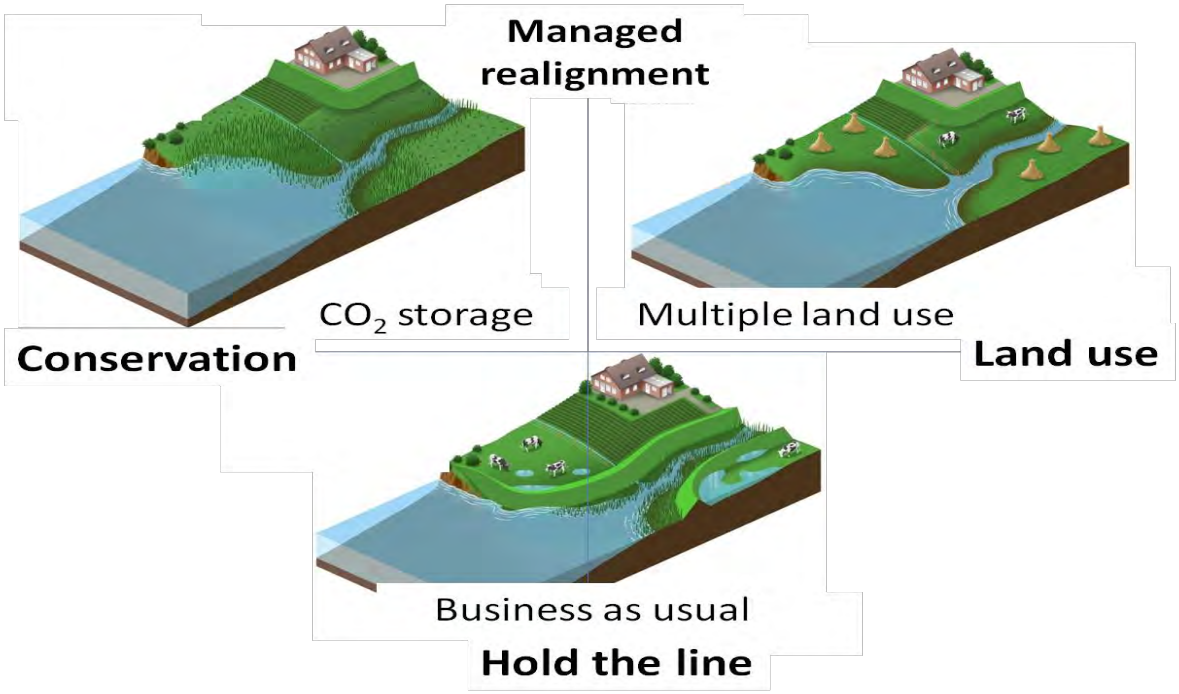

Figure 4: Restructuration of COMTESS land-use scenarios

Table 6 shows an overview of the arguments used by different parties involved in the assessment of the various combinations of coastal defence and land-use strategy encompassed within the COMTESS scenarios. Since interviews used open questions, not all aspects considered below were mentioned by any one interviewee, while different actors from the same "sector" may have placed different emphases. Important overlaps as well as critical differences in focus, interests and priorities among different experts involved became thereby clear. This overview contributed substantially to the articulation of the fourth, "expert-based", COMTESS scenario to be discussed below.

Table 6: Different priorities mentioned by different actors involved in COMTESS

	COMTESS	Coastal Management Regional Planning (P10, P13, P17)	Local authorities (P7, P11, P12)	Conservation (P1, P2, P3, P4, P9, P14)	Agricultural sector & Inland Drainage (P5, P6, P8, P15, P16)
MR (Co^2 Storage)					
Climate mitigation	■	■		■	
Restoration natural processes	■	■		■	
Process conservation	■			■	
Landscape naturalness (nature tourism)	■			■	
BOTH					
Coastal protection (population)	■	■			
Optimisation long term adaptation costs	■	■			
Improvement of inland drainage	■	■	■		

	COMTESS	Coastal Management Regional Planning (P10, P13, P17)	Local authorities (P7, P11, P12)	Conservation (P1, P2, P3, P4, P9, P14)	Agricultural sector & Inland Drainage (P5, P6, P8, P15, P16)
Release of compensation areas		■	■	■	
Release of economically marginal lands		■			■
MR (Multiple Land Use)					
Preserving cultural landscapes / diversity	■		■	■	■
Alternative sustainable income sources	■	■	■	■	■
Renewable energy through reed	■				
Hold the Line					
Coastal protection (population / agriculture)	Control scenario		■		■
Biotope conservation			■	■	
Crane feeding grounds (species conservation)				■	
Local economy, agriculture, tourism		■	■		■
Fostering food security			■		■
Renewable energy through arable crops		■			■

Interestingly, experts from different institutions may support Managed Realignment, while emphasizing different priorities. Thus, from a local and regional planning perspective Managed Realignment may help to secure compensation areas for development projects (P10: 15; P3: 55-57; 231-271), from a coastal zone management view, it may also contribute to optimize coastal adaptation budget (P4: 8-13; P9: 127-133). From an environmental management perspective, it may provide additional water retention surfaces to mitigate flood risk, help regulate nutrients (P9: 73-75), but also to keep pace with SLR (P4: 3) and contribute to regional climate protection goals (P2: 31; P4: 3). From a conservation point of view it can further foster the ecological restoration of important natural buffers, create a high value cultural landscape mosaic and alternative sustainable livelihoods (P15: 6-69; P3: 94-97). The diversity in these answers highlights the potential synergetic effects of Managed Realignment in different dimensions of policy and management.

In contrast, different experts may stress a similar priority, but envisage very different, possibly incompatible strategies to achieve it. For example, optimizing coastal protection costs for a policy expert may imply Managed Realignment, whereas for an expert from the agricultural sector, it might primarily involve technological improvements to reduce energy costs needed for drainage (P7: 45-59; P6: 203-205; P8: 215-237; P8: 239-261).

Moreover, the perception of expected, desired or feared outcomes appears to significantly influence how specific coastal zone management and land-use strategies are judged. For example, the expected outcomes of Managed Realignment mentioned above can partly explain the generally positive attitude of the experts from governmental administration interviewed (P4: 32; P9: 67; P13: 453). However, for experts, whose constituencies, environment or activities may be directly affected, Managed Realignment and re-naturation programmes are primarily associated with potential land loss, and

thus as a threat to local agriculture (P6: 181-183; 219-221), livelihoods, employment and local development (P11: 33-38) and more broadly cultural landscape and regional identity (P9: 191-205). Also, the restoration of near natural landscape processes and dynamics is welcomed by conservation experts (P2: 71-79). Nevertheless local authorities fear that specific cultural landscape may turn wild (P11: 54; P9: 191-205; P2: 277-279) and landscape aesthetics and desirable biodiversity significantly decline (P11: 54; 140-144; P6: 203-205). This would in turn strongly affect tourist attractiveness and the local economy (P2: 281-283). Interestingly, negative perception of landscape uniformity (e.g. spreading reed beds in the Carbon Storage scenario) can also work against the Business as usual scenario, when intensive agriculture and its effects (e.g. monoculture plantation, water and soil contamination) are rejected (P7: 119-131; P2: 295-311).

Further, experts perceive differently the necessity to prepare for possible future climate change impacts and its degree of urgency. Overt positions on climate change range from scepticism towards the urgency raised by climate change to full endorsement (P15: 64; P17: 37; 123). Interviewed experts from governmental administration and conservation organization tend to underscore mainstream climate change discourse, while local private sector / authority experts are more likely to question the climate change discourse and argue that other matters have higher priority.

Perceptions on the feasibility, desirability or legitimacy of alternative land-use strategies are again very diverse. For example, if bioenergy from reed is largely dismissed by many interviewed experts due to the perceived lack of technical feasibility, efficiency or economical viability (P1: 129-141; 288-298; P7: 119-131; P5: 69-85; P3: 132-135), bioenergy from maize is often judged morally unacceptable, since it threatens food production and security (P11: 80; P14: 3-328). Furthermore, the argumentation used by different experts to embed their approval or rejection of Managed Realignment in a wider debate on individual and societal responsibility is interesting. For example, one expert openly questions costly long-term coastal adaptation that protects individual assets at the expenses of tax-payers and the broader needs of society (P2: 313-321; P4: 7). Also, if experts from the farming sector may argue that agriculture's role towards realizing food security legitimates federal subsidies for coastal protection (P5: 61-68), conservation experts on the contrary may fundamentally question the agricultural subsidy system (whether for food or bioenergy) that is believed to artificially maintain the economic viability of agricultural activities on marginal land and makes ecological re-naturation difficult to implement (P10: 161-185; P15: 597-625).

3.1 Expert-based scenario

Table 6 makes the wide spectrum of expert opinions on the COMTESS scenarios visible, as well as convergence and divergence with the rationale of the project. Though some experts hold very clear and strong views on the appropriateness, desirability and feasibility of "Hold the Line" or Managed Realignment strategies, there is room for commonalities of interests. Thus if experts generally agree that coastal surge and flooding can seriously impact the region and require appropriate anticipatory adaptation action, they in general disagree on the rationale of the COMTESS scenario. Two main aspects have generally been criticised by interviewed experts:

- The COMTESS scenario envisage one single land-use strategy over the modelled area (e.g. Carbon Storage), which is uniformly implemented in time and space. The relocation of coastal defence occurs in the first modelled time step and remains valid for the whole modelled period (i.e. till 2100).

- The COMTESS scenarios do not take into consideration the complex interactions of policy, economic and societal drivers that influence land-use decisions. However, the latter, for interviewed partners, are primarily driven by changes in economic viability (e.g. of agricultural production), which in turn is critically influenced by public / European Union subsidy programmes, world prices, national markets, lifestyles etc.

Though all alternatives proposed by experts could obviously not be reconciled into one single additional scenario, the critiques above emerged as a satisfactory common ground on which to formulate a fourth scenario. A key message from all experts, who did not fully support one or the other of the COMTESS scenario, was that a differentiation rule needs to be included to allow gradual Managed Realignment and land-use changes. For many experts, a radical change, though it might be perceived as needed / desirable, is not realistic. Instead, it is probable that land use will be maintained as long as it is economically viable (P5: 61-68; P16: 395-419; P6: 117-127) after which it will progressively be adapted only to be abandoned, when no further economically viable adaptation is possible (P5: 112-125; 150-183; P9: 219-251; P15: 568-574). To incorporate this land-use decision process, even if coarsely, it was proposed to include in the COMTESS modelling a threshold based on agricultural productivity and returns. A more realistic sequence of land-use change and coastal protection for interviewed experts would be as follows:

1. Continuation of current land use (Business as usual – "Hold the Line")
2. Once a given kipping point in viability is reached, a first Managed Realignment occurs. Productive areas are protected by new dikes, while on marginal land fronting these dikes land use is adapted to temporal flooding and gradual submergence ("Multiple Land use")
3. Once a further kipping point in viability is reached, dikes are constrained to settlements and land use is abandoned ("Carbon Storage")

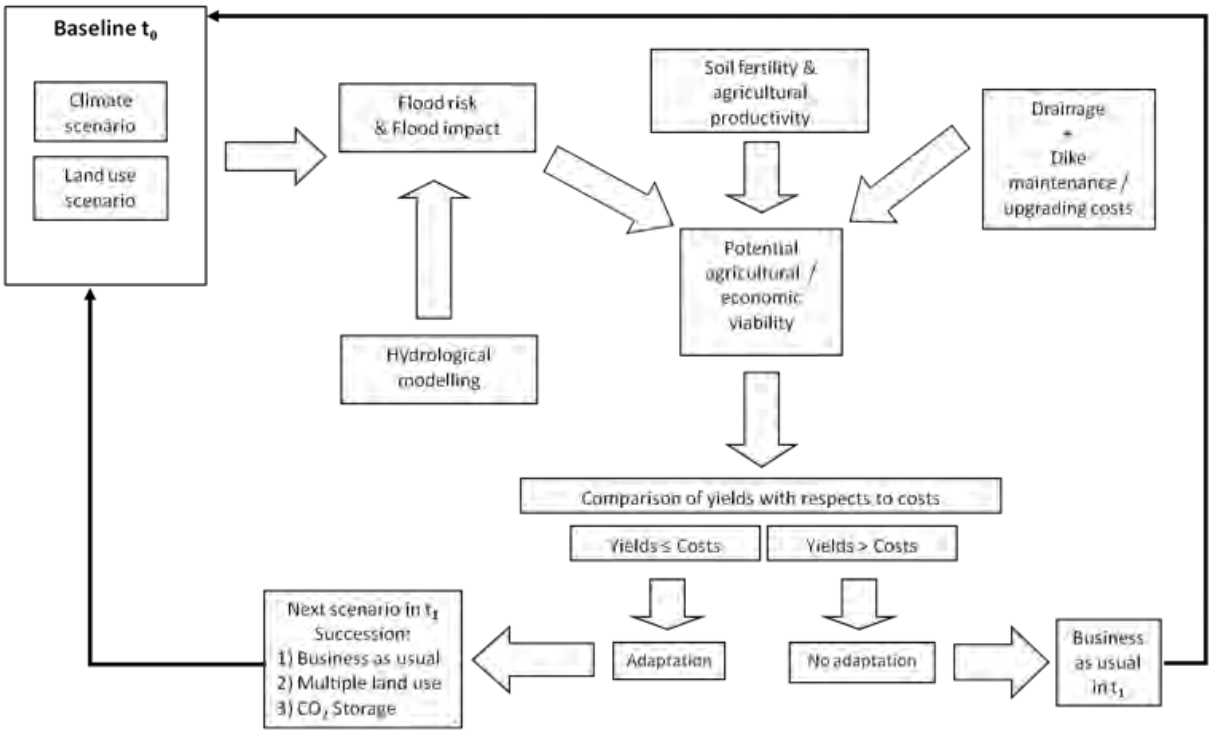

Figure 5: Proposal for the implementation of the expert-based scenario

Differentiation further not only applies temporally (i.e. with increasing sea-level rise) but also spatially (i.e. as specific areas progressively become unfit for Business as usual land use) (see Figure 5). This enables a more complex and realistic representation of land-use changes and adaptation, although it remains very coarse and does not adequately consider the complex interplay of global to local factors and processes that lead to land-use decisions.

This sequential Managed Realignment can be envisaged for the German Baltic region, since specific characteristics are in place:

- the low exposure to, and magnitude of, extreme coastal surges (in comparison to the North Sea)
- the compartmentilisation of the coast, the integrity of which does not rely on one coherent hard defence system (i.e. a breach of one dike does not fundamentally endanger wide stretches of coastal plain as in the North Sea region),
- the recent upgrade of major structural coastal defence works (e.g. on East Zingst), which secure the protection of coastal settlements and attenuate coastal surges impacts on the inland Bodden coast for the next decades.
- the legal framework of the State of Mecklenburg – Western Pomerania, which allows public authorities to disengage from the task of protecting agricultural land and enables the transfer of responsibility on local drainage boards
- the locally high soil quality (e.g. Neu Bartelshagen) and favourable current EU subsidies, which assures a high economic viability of cereal production (for food or bioenergy) on coastal arable land protected by dikes. Here, farmers and the responsible drainage boards experts insist that land users will choose to upgrade at their own costs the coastal dikes, even if reluctantly, should the State step out of this responsibility, rather than let go of the land (P5: 150-183; P8: 215-237; 421-443).

4 DISCUSSION

The COMTESS land-use scenarios are implicitly founded on a rationale of ecological and economic optimisation of coastal resources. The choice of Managed Realignment as coastal adaptation option explored in the COMTESS scenarios implicitly relies on a number of premises (See Table 7).

Table 7: Premises underlying the COMTESS land-use scenarios

Premise	**Hypotheses**
Climate change will lead to substantially increases in dike upgrade and maintenance and drainage costs.	➔ Long-term coastal policy and management aims at optimising these costs ➔ Alternatives that reduces the long-term economic costs of adaptation are desirable

Premise	**Hypotheses**
Managed Realignment has the capacity to: 1. reduce long-term economic costs of adaptation; 2. promote the re-establishment of natural habitats and processes, which can: a. allow coasts to keep pace with sea-level rise b. act as valuable carbon storage c. form adequate sources of bioenergy	➔ Managed Realignment is in principle beneficial both economically and ecologically ➔ Managed Realignment is in principle a desirable coastal adaptation option
Different land-use strategies have different implications for the local provision of ecosystem services. Modelling results on synergies and trade offs is an important decision-making tools in land-use policy and management	➔ Modelling informed by detailed experimental work leads to a better understanding of complex interactions that substantially influence ecosystem service provision under specific land-use strategies and trade offs between these.

Some of these premises and hypotheses may be shared by a number of experts involved in the COMTESS project, but not necessarily all to them. The rationale of the COMTESS scenarios supports an overall goal of optimising coastal ecosystem services and adaptation costs in the context of accepted scientific discourse on potential climate change impacts. Interestingly, it appears that since the turn of the century a slow process of mainstreaming of the Managed Realignment strategy is taking place in Northwest Europe. From localised experiments in a dominant "Hold the Line" discourse, managed realignment is gradually becoming endorsed explicitly or not in regional and national legal and planning framework, though only envisaged in areas of high exposure, low population and / or capital assets, where hard defence would be a costly long-term commitment. The arenas where this mainstreaming is arguably most visible include research on climate change impact and adaptation and coastal ecological processes (a precursor of COMTESS, RegIs performed the first UK coastal vulnerability assessment to envisage explicitly Managed Realignment - Holman et al. 2002), applied sciences on renewable energy and climate mitigation (e.g. the VIP project mentioned above), coastal zone management administrations (e.g. UK Natural Environment White Paper - HM 2011) or conservation administrations and non-government organisations (e.g. white paper on re-naturation from the leading German conservation non-governmental organisation NABU 2012).

Managed Realignment fundamentally implies a prioritisation in coastal defence and land-use management. More practically this means:

1. coming to turns with the notion of letting go some of the land won to the sea, which runs against the grain of centuries of coastal occupation,
2. a new valuation of coastal land-use and ecosystems and services (as seen in increasing demand for compensation areas),

This strategy effectively leads to a differential approach: the reinforcement of hard coasts in densely occupied areas simultaneous to the release of land and ecological restoration in sparsely occupied ones. Managed Realignment is, thus, a substantial departure from historical trends in coastal land

claim and is politically a very sensitive issue. If implemented at large scale it can result in a significant reconfiguration of coastal land use, which at local level often causes strong rejection and social mobilisation. This resistance to let go of land claim can be associated with deeply engraved conceptualizations of the occupation and use of coastal regions, perceptions of landscape aesthetics and cultural identity, while other factors such as land tenure, definition and perception of coastal risk, lack of understanding of coastal dynamics also play an important role (Goeldner 1999; Ledoux et al. 2015; Goeldner-Gianella 2007; 2008; Rupp-Amstrong and Nicholls 2007). Resistance and conflicts related to endangered individual preferences and assets can nevertheless not simply be appeased through raising awareness of the expected societal gains of Managed Realignment. They raise fundamental and complex social justice issues and need to be addressed though adequate participation in decision-making (O'Riordan and Nicholson-Cole 2010).

5 CONCLUSIONS

In the Darß - Zingst study area coastal defence plans have now been fixed for the next decades and are non-negotiable. At the same time Managed Realignment is clearly embedded in the legislation of Mecklenburg – Western Pomerania and is actually taking place. A growing consensus on the necessity in future for localised land abandonment and some form of coastal land-use adaptation is emerging in science, policy, regional planning and coastal land management arenas. To a certain extent, we are thus witnessing a process of mainstreaming of Managed Realignment, which results in the harmonisation of science and policy discourse. However, if Managed Realignment appears to becoming increasingly desirable in these arenas, implementation remains politically, socially and also technically complex. Thus, the actual breaching of dikes and re-naturation entails important uncertainties related to the capacity of semi-natural processes to re-establish resilient dynamics. Managed Realignment is not simply about letting go, but about carefully engineering the desirable ecological response.

Nevertheless, locally affected land users and inhabitants continue to show a very vocal resistance to Managed Realignment and a strong attachment to the traditional "Hold the Line" coastal defence paradigm. Interviewed experts representing potentially affected parties confirm that: 1) Managed Realignment and coastal re-naturation is polemic and can only be envisaged in specific circumstances, while 2) coastal defence should prioritize not only the protection of populations but also of their productive resources and activities.

Our work points at key discrepancies between science, policy and societal views on Managed Realignment and in the rationalisations, positions and legitimisation of coastal defence and land use. These are indirectly related to different perceptions and prioritisations of what is needed vs. what is desirable vs. what is acceptable. More complex modelling frameworks, which incorporate critical factors and processes that affect societal vs. individual adaption in coastal land are needed to address societal reactions towards controversial strategies, such as Managed Realignment, and develop acceptable consensual approaches towards their implementation.

In this respect, Douglas et al. (2012) invites us to consider adaptation also as a creative social process, where communities re-explore their cultural attachment, needs and aspirations in relation to their coasts. In this task, science and policy have a key role to play by fostering societal debate and common

understanding on sustainable coastal land use, possible avenues and their implications and construct a solid legal framework towards adaptive, socially just and democratic coastal management (O'Riordan et al. 2014; Schmidt et al. 2013).

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