

G. Martinez, P. Fröhle,  
H.-J. Meier (Eds.)

**KLIMZUG** 

## **Social Dimensions of Climate Change Adaptation in Coastal Regions**

Findings from Transdisciplinary Research

*Klimawandel in Regionen zukunftsfähig gestalten / Volume 5*



Grit Martinez, Peter Fröhle, Hans-Joachim Meier (Eds.)  
**Social Dimensions of Climate Change Adaptation  
in Coastal Regions**

Findings from Transdisciplinary Research

ISBN 978-3-86581-682-5

252 Seiten, 16,5 x 23,5 cm, 29,95 Euro

oekom verlag, München 2014

©oekom verlag 2014

[www.oekom.de](http://www.oekom.de)

Grit Martinez, Mike Orbach, Fanny Frick, Alexandra Donargo,  
Kelsey Ducklow, Nathalie Morison

## The cultural context of climate change adaptation *Cases from the U.S. East Coast and the German Baltic Sea coast*

### **Abstract**

This contribution explores the role of socioeconomic development, as it is displayed in law and policy, in relation to perceptions, local knowledge and values concerning adaptation to climate change in two geomorphologically similar coastal regions: the East Coast of the U.S. (specifically, the states of Maryland and North Carolina) and the Baltic Sea coast in Germany (the states of Mecklenburg-Western Pomerania and Schleswig-Holstein). Though the study sites both face large and similar natural threats, such as coastal erosion and storms, the social, economic and cultural ‘climates’ and political and policy approaches to dealing with changing environmental conditions and the acknowledgment of and response to climate science have developed differently in the U.S. and in Germany. Against these differences, we investigated the varying ways in which the local knowledge and socioeconomic values have shaped risk perceptions, interpretations and actions. We found that experiences, history and values of a distinct community in a given region shape their perception of climate change, and hence their response to their changing environment. The article illustrates that regional and local policies for adaptation to a changing climate, if they are to be grounded and sustainable, must be understood and developed within a given cultural perspective, through an understanding and appreciation of local knowledge, values and belief systems.

## 1 Introduction

Changes in environmental conditions have always created the need for people to alter their way of living, i.e. to adapt to change. This is particularly evident in coastal regions, where such phenomena as storm surges and changes in coastal morphology require coastal dwellers to be prepared to adapt to changing conditions. Never in human history has the share of the global population living close to the sea been as big as it is today. At the same time, the impacts from climate change—in particular sea level rise—heighten levels of risk and uncertainty in coastal regions (McGranahan et al. 2007). While this pattern of increasing exposure to risks in coastal areas can be observed at global level, the political and policy approaches to climate change, its consequences and required actions are pursued differently at national, state/regional and local levels.

Both Germany and the United States are economically highly developed nations with well-developed democracies. Coastal settlements have significantly contributed to socioeconomic development in both countries for centuries, although the history of such settlements is a great deal longer in Germany. The countries moreover share a long history of environmental awareness: In the 18th century, German scholars noted that “the effect of the environment on human life was mediated through culture.” (Galloway 2002) This later eventually resulted in the German environmental movement which, after the Second World War, emerged differently in the Federal Republic of Germany and the German Democratic Republic. Likewise, in the United States the history of environmental thinking has been well established. As early as 1995, an anthropological study on how Americans view global warming and environmental changes revealed that “half to three quarters of all Americans now consider themselves to be ‘environmentalists’” (Kempton 1997). Nevertheless, the two countries’ socio-political conditions and political and policy reactions to climate-related changes differ significantly.

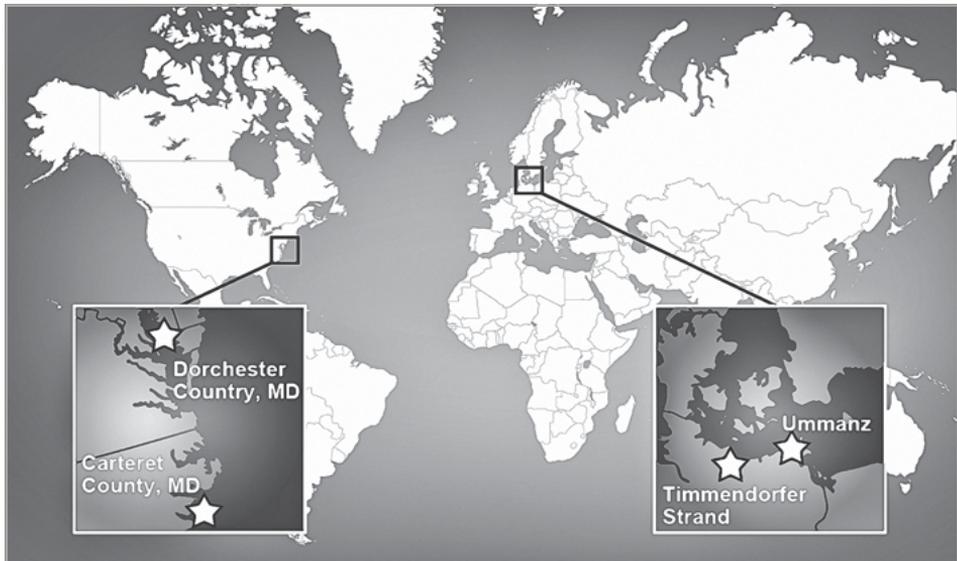
The actions taken by coastal dwellers in response to changing environmental conditions are based on habits specific to local culture, and shaped by the struggle that living in a coastal environment entails (Cutter et al. 2004). We therefore argue that by investigating coastal societies “from below and within”—e.g. their interaction with coastal landscapes, their local knowledge and the history of their social-economic developments—policy makers can gain new insights into drivers and motivations for climate change adaptation. In this respect, the following text sets out the varying ways in which the local knowledge, experience and wider political context of cultural entities (communities and counties) in coastal areas

in the U.S. and Germany have shaped their respective patterns of risk perceptions and interpretation that have in turn shaped responses to climate change. We conclude by outlining what can be learned from such differences, and what the preconditions for a transatlantic learning exchange might be.

## 2 Study region

The research in the U.S.-Atlantic coast region was conducted in the Chesapeake Bay region of Maryland and the region surrounding the Albemarle-Pamlico Sound complex in North Carolina. The Mid-Atlantic region is one area of the U.S. that is likely to see the greatest impacts of climate change due to rising waters, subsidence, increased storms and a high population concentration along the coastline. Substantial shoreline areas are already feeling the effects of sea level rise and erosion of tidal marshes (Titus et al. 2009). While Maryland's state government actively encourages communities to implement adaptation activities<sup>1</sup>, the state senate of North Carolina acts in an opposite way. In 2012, the North Carolina Leg-

<sup>1</sup> E.g. in the web-based portal <http://dnr.maryland.gov/CoastSmart/>.



**Figure 1:** Map of study region (U.S. and Germany) (Source: the authors).

islature voted to pass a bill (North Carolina HB819) that prevents state and local agencies from developing regulations or planning documents that consider the possibility of a significant increase in the rate of sea level rise in the future until the year 2016.<sup>2</sup> The portion of the research that we will cite here was carried out in Dorchester County, Maryland, and Carteret County, North Carolina. These counties exhibit geophysical characteristics and projections for sea level rise and storm surges similar to those in the German Baltic Sea region.

In Germany, the research was undertaken in two counties: Timmendorfer Strand, Ostholstein, and Ummanz, Western Pomerania, Rügen. Although storm surges have been less of a threat on the Baltic coast of Germany (Sterr et al. 2004) than on the Mid-Atlantic Region (Titus et al. 2009), as a consequence of climate change and the associated sea level rise, higher storm surges can be also expected in the western Baltic in the future (Gräwe & Burchard 2011: 180). The state's government is therefore urging communities to increase coastal protection and adaptation measures.

### 3 Study Sample and methods

The research consisted of two parts: (1) a literature review (including media analyses) and (2) in-person interviews with key informants as well as random “on-the-street” interviews. Desk research focused on the biophysical, human, institutional and economic history of the counties and communities. The reviewed material included chronicles, narratives, paintings and photos, and provided the ethnographic background for the subsequent interviews which took place in autumn and winter 2012/13.

In addition, newspaper articles from local media covering topics related to climate change, sea level rise and published within a period of one year (between July 2011 and July 2012 for the U.S. and between October 2011 and October 2012 for Germany) were analysed. The purpose of this media analysis was to identify dominant framings of causes, consequences and responses to coastal change. While the framings identified should not be mistaken as representative of the dominant framings in the study areas (because framings in one newspaper only represent those of the respective discursive community, i.e. mainly the journalists and readers), they demonstrate how arguments for or against adaptation to

---

<sup>2</sup> <http://votesmart.org/bill/15389/40899#.UxdH5xC2yIA>, accessed 5 March 2014.

coastal change relate to belief systems, values and socioeconomic conditions. As the newspapers were selected by circulation number, the framings represented are considered to be influential in the case study areas (cf. Frick 2012 for detailed methods of the media analysis).

The length of semi-structured interviews with key informants (municipal and county officials, government employees, and local residents) varied between 1.5 and four hours while “on-the-street” surveys usually took 15–20 minutes. In the U.S. a total of 165 interviews with 39 key informants and 125 “on-the-street” citizens were conducted, although the analysis detailed below in this article refers only to those interviews conducted in Dorchester (7 key informants and 20 on the street) and Carteret Counties (13 key informants and 20 on the street). In Germany, 17 key informants were interviewed and complemented by 30 “on-the-street” interviews. The survey questions centred around knowledge about climate change, its local impacts, needs and measures of adaptation, and were derived from a survey on perceptions of climate change among decision-makers in the German Baltic Sea region conducted by Bray and Martinez (2011). They were adapted to the local context for each case study area (see Donargo et al. 2012, Martinez, Frick and Gee, this volume). Questions asked in semi-structured interviews were also guided by the survey questions. Because of the small sample size, data collected in Germany was assessed in a qualitative analysis and is presented as such. The dataset from the U.S. counties by contrast allowed for a quantitative analysis. The return of articles in the media analyses was highly uneven (120 in the U.S. versus 37 in Germany). Because newspaper articles in Germany were found on Timmendorfer Strand only, and not on Ummanz, results were discussed as background information rather than as a centrepiece of information in the German case.

The cases were first analysed individually. Key factors shaping attitudes towards adaptation to coastal change were identified for each case study areas (see Frick 2012 and Martinez, Frick and Gee, this volume). These were then compared to derive parameters of socioeconomic development and cultural values along which sociocultural differences in attitudes towards adaptation to coastal change occurred.

## 4 Findings

### 4.1 Socioeconomic context and local approaches to coastal adaptation

#### 4.1.1 *Germany*

The community of **Timmendorfer Strand** is a famous historic spa resort situated at the Bay of Lübeck on the Baltic Sea coast of the German federal state of Schleswig-Holstein. Timmendorfer Strand ceased to be a farming village in the early 20th century. Ever since then, tourism development has been the major driver of the economy, and consequently of land-use changes. With about 1.2 million overnight stays per year, the local economy strongly depends on tourist activities and secondary homes in the area (Lehners: 2011). The community's beach assets (monetary values) are mostly concentrated along the sea front. Today, the political discourse in Timmendorfer Strand focuses heavily on the importance of this tourism. This is also reflected in a very utilitarian view on nature as the basis for tourism business (see Martinez, Frick and Gee, this volume).

Due to its low elevation (approx. 3 metres above mean sea level), the community is acutely threatened by flooding in the case of extreme storm surges. In the past, the state authority for coastal protection has repeatedly highlighted the critical situation, putting forward technical solutions to the municipality for raising the existing dyke. After years of struggle over the form of future sea defence, a sea wall was finally constructed to protect the community from future coastal flooding, including that induced by climate change/sea level rise.

**Ummanz** is situated off the coast of the island of Rügen in the Baltic Sea and belongs to the federal state of Mecklenburg-Western Pomerania. The island has been connected to Rügen via a long bridge since 1901. Ummanz is extremely flat and its 20 square kilometres of land are frequently inundated with water from the shallow lagoons around Rügen. Up to today, Ummanz has retained a relatively pristine countryside, sculpted by fishing and agriculture. Until the collapse of the German Democratic Republic in 1990, the community of Ummanz was a prosperous area due to intensive cattle and crop farming and fishery. Today, only 600 inhabitants live in coastal flood-prone areas next to the Lagoon Area National Park. The community is solely dependent on agriculture and scenic tourism (in the absence of sandy beaches), and enjoys what is still a rather insider reputation for ecological tourism. Large-scale reclamation through dykes and development of wetland drainage was implemented in Ummanz in 1879 (Freyschlag 2009: 65).

Today, agricultural land in Ummanz is drained using coastal pumping stations by the water and soil association (*Wasser- und Bodenverband*) of the community (Landtag Mecklenburg-Western Pomerania 2007: 3). The expenses are carried by the beneficiaries of land drainage, i.e. land owners (ibid: 3). Coastal protection in Mecklenburg-Western Pomerania—with the exception of protection of agricultural land—is the responsibility of associations for coastal protection. As part of a transitional arrangement, the state government can take over coastal protection, but only in built-up areas, which is the case in Ummanz (Landtag Mecklenburg-Western Pomerania 2007: 2; see section VIIc). Coastal defence measures in settlements consist of dykes. Different proposals for adapting coastal defence to rising sea levels are vividly disputed in the community.

#### 4.1.2 United States

**Maryland/Dorchester County:** Maryland's Eastern Shore has been inhabited since four centuries ago (White and Fole 2012). Town names like Cambridge, Oxford, Salisbury, Easton or Vienna, and counties such as Kent, Queen Anne or Dorchester, refer to the European heritage of the early settlers. The county seat of Dorchester is the historic town of Cambridge (founded in 1669). Having been settled for hundreds of years, this maritime region has developed a strong set of regional traditions and values with skipjacks (a local type of sailing fishing vessel) functioning as a symbol of the cultural heritage of the Chesapeake Bay. The activities in the region, mostly fishing and farming, demand that many inhabitants have close contact with nature. Since 1973, the Chesapeake Bay Bridge has connected the state's rural Eastern Shore region with the more urban Western Shore (where the state capital Annapolis is located). The bridge which connects Anne Arundel County and Queen Anne's County, also metaphorically joins the politically liberal western shores with the politically conservative eastern shores, where people tend to live in small villages and scattered settlements. While the extent and range of climate change impacts may vary, it is generally agreed that the low-lying eastern shores are at high risk and susceptible to erosion, flooding and inundation. Maryland deems Dorchester County as one of three counties most at risk in coping with irreversible damages due to sea level rise, and "much of the County is already wet and getting wetter" (Cole 2008). Since 2008, the Maryland Department of Natural Resources and the Maryland Chesapeake & Coastal Program have been active in designing instruments to support adaptation activities. In Maryland, for instance, a website entitled "Coast Smart Communities" was put in place for counties and political decision-makers: Counties who are interested in

learning more about adaptation can obtain services from Maryland's coastal programme (DNR Maryland 2013). Although these services are available, the use of the services is voluntary, and consequently the more politically conservative regions of the state may not fully take advantage of the information. A variety of studies point out that conservative political attitudes in the U.S. make people less responsive to climate change issues. For instance, studies exist that show the relationship between political attitudes and climate change perception (Hoffman 2011). In the case of Dorchester County, one of the most vulnerable regions at the Chesapeake Bay, the politically conservative attitude of the local county council—which employs staff of the county's planning and zoning department—has led to a situation where concern regarding environmental changes is often limited to the protection of property values and to attracting potential secondary house owners (Pyke et al. 2008).

**North Carolina/Carteret County:** As a coastal state with over 19,000 kilometres of inland sound coastline and more than 500 kilometres of Atlantic Ocean coastline along the barrier islands, North Carolina is extremely vulnerable to sea level rise and has a long and continuous history of battling shoreline erosion. Many houses are built in low-lying areas, next to the sea on very vulnerable locations, even within the sand dunes. The tax income from those properties represents an essential portion of the income of coastal counties. Consequently the communities/counties have very little interest in opposing development near the shore.

Carteret County is located at the eastern fringe of the U.S. Atlantic coast, reaching far into the Atlantic. The county seat is the historic town of Beaufort (founded in 1722) which is well known for its history and heritage of fishing, shrimping and oystering. Like Dorchester County in Maryland, most of the county consists of very low-lying shoreline communities. The often isolated houses and fishing villages in the marsh county east of Beaufort are known as the “Down East” area, where people still speak an Elizabethan-sounding brogue. Nevertheless, the 21st century is certainly present: Traditional fishing and lifestyle is declining and especially the shoreline areas in Carteret County have changed their character from residential population to seasonal population (secondary house owners) and year-round residents such as retirees. These are mostly white, well-off residents who tend to live along the ocean shore, often protected by costly measures for their coastal defence while “in return” contributing to the income of the county via their property tax. As a result of this dependency on local property taxes, coastal real estate development defines the voice of the political attitude towards climate

change and discussions about sea level rise. In 2012, the board of Commissioners and the county manager of Carteret County expressed the concern that “exaggerated sea level rise projections and resulting policy/rules can cause irreparable economic harm to the coastal plain of North Carolina by adversely changing land/property values, uses, insurances, and construction/ maintenance costs of both private and public infrastructure” (North Carolina Carteret County 2012).

#### 4.1.3 *Differences in local approaches to coastal adaptation*

In summary, in the German cases, strategies for adaptation to climate change consist of strengthening hardening structures. In Timmendorfer Strand, the strategy was implemented in the construction of a sea wall, whereas in Ummanz, disputes over what parts of the island to defend, how high to raise dykes, and how to cover the costs involved have impeded the implementation of any strategy thus far. Adaptation to rising sea levels and storm surges in Germany is equated with ‘coastal protection’—understood as the defence of human settlements from the sea. This paradigm of defending the coastline against (natural) change has traditionally dominated coastal management in Germany and remains unquestioned both in local discussions and in governmental plans. Many residents in Ummanz consider it their duty to protect the land their ancestors reclaimed from the sea for cultivation. Accordingly, there appears to be no room for discussing alternatives to hard structures of coastal defence such as sea dykes (see Martinez, Frick and Gee, this volume).

By contrast, approaches to coastal adaptation are more differentiated at the U.S. coast, both in current policy making and planning and in historic responses. In the U.S. cases, myriad strategies for adapting to rising sea levels are discussed and partially implemented, ranging from coastal retreat and soft structures to allow for natural shoreline development, to individual constructions of hard defence structures. Particularly in Carteret County, interviewees were very aware of ongoing responses to coastal change (only 15.4 % said that no action had resulted from changes discussed; as opposed to 60 % in Dorchester County). Next to hard structures—the construction of which is illegal by state law on the ocean front of North Carolina, where Carteret County is located—other types of responses were frequently discussed in the interviews in the U.S. With regard to responses to flooding and erosion in the past, hard structures, retreat, soft solutions such as sand nourishment, environmental restorations and raising structures were mentioned, but 40 % in Dorchester and 7.7 % in Carteret said nothing had been done.

## 4.2 Comparative findings parameters

Based on the analysis of the development of coastal adaptation strategies in the different study areas, key socioeconomic and cultural factors were identified that shape attitudes and approaches to adaptation. In the U.S., these were values, knowledge and experiences about coastal change, perceptions and acceptance of risk, private property issues and power relations (Martinez et al. 2014; Frick 2012). In the German cases, factors identified were socioeconomic values, perceptions of nature and the sea, and the history of socioeconomic and political development (Martinez, Frick and Gee, this volume). In the combined analysis, three parameters were found to be insightful as indicating variables of the divergent approaches in place. They include socio-cognitive as well as governance-related parameters.

### 4.2.1 *Discussing climate change and sea level rise (knowledge/perceptions of nature/experience)*

Overall, the findings from the German communities revealed that local residents are aware of climate change, but hardly regard it as a source of risk directly affecting them in their immediate environment. When considered at all, local impacts of climate change are regarded as less of a concern than other environmental problems (e.g. pollution). Instead, climate change is mostly considered a societal problem, and mitigation measures are far more present in terms of local awareness than in adaptation measures. The according framings were dominant in semi-structured and structured interviews as well as in newspaper articles. The historical 1872 coastal storm surge on the German Baltic Sea remains present in the social memory of coastal residents today. Hence, while only very few such residents have experienced damage or losses from coastal hazards, there is a general awareness of the risks involved in living near the coast, and of the need of protection from seaward hazards (see Martinez, Frick and Gee in this volume). Nevertheless, interviews demonstrate that people mostly do not feel threatened by sea level rise, presumably because they trust the existing coastal protection measures, and because no significant changes in sea levels have been reported for the past century. This contrasts with the high awareness of climate change as a local threat in national and state policy, where adaptation to rising sea levels and storm surges is paramount (MELUR-SH, 2013, Bundesregierung Deutschland, 2011).

In the case of the U.S., the analysis of newspaper articles from Maryland and the Carolinas revealed greater concern for the immediate impacts of climate change in space and time on the U.S. coast (Frick 2012). At the same time, less

than half of the respondents in Dorchester County said that climate change had been discussed in their communities in the context of coastal management, and just as many (47.2 %) said it had not. In Carteret County, 75.7 % said it had been discussed and 21.6 % said it had not. Sea level rise at the Eastern U.S. coast is a far more acute concern among residents and in planning than in Germany, since relative sea level rise has been reshaping the coast for the past century (Kana 2010). In Dorchester County, 50.0 % said that sea level rise had been discussed and 41.7 % said it had not, while in Carteret County 75.7 % said it had been discussed and 18.9 % said it had not. In both counties, all respondents had heard sea level rise discussed in the context of future development. Accordingly, framings of local vulnerability to sea level rise were frequent in the newspaper articles analysed (see Frick 2012).

In short, while interviewees in the German case study areas perceive little threat from climate change and sea level rise, those in the U.S. cases are much more aware of risks resulting from rising sea levels. The same is reflected in newspaper articles. At the same time, impacts from climate change more generally (in distant places, or at global level) are more often/explicitly discussed in the German case study areas than in their U.S. counterparts.

#### 4.2.2 Drivers of socioeconomic development

Based on its historic development as a spa resort, community development in Timmendorfer Strand is strongly shaped by private and public interests in tourism and property development. This is reflected particularly in the year-long quarrel over the construction of a sea wall: The design agreed on in a participatory process and finally implemented carefully takes account of the concerns of tourism (conserving the sea view, space for walking by the sea, etc.). Ummanz by contrast has experienced a major shift in its socioeconomic development since the collapse of the GDR, and the associated collapse of collective intensive agriculture and fishery industries. The economic crisis was accompanied by a comprehensive re-orientation in terms of ideologies and development objectives in the shift from communist to capitalist leadership during the early 1990s. The impacts of this re-orientation are still present in the community today, in the form of a general mistrust of both governmental and economic interventions from outside the community, and a certain nostalgia for the (early) GDR system among local interviewees, and there are signs of growing tension between residents seeking to protect the historic cultivation of land and those encouraging tourism development on the island (see Martinez, Frick and Gee, this volume). In Dorchester

County in the U.S., 100 % of respondents said that economic and environmental factors guided the discussion of responses to climate change; 80 % said social factors, and 40 % said political factors. In Carteret County, 84.6 % cited economic factors; 61.5 % cited environmental factors; 53.8 % cited political factors; 38.5 % cited social factors and 15.4 % cited religious factors. These results emphasize the importance of economic, environmental, social and political factors in the discussions of climate change effects in the U.S. The mentioning of religious factors in Carteret County furthermore indicates cultural differences in perceptions of coastal change between the two counties analysed.

#### *4.2.3 Trust in public authorities and power relations*

Among residents in Timmendorfer Strand and Ummanz, expectations towards governments as being in charge of dealing with coastal defence and adaptation to climate/coastal change are high. Disputes have arisen in both communities throughout the planning of specific measures, due to conflicting land-use interests. In the Timmendorfer Strand case in particular, the tourism lobby has exerted a strong influence during the search for an acceptable solution, and close cooperation among government bodies at different levels (i.e. community and state) have been a key factor in its implementation (see Martinez, Frick and Gee, this volume). At the same time, it appears that private households would not consider implementing measures on an individual basis to protect houses (private defence measures are absent from the discourse on adaptation to coastal change in newspapers and interviews, and the limitation of coastal defence measures implemented by the state regarding settlements is perceived as unjust by Ummanz' residents, (Landtag Mecklenburg-Western Pomerania, 2007: 2; see section VII c). In the U.S., the results show a similarly important role for governmental action at all levels, principally at state level. In addition, 61.54 % of the interviewees in Carteret County mentioned private entities. This reflects a more general mistrust of the government—especially the federal government—in the U.S., and an emphasis on the role of the private sector.

Financial resources for coastal protection and adaptation in Germany come from the federal government, and are channelled through state and local government. Strict regulations apply where communities lack the capacity to coordinate coastal management and the state government is in charge of implementing measures, as is the case in Ummanz. Farmers are responsible for managing and financing the drainage of reclaimed land for coastal protection outside of the built-up area—a regulation that is widely perceived as unjust (Landtag Mecklenburg-

Western Pomerania, 2007). In the U.S., regarding the most appropriate source of 'resources' to deal with climate change and SLR, 50 % of municipal officials in Dorchester County cited local government or NGOs, and 50 % cited state and federal government. Among municipal officials in Carteret County, 67 % cited state and NGO resources, while 33 % cited a combination of local, state, federal and NGO resources. These findings represent the more accentuated role of local government in the U.S.

## 5 Conclusion

In both the German and the U.S. case studies, local socioeconomic development was shown to affect local preferences for specific measures for coastal protection. In all case studies, local risk perceptions differed from those at higher levels of decision-making. Hence the community-based research indicates that it is crucial to understand local traditions, experiences, etc. *before* designing (let alone implementing) a coastal adaptation project, particularly if approaches are intended to be transferred to differing socioeconomic contexts. Apart from this general finding, several points can be highlighted with regard to differences in the transatlantic comparison.

To begin with, the issue of 'climate change' was shown to be highly politicized in both countries, but with different outcomes. In Germany the general framing is that anthropogenic climate change is an 'issue to be solved' (i.e. reducing emissions) through politics, science, technology and 'environmentally friendly behaviour'. Although there is no perception of acute danger at local level, measures for adaptation to coastal impacts from climate change are widely accepted and taken as reassurance that the authorities are managing the risks effectively. While some opposing positions exist, they are far less the subject of dispute as in the U.S., where the scientific basis used to estimate sea level rise is an issue of political contestation. In summary, these findings suggest that framing a measure for preparing for rising sea levels as an 'adaptation to climate change' can be beneficial to its acceptance in communities in Germany, and is more likely to hinder implementation in U.S. communities.

Secondly, the differences found in terms of trust in public authorities and funding mechanisms indicate that the political culture in general has an influence on strategies preferred in adaptation to coastal change: German coastal dwellers generally expect to be able to rely on governmental institutions when it comes

to protection from coastal hazards, whereas in the United States, measures on an individual basis are considered by private households, and NGOs contribute to the funding and design of adaptation measures, in addition to governmental action. In addition to these general observations, the Timmendorfer Strand case demonstrates the influential role of lobby groups, particularly in the context of a singular dominant industry (in this case, tourism). These results indicate that both the institutional design and financing mechanisms of adaptation strategies need to be tailored to the relevant political, economic and cultural context of a site.

Thirdly, the preference for individual measures in the U.S. case studies is likely to be linked to personal experiences of coastal hazards. While coastal adaptation measures considered in Germany are (so far) solely preventive measures, in the U.S. local experience provides a more evident link between reactive and preventive measures. What is more, the German coastal federal states are willing and able to pay for the largest share of adaptation measures along the Baltic Sea coast, whereas this is not at all the case in the US state of North Carolina, while in Maryland the need for governmental activities at state level is acknowledged, and initiatives such as the Coast Smart initiative are under way. However at the county level, in this case Dorchester County, the conservative attitude of the elected officials hinders an active public outreach strategy regarding the state's coastal defence/adaptation initiatives. (Martinez et al. 2014)

It is therefore likely that incentives for individual protection measures, including retreat strategies which are not at all discussed in Germany but have been frequently mentioned in the U.S. cases, are much more widely accepted by U.S. residents than by German coastal dwellers as a result of the individual perceptions of the level of danger.

In summary, the results suggest that measures for adaptation to coastal change face opposition for different reasons at the U.S. mid-Atlantic and the German Baltic Sea coasts, and accordingly divergent strategies and arguments are most suitable for their implementation in the respective coastal communities.

## 6 Literature

- Blandford, K., Gruby, R., Pott, R., Talal, M., Villantueva, C. 2009. Climate Change. Perceptions, knowledge and needs of local decision-makers in coastal North Carolina. ENV 280: Social Science Surveys for Environmental Management. Duke University.
- Bray, D. and Martinez, G. 2011. A survey of the perceptions of regional political decision-makers concerning climate change and adaptation in the German Baltic Sea region. Geesthacht, DE: International BALTEX Secretariat Publication.
- Bundesregierung Deutschland 2011. Aktionsplan Anpassung der Deutschen Anpassungsstrategie an den Klimawandel. Vom Bundeskabinett am 31. August 2011 beschlossen. Berlin.
- Cutter, S., Mitchell, J., Scott, M. 2004. Revealing the vulnerability of people and places: A case study of Georgetown County, South Carolina. In: *Annals of the Association of American Geographers*, 90/4: 713–737.
- DNR Maryland (Maryland Department of Natural Resources) 2013. Coast Smart Communities. <http://dnr.maryland.gov/CoastSmart/> (accessed May 8, 2013).
- Donargo, A., Ducklow, K., Morison, N. 2013. Cultural Perceptions of climate change and sea level rise adaptation strategies in Maryland, North Carolina and the Baltic Sea Coast. Masters project, Nicholas School of the Environment of Duke University.
- Freyschlag, U. 2009. Der Nationalpark Vorpommersche Boddenlandschaft. In: *Schauplätze und Themen der Umweltgeschichte: Umwelthistorische Miscellen aus dem Graduiertenkolleg*. Herausgegeben von B. Herrmann, U. Stobbe. Werkstattbericht. 61–70.
- Frick, F. 2012. Contested values and practices in coastal adaptation to climate change. The role of sociocultural construction in decision-making for adaptation to climate change and sea level rise in three U.S. states. Master thesis, University College London.
- Galloway, C. G. 2002. Historical encounters across five centuries. In: *German & Indians. Fantasies, Encounters, Projections*. Edited by C.G. Galloway, G. Gemünden, S. Zantrop. Lincoln and London: University of Nebraska Press. 68.
- Gräwe, U., Burchard, H. 2011. Storm surges in the Western Baltic Sea: the present and a possible future. In: *Climate Dynamics*. 39/1–2: 165–183.
- Hoffman, Andrew J. 2011. The Growing Climate Divide. In: *Nature Climate Change*: 1195–1196.
- Kana, T. 2010. Coastal Erosion and Solutions. A Primer. (C. S. Engineering, Ed.) from Coastal Science & Engineering. [www.coastalscience.com/?p=321](http://www.coastalscience.com/?p=321). (accessed August 4, 2012)
- Kempton, W. 1997. How the public views climate change. In: *Environment* 39/9: 1–12.
- Landtag Mecklenburg-Western Pomerania 2007. Kleine Anfrage der Abgeordneten Sigrun Reese, Fraktion der FDP – Zukunft des Küstenschutzes auf der Insel Ummanz – und Antwort der Landesregierung.
- Lehners, C. 2011. Coastal protection in tourism communities – the case of Timmendorfer Strand. In: *EUCC Coastal & Marine Magazine* 20/3.
- Martinez, G., Paolisso, M. Forthcoming. Cultural dynamics of adaptation to climate change: An example from the East Coast of the U.S. In: *Cultural Dynamics of Climate Change and*

- the Environment in Northern America. Climate and Culture vol. 3. Edited by Sommer, B. Brill. Leiden.
- McGranahan, G., Balk, D., Anderson, B. 2007. The rising tide: assessing the risks of climate change and human settlements in low elevation coastal zones. In: Environment and Urbanization 19/1: 17–37.
- MELUR-SH (Ministerium für Energiewende, Landwirtschaft, Umwelt und ländliche Räume des Landes SH) 2013. Generalplan Küstenschutz des Landes SH – Fortschreibung 2012.
- North Carolina Carteret County 2012: Resolution Concerning North Carolina's Sea Level Rise – Reports, Policies and Monitoring Efforts. Adopted March 19, 2012. [www.nc-20.com/pdf/CountyofCarteret-SLR.pdf](http://www.nc-20.com/pdf/CountyofCarteret-SLR.pdf) (accessed March 7, 2014).
- Pyke, C. R. et al. 2008. Climate Change and the Chesapeake Bay: State-of-the-Science Review and Recommendations. [www.chesapeake.org/stac/Pubs/climchangereport.pdf](http://www.chesapeake.org/stac/Pubs/climchangereport.pdf) (accessed March 6, 2014).
- Reese, S., Markau, H.-J. 2002. Risk Handling & Natural Hazards: New Strategies In Coastal Defense – A Case Study From Schleswig-Holstein, Germany. In: Proceedings of Solutions To Coastal Disasters '02. American Society of Civil Engineers.
- Sterr, H., Markau, H. J., Reese, S. 2004. Risiken eines Klimawandels an den Küsten Schleswig-Holsteins. Schadenpotentiale und Vulnerabilität. In: Proceedings of the conference "Klimaänderung und Küstenschutz". Universität Hamburg.
- Titus, J.G., Anderson, K.E., Cahoon, D.R., Gesch, D.B., Gill, S.K., Gutierrez, B.T., Thieler, R.E., Williams, S.J. 2009. Coastal Sensitivity to Sea-level Rise: A Focus on the Mid-Atlantic Region, Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research. Washington, D.C.: U.S. Climate Change Science Program.
- White, T.L., Fole, A.M. 2012. A Dorchester County Scrapbook: "That Reminds Me of a Story". Elliott Island: Dogwood Ridge Books.
- Zelko, F. 2006. From Heimat to Umwelt: New perspectives on German environmental history. Bulletin, Supplement 3 of the German Historical Institute, Washington D.C.