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Neopragmatic Reflections on Coastal Land Loss and Climate Change in Louisiana in Light of Popper's Theory of Three Worlds

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Abstract: This paper addresses the social resonances to the complex causes, effects, and feedback of land loss in southern Louisiana, particularly with respect to the region's vulnerability to the impacts of anthropogenic climate change, especially against the backdrop of the consequences and side effects of the resident petrochemical industry. Using empirical findings from an online discussion about coastal land loss and talks to people in Louisiana, the different perceptions of coastal land loss of affected and not-affected people become apparent. As a result of the high complexity of the topic, a meta-theoretical framing by neopragmatism, as well as an analytical framing based on Popper's theory of three worlds, is provided.

Keywords: coastal land loss; climate change; Louisiana; three worlds theory; energy transition; citizen participation

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1. Introduction

Coastal land loss in Louisiana is the result of a complex interplay of natural and anthropogenic processes [1,2], with significant collateral consequences on local societies. These collateral consequences are the focus of interest of our article, following the understanding of Karl Popper [3,4], Max Weber [5], and later, Peter Berger [6] of the essential task of social sciences to study the unintended consequences of human actions. Due to the complexity of the interplay of natural and anthropogenic processes, as well as the repercussions of anthropogenic processes on natural processes, a monotheoretical and monomethodical approach to the topic hardly seems appropriate. Therefore, we follow a neopragmatic approach, which allows, from a meta-theoretical perspective, the combination of especially different theoretical approaches [7,8]. A basis for the order of these theoretical approaches is provided by Karl Popper's three worlds theory [9,10], whose extension into a theory of three spaces or three landscapes [11–13] makes it possible to examine specific modes of constructing space and landscape in order to attain a more nuanced understanding of the processes surrounding land loss in Louisiana. After all, the state is not only being affected by sea level rise due to climate change but, with its focus on the petrochemical industry, is also a contributor to climate change directly (land subsidence) and indirectly (greenhouse gas emissions). The article, which is based on a theoretical approach to the causes and social resonances of land loss in Louisiana in a more extensive study [14], is organized as follows: First, we briefly outline the theoretical and methodological frameworks: first, the theory of three spaces/landscapes as an extension of the theory of three worlds, then neopragmatism, followed by our methodological approach. We then outline the 'natural' and collateral consequences and causes of coastal land loss in Louisiana that have arisen as a result of human action before turning to the social resonances of land loss. We then take a closer look at our empirical findings of the social perception of coastal land loss based on analyzed comments from a YouTube discussion as well as qualitative interviews conducted in Louisiana. Finally, we discuss the findings in the context of anthropogenic climate change, its social resonances, and its implications for energy policy. Last, we reflect on the theoretical framework chosen here.

2. The Theoretical and Methodological Framework

The natural and anthropogenic processes on the coast of Louisiana, their (unintended) side effects, how they are dealt with, and the consequences for the local population result in a complex research area. To do justice to this, we approach our consideration of coastal Louisiana based on the meta-theoretical perspective of neopragmatism. In doing so, we capture the complex natural, social, and cultural structures using Karl Popper's three worlds theory and its further development into three spaces and landscapes. Complementing these base approaches to the object of study—which will be examined in summary in the following two chapters—we provide an overview of the methodological approach of the empirical surveys in Section 2.1, which will be presented and discussed in the course of the article.

2.1. The Theory of Three Worlds, Spaces, and Landscapes

In his theory of three worlds, Karl Popper structures [9,10] the Worlds 1 (material world), 2 (world of individual contents of consciousness), and 3 (world of cultural contents and the social stock of knowledge). Thereby, two specifics essential for further argumentation can be found: First, World 2 is in the center, i.e., Worlds 3 and 1 are connected solely via World 2. Second, humans have a share in all three worlds; they have an individual consciousness, a body, and, with their personal stock of knowledge, they also have a share in World 3. Spaces 1, 2, and 3 can be understood as parts of Worlds 1, 2, and 3, namely, material objects in spatial arrangement, individual ideas of and about spaces (Space 2), and socially shared stocks of knowledge about spaces (Space 3). Landscapes, in turn, represent special cases of spaces: First, because not every space is interpreted as a landscape; second, because the constitutive level of landscape lies in the social (Landscape 3) or individual (Landscape 2) points of view, on the basis of which Landscape 1 is projected into Space 1 [15,16] (see Figure 1).

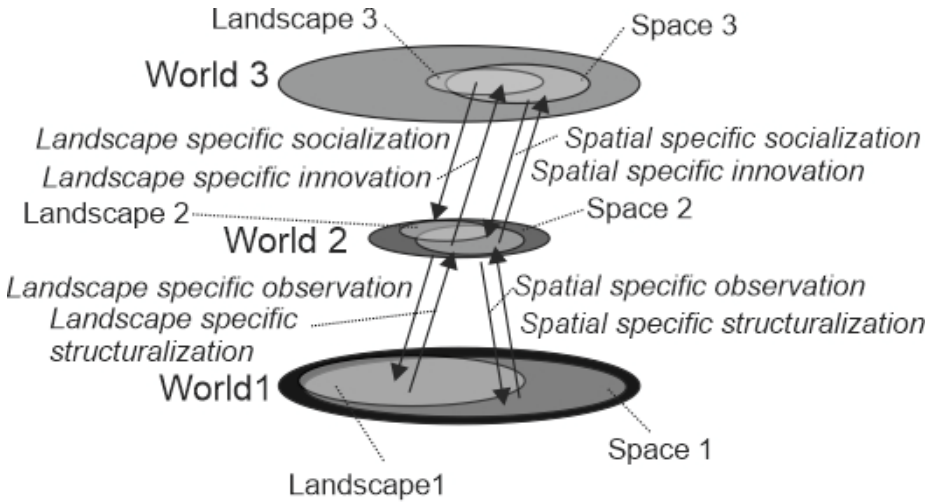

Figure 1. Visualization of the relationship of the three worlds, spaces, and landscapes to each other (own representation).

Space in general and landscape in particular are not constructed in the same way by all people. A major difference in construction occurs in different modes. The a-mode can also be described as a 'native norm landscape'; it is formed from direct individual experience (Landscape 2a) of the surrounding space (1a) to Landscape 1a, drawing on socialized interpretation from Landscape 3. The norm formed in the a-mode is that of the stability of material (but also social) structures. The b-mode describes the common sense, i.e., the patterns of interpretation, categorization, and valuation shared in a society with respect to landscape. Here, social stereotypes, mostly aesthetic, increasingly also ecological, are applied to landscape. Here, Landscape 3b is constitutive. The c-mode describes the expert-like special knowledge stocks, which are mostly formed in academic study. These

exhibit considerable interpretive sovereignty competition among themselves and generally override the a- and b-modes. The norm formulated here is that of the fit of Landscape 1a to expert standards (to empiricism and theory among many: [11,17,18]).

As a result, it can be stated: a Space 1 contains many Landscapes 1, which are constructed into it, depending on the mode.

2.2. Neopragmatism

This recognition of the diversity of patterns of construction, including technical ones, can be productively developed with the help of neopragmatism. Neopragmatism, as advocated by Richard Rorty and Hillary Putnam [19–21], embraces the tradition of pragmatism. Pragmatism, as 'consciousness for action', represents the primacy of practical [22] criteria over abstract theory. Neopragmatist approaches extend pragmatism by ideas of language theory, in parts also poststructuralist thought: "Apart from the usual American suspects (Rorty's favorite was Dewey), they also included in his view European philosophers like Wittgenstein, Heidegger, Foucault, and Derrida" [23]. For Rorty, "there is no way to grasp reality (whatever that is) without the mediation of a linguistic description." [24]. Thus, for Rorty, "neither knowledge of nature nor beliefs concerning moral or social facts [. . .] are a reflection of a given reality" [24]. Instead of an 'objective truth', pluralistic conceptions of the world take the place of dealing with contingency. The concept of 'discovery' is replaced by the concept of 'invention', which reveals a nominalist view of the world [21,25]. Central for neopragmatism is, therefore, not 'the discovery of truth' but the 'invention of interpretations of the world', which must prove to be suitable for dealing with scientific as well as practical questions.

According to this insight into contingency, paired with the need for the justification of decisions during the research process, different theoretical perspectives, methods of collection and evaluation, disciplines, data of different sources (and types), and also forms of representation and, beyond the c-mode, the a- and b-modes, can be integrated and justified according to the subject matter [14].

The study presented here is concerned with natural processes in Space 1, its influence by society (i.e., Space 3), and the intrinsic logical side effects of this interaction in the natural part of Space 1. Accordingly, it draws on research findings obtained from a positivist perspective, framed by a constructivist (here, social constructivist) perspective prevalent in much of the social sciences.

2.3. Qualitative Methodological Approach

To examine social resonances to the impacts of climate change and land loss in Louisiana, we methodologically resorted to qualitative content analyses. Following the approach of Mayring [26], they allow us to systematically examine qualitative content in terms of interpretations and attributions. The results obtained in this way are based on two differently collected data sets: the personal experience (Space 2) of the effects of climate change in Louisiana was gathered using guided interviews and eroepic conversations, while the analysis of comments published online under a relevant YouTube video in the immediate aftermath of Hurricane Ida (2022) provides insight into the social media discussion of the topic.

We examine the mass media discussion of land loss in Louisiana on the basis of interpretations and statements by commentators—due to its dominant importance, we draw on the platform 'YouTube', founded in 2005 [27]. YouTube was able to make its way from a niche program for young people "into the center of globalized media culture [. . .] at breakneck speed" [27] (p. 2) and represents an important object for the scientific investigation of social processes due to the associated penetration of everyday life with videos and the essential contribution to the mediatization of society [27–31]. A total of 488 comments were considered, which were published below a video showing drone footage of the barrier island Grand Isle in August 2021, taken only a few days after Hurricane Ida hit the island and the mainland [32]. Using an inductively generated code system, the content of the comments was qualitatively analyzed with respect to the discussion of the aftermath of

Hurricane Ida and could be summarized and characterized into 13 interpretive patterns. This approach of analyzing internet videos and their comments is becoming more and more widespread with regard to the consideration of the social construction of the world in general, as well as of landscape in particular (a.o., [33–40]). Thereby, it becomes apparent that in the predominant comments, no personal concern is recognizable, and sometimes, c-modal interpretations are resorted to (see also [14]; something similar was shown in [37]).

The collection of qualitative interviews took place between May and September 2022 in southern Louisiana, with now a total of 61 interviews and conversations being available for analysis. Based on a guideline developed in advance, 24 qualitative interviews with passers-by were conducted, which were supplemented by 37 eroepic conversations, some of which were very detailed. Eroepic interviews are a topic-centered, unstructured form of interview that usually takes place in everyday situations in order to create a low-threshold environment for the interviewees (see in more detail [41]). In both forms of qualitative information gathering, particular emphasis was placed on individual and social experience, as well as perceptions and attributions regarding the Louisiana coast, its land loss, and hurricanes. Overall, the method of eroepic conversations proved to be more profitable since the interviewees spoke more freely and in more detail about their individual experiences and impressions than was the case in the interview situation.

Consistent with the neopragmatic approach of this article, we complement the qualitative surveys of social resonances and perceptions of the impacts of coastal loss in Louisiana (Spaces 2 and 3) with cartographic representations of the physical material base (Space 1) to illustrate changes from World 1 and visualize physical material manifestations of responses to coastal loss (such as levee construction).

3. Land Loss in Louisiana—A Brief Overview

The causes of land loss (Space 1) in Louisiana are diverse, some beyond human influence (see in more detail [14]). This applies, for example, to glacial isostatic subsidence resulting from the melting of the North American ice sheet after the last glacial melt, causing the lithosphere in coastal Louisiana to sink [42]. This subsidence is enhanced by additional uplift by Mississippian sediments, which regionally pushes the lithosphere into the asthenosphere [1,43]. The sedimented material is also subject to compaction and tends to be mobile in parts under surcharge, which leads to the formation of salt diapirs but also to downdrift toward the Gulf of Mexico [43–45]. Other processes leading to Louisiana's land loss, however, are secondary consequences of human intervention: The construction of levees along the Mississippi River (especially to prevent flooding—particularly along the Mississippi River south of Baton Rouge, petrochemical industry facilities are heavily concentrated beyond the levees) reduces areal sedimentation, which does not compensate for the subsidence of the regional earth's surface [46]. Drainage of land for agricultural use or even infrastructure and settlement (Space 3c) accelerates subsidence in mineral soils and oxidation in organic soils, resulting in subsidence in both cases [44,47], which is further intensified in the presence of superimposed load (e.g., large buildings such as those in downtown New Orleans; Space 1 [43,44]). The extraction of oil and gas (characterized by the c-mode) also leads directly to pressure loss, and often, the extraction of raw materials is also associated with water intrusion into salt diapirs, both of which lead to surface subsidence (Space 1 [44,48]). For the purpose of transporting materials and oil and gas, Louisiana's coastal region is crisscrossed by innumerable pipelines and canals (Space 1 c-mode), causing seawater intrusion and the disturbance of autochthonous vegetation, which is already damaged by invasive species (such as Roseau scale insects; [49,50]). These processes make coastal Louisiana particularly vulnerable to the impacts of anthropogenic climate change, least of all sea level rise and projected increases in hurricane numbers and intensity (Space 1 with implications for Spaces 2 and 3; [1]).

4. Social Resonances to Coastal Land Loss

From these explanations, the different construction of space and landscape in the c-mode already becomes apparent: From the point of view of the petrochemical industry, the marshland is merely a space to be overcome; for hydraulic engineering, it is a matter of protecting areas from floods by means of levees; real estate management is oriented to the construction of buildings, and nature conservation, for instance, to the preservation of certain biotopes, etc. The consequence: the respective systemic logic projects a lot of different Spaces 1cs into one Space 1. More abstractly spoken: no social system is able to construct Space 1 as it 'is' but performs the construction depending on its own systemic logic [51,52]. This is also evident in the cartographic treatment of Louisiana's coastline: following the positivist cartographic tradition, space is divided in a dichotomous distinction into either land or sea, which currently suggests land where an everchanging hybrid space between land and sea is found [14] (see in comparison Figures 2 and 3).

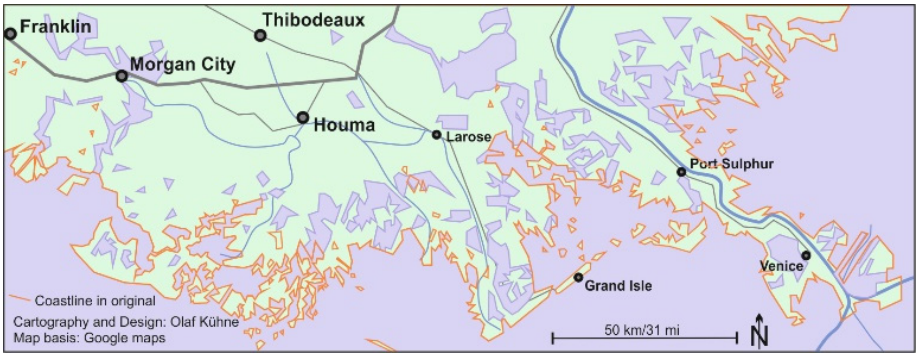

Figure 2. Generalized cartographic representation according to Google Maps (retrieval date: 15 May 2022; [53]). Remarkable here is the strong divergence between the specifically designated coastline and the land areas represented using area signatures (own representation, as in [54]).

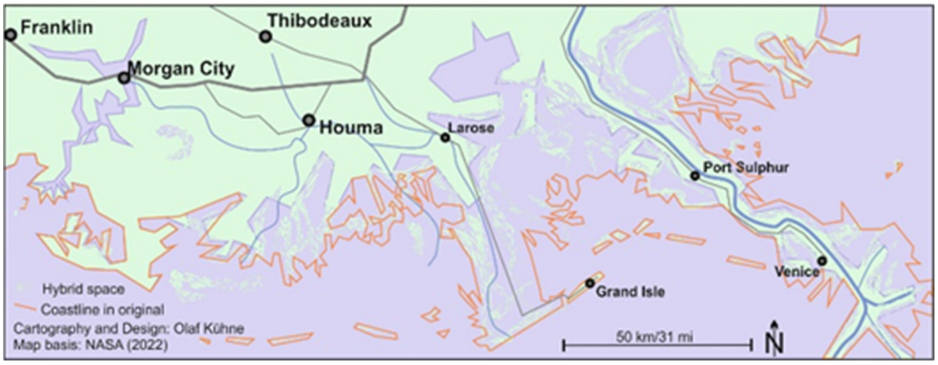

Figure 3. Generalized cartographic representation based on a recent NASA satellite image from 12 May 2022 [55]. In comparison to Figure 2, the shrinkage of the areas classified as land is particularly significant. Strongly pronounced is the intrusion of marine water as well as of spaces that exhibit hybrid land–sea characteristics. Here, too, there is a strong divergence between the coastline and the land or hybrid areas (own representation, as in [54]).

In dealing with the consequences of land loss, a top-down implementation of c-modal, sectoral normative ideas has dominated for a long time. Only in recent decades has technical protection (relying in particular on large-scale embankments and channeling of water) been supplemented by a perspective that—from the perspective of ecology—has focused on the preservation of marshes and the rewetting of swamps for flood protection [2,56]. In recent years, the realization has emerged that a-modal and b-modal approaches are also relevant in the context of dealing with land loss. Particularly in the context of increasingly significant population relocations from coastal settlements that are now difficult to sustain (for example,

the 2018 Coastal Master Plan identifies twelve settlements that are unlikely to remain habitable within the next 50 years; [57]), there is increasing pressure to integrate affected people (and thus a- and b-mode perspectives) into resettlement projects in a participatory manner [58,59] because, after all, the challenges of resettlement are not solely technical: "The displacement and transition of population, business, industry, and social functions from the coast is sometimes a hope to get to higher, drier, and safer places" [60] (p. 191).

The Isle de Jean Charles has also been and continues to be covered by the media and is a particular example of land loss: the island's land area was 2400 acres in 1955; by the mid-2010s, it had shrunk to 320 acres ([61]; see also Figure 4). This particularly extensive land loss of the Isle des Jean Charles is due to some specifics that go beyond the general processes of land loss outlined in the preceding paragraphs: the island lies outside the protection of the 98-mile levee of the Morganza to the Gulf Risk Reduction System, constructed in 1998 (see Figure 5). This protects, in particular, parts of the country farther to the north [62]. The offshore barrier islands are subject to increased erosion due to the intensification of hurricanes and are outside the protection system [63]. This is due not least to the prioritization of the protection of larger settlements. However, this does not consider smaller settlements. Indigenous communities, in particular, live in smaller settlements, which has made the policy of coastal protection suspect of the persistence of colonial patterns of interpretation [58,64]. The progressive loss of land led to the resettlement of the island's inhabitants near the city of Houma, which has been practiced since 2010 (in more detail, see, a.o., [65]). For this purpose, 48.3 million dollars of state funds were made available [63]. This resettlement is largely closed to avoid social disintegration through the loss of locally formed social capital. To achieve this, the people living on Isle de Jean Charles were intensively involved in the planning of the resettlement project [63].

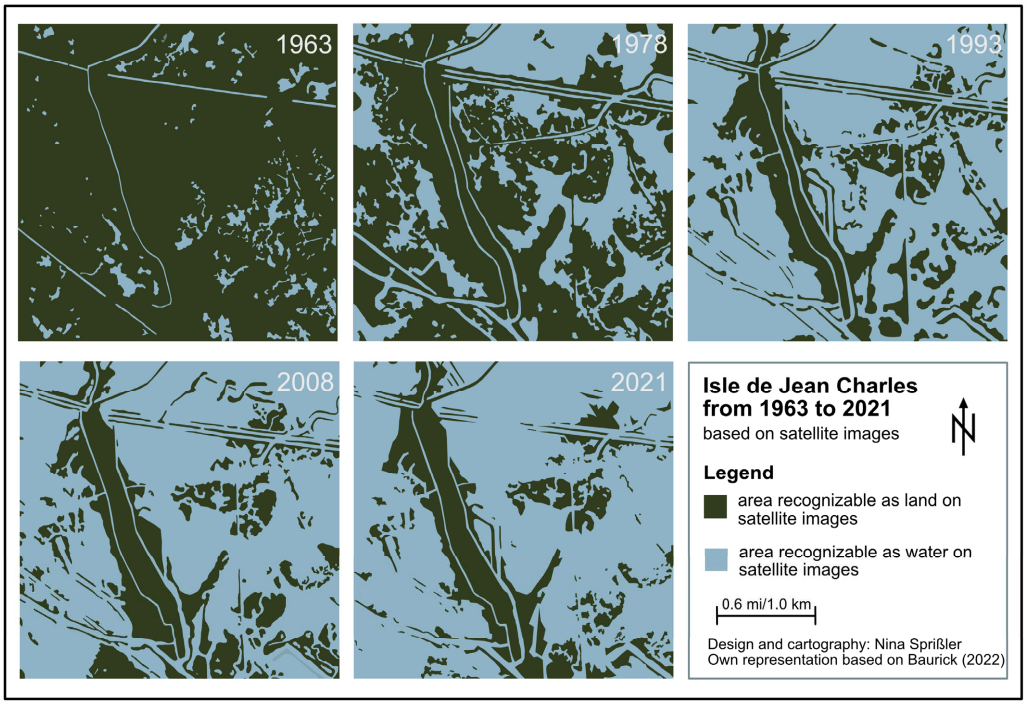

Figure 4. The change of the physical Space 1 due to land loss is particularly evident in the example of Isle de Jean Charles: The area recognizable here as land decreases significantly between 1963—the area identifiable as land dominates—and 2021—the area identifiable as land has decreased significantly, water dominates. This results in an area that is characterized by an everchanging hybridity of water and land, as Sallenger [66] (p. 6) puts it, "a coast in motion". It is important to note that the present cartographic representation of land loss was created on the basis of satellite imagery, classifying as land what is visually recognizable as such (own representation based on [67]).

Figure 5. Map of the Morganza to the Gulf Risk Reduction System, highlighting that not all inhabited areas are located within the levees protection (own representation based on [62], as in [54]).

However, relocation of affected communities is not only accompanied by spatial change but usually also by the loss of lifestyles that have been practiced for generations because residents "strongly identify with place, and this attachment and identification has developed from generations where their 'livelihood,' that is, everything from the social to the economic, has been intertwined with place." [68] (p. 348). This close interweaving of space and daily life has led, not least, to the emergence of "localized expert knowledge", as Burley et al. [69] (p. 362) make clear. These local knowledge stocks in the c-mode contain important information and possibilities for action for the restoration of the coastal areas, but, according to the study conducted by Burley et al. [69], they receive little attention in the eyes of those affected when implementing and planning coastal protection measures (see also [68,70]). Lambert et al. [59] further point to the potential that the importance of space has for cultural and traditional aspects throughout Louisiana: Beyond the livelihoods of affected coastal regions, land loss affects "important cultural symbols and traditions, particularly related to Louisiana's renowned cuisine" [59] (p. 13).

The resettlement of long-established populations induced by land loss not only implies the total loss of their Landscape 1a but also has implications reaching into social Spaces 1, 2, and 3: Those affected by coastal land loss are often populations whose ancestors, as a result of displacement (of French-born Acadians from what is now Canada and Native Americans (i.a., [71,72]), were forced to settle in what is technocratically (Landscape 3c) termed 'uninhabitable swampland' and to develop a land use adapted to the conditions there, which, in turn, had already been increasingly disrupted by oil and gas extraction and transportation—and not least the associated accidents—before the increasing manifest pressure of land loss [63,73]. The resettlement is accompanied by the loss of not only the cultural capital [52] that comes with the way of life adapted to the specific Space 1. To ensure that this loss is not accompanied by the loss of social capital, combined with social disintegration, a constitutive shaping of the resettlement processes by the coastal population is necessary.

5. Empirical Findings—The Interpretation of Land Loss by Affected and Non-Affected People

Empirically examining the comments posted on YouTube below the video, we were able to summarize them into three groups of similar interpretive patterns: First, there are a large number of comments with positive feedback that use expressions of sympathy and encouragement to make their compassion clear and to inquire about how the people

of Grand Isle are doing. Similarly, there are questions about the reasons that led to the widespread damage and even destruction of buildings on the island (a total of 158 of the 488 comments examined). The second group includes patterns that discuss, debate, and, at times, even question the rebuilding of Grand Isle (a total of 173 of the 488 comments examined). The third pattern groups together comments in which a basic understanding of the world is evident, outside the generally accepted body of scientific knowledge (a total of 48 of the 488 comments examined; in a total of 109 comments, no further significance to the interpretation of the hurricane's impact on the Grand Isle could be discerned; see in more detail: [14]).

Furthermore, in our empirical investigations of the YouTube comments as well as the conducted conversations, two different perspectives on the loss of land on the Louisiana coast become particularly clear: On the one hand, the perception of people who are directly or indirectly affected by coastal land loss and are aware of it, and on the other hand, the perspective of those people whose interpretations of land loss are characterized by a—psychological and, in parts, physical—distance to the topic. This view from the outside is taken on, in particular, by people who, in their own opinion, are not directly affected by the loss of land on the coast. These are both people who have a distance to the spatial impacts of land loss due to physical distance and people who live in affected areas but do not see themselves affected by coastal land loss and its consequences (such as the reduced weakening of hurricanes). This association of spatial distance and affectedness with perceptions of land loss was also observed by Burley [68] (p. 106) in his study in the early 2000s: "It was not only their physical proximity, but resident's cognitive closeness with the coast that gave them a sense of bearing eyewitness to a process that others only knew in an abstract fashion". The influence of personal perception and the direct experience of coastal land loss on the risk perception of land loss is also identified by Lambert et al. [59] (p. 7) in their study: "Familiarity with and knowledge about coastal land loss was most often related to either indirect experiences through social connections or direct, personal experience". In some of the YouTube comments analyzed, the abstract b-modal knowledge of non-affected people about the impacts of coastal land loss and life on the Louisiana coast leads to prejudice and ignorance, resulting in condemnation and blame. For example, some of the commenters assign partial blame for the destruction of their home, in the sense of a 1a landscape, to the residents of Grand Isle because they voluntarily moved to an island in a hurricane zone and in the immediate vicinity of the Gulf of Mexico: "It has been told and told again & again. Do not build your home on sand" (K191). At times, these recriminations culminate in insulting and provocative statements in which the commentators ascribe to themselves a cognitively as well as morally superior position vis-à-vis the residents, condemning them and denying them any chance of living on Grand Isle (e.g., "These are the kind of people who need a blowtorch to the face 100 times to learn fire burns sorry zero sympathy. LEARN!!!!!" (K123)). On the basis of an exaggeration of their own worldview, the commentators discredit the inhabitants of the island, and any sympathy with the loss of the place of residence, of home, of places with memories, and, sometimes, of loved ones is lost. In the conversations conducted, this reveals another interpretation, particularly in places not directly affected by land loss: the destruction of buildings and infrastructure on Grand Isle and other affected places is monetized as there is no willingness by some for the tax dollars they pay to be used for reconstruction. Rather, there is a lack of understanding as to why residents of coastal regions do not relocate to less affected regions even after repeated destruction. This ignores the aspect of home as well as the emotional and identity connection with the area and the adapted ways of life. This can be understood in the terminology introduced above as b-modal devaluation of the a-modal construction of landscape. Ironically, statements such as these came, in our case, particularly from residents of New Orleans, a city that, as has been evident in the past, at least since Hurricane Katrina, has itself been severely impacted by the effects of land loss and the resulting less-weakened hurricanes. Accordingly, local differences in the interpretation of landscape in the b-mode are evident, which are not only shaped by different spatial locations but are also influenced by different social systems: a

Space 1 is not perceived as it 'is' but rather based on the systemic logic of the corresponding social system, here, for instance, the economic system [74,75], but also according to specific landscape socialization in the a- or b-modes and, as also became clear in the previous sections, in the c-mode.

Furthermore, the focus of the discussion in the comment column on YouTube is particularly on everyday world experiences and pragmatic reactions to the destroyed buildings—here, too, a connection to spatial distance and lack of personal experience with coastal land loss can be assumed. The commentators thereby discuss questions of how buildings in affected areas—in this case, the Grand Isle—can be built more permanently and whether the island should be built on at all, using jargon borrowed from the c-mode, although the manner of argumentation is less concerned with gaining a socially, politically as well as ecologically appropriate way of dealing with the consequences of the hurricanes but, rather, with supporting one's own (usually self-aggrandizing) position. Thus, there is no reflection on the fact that a discussion about it in this setting—a comment column on YouTube under a video of drone footage—will have no impact on the planning and future design of Grand Isle. Rather, ignorance and disinterest in the historical–social development of the settlement of the Barrier Isle are shown because this is, as already addressed, an area that has been inhabited particularly by Native Americans and Cajuns for decades, who had to leave their respective previous homes. The, in parts, rather pessimistic basic attitude online regarding the future of Grand Isle as a place to live is contrasted by an optimistic perspective on the ground: The reconstruction and repair of damaged buildings are clearly very evident one year after Hurricane Ida, despite reports of delivery problems for building materials and long waiting times for the needed tradesmen. Burley [68] (p 11) suggests in this context that "the determined rebuilding [. . .] may have served as a coping mechanism. By rebuilding, residents reclaimed a relationship with place and reasserted their identity as residents of coastal Louisiana".

In the analyzed comments of the YouTube video, the opinion seems to exist that Grand Isle is only or predominantly built up with vacation camps (camps is a regional term for wooden houses of below average size, which, contrary to the understanding present in the comments, are often used as main residence) and that their destruction is apparently not as bad: "Most of these buildings are fishing camps owned by rich people" (K369) and they "don't feel sorry this is rich peoples toys" (K357). In parts, this assumption is directly refuted: "These comments are unbelievable. Blaming "rich people" for the houses. Most of the people who live there are at or below the poverty line. These houses are meant for those essential workers." (K287), but it testifies to a body of knowledge, assumed to be correct by the commentators, that does not correspond to the situation found on the ground (according to the 2020 Census, 672 people live permanently on Grand Isle [76]). Apart from this, it became apparent, especially in the interviews on-site but also in a few of the comments, that the loss of a camp also brings emotional burdens (e.g., "3:09 that was my camp the big hole in the ground and 1 palm tree. It was my step-dads camp before me, it was built in the 60's sadly we left all the photo albums in it when Ida struck. Its all gone. I cant believe it." (K9)), and they are often refurbished and made usable again, if possible. Joint efforts by residents and camp owners are evident in, among other things, an effort by the island's Catholic community to draw attention to the rebuilding of Grand Isle (see Figure 6, left) and to help people "that are not fortunate enough to have insurance, to put a roof back on, not to make it a plantation, but to make it livable" (E23). The renovation of the buildings on-site can sometimes take a long time due to supply shortages and craftsmen's capacities. For example, one camp owner told us that in September—more than a year after Hurricane Ida made landfall—the new windows had finally been delivered and could be installed. In Figure 6, the attempts to reestablish a bit of normality, even in the midst of damaged houses and infrastructure, become clear.

Figure 6. In September, almost exactly one year after Hurricane Ida hit Grand Isle, most of the debris has been removed and many of the camps and houses have been rebuilt or deconstructed, although there are still buildings in need of repairs and reconstruction (as visible in the picture on the right). The deck chairs on the levee, which is still damaged in some places, illustrate the attempt to return to normalcy and are in stark contrast to the building in the background, which is still in need of reconstruction. Signs of a campaign to rebuild Grand Isle in front of many buildings visualizes the community spirit of the inhabitants and their optimism and attachment to the island (left; photographs: Koegst September 2022).

Furthermore, different interpretations regarding the background of coastal land loss are noticeable: only rarely is reference made to climate change and its consequences, and the effects of oil production in coastal Louisiana, described by many researchers (among many [77,78]), is not mentioned. Rather, alternative interpretations, apart from the generally accepted scientific knowledge of the c-mode, are represented in parts, blaming "Mother Nature" and human modifications of the weather for Hurricane Ida. In addition, there are clear religious references, some of which blame not only God for the destruction of Grand Isle but also the inhabitants of the island: "Watch every one rebuild on the same spot, with very very expensive, nuclear hardened, new homes, only for God to tear them down again. They just don't get or comprehend the picture. He has adequately warned us to change our wicked behavior" (K89, see in more detail [14]).

Whereas in the online comments, climate change is only associated with land loss to a very limited extent and the oil and gas industry is not associated with it at all, a different tendency emerges in the interviews we conducted, particularly with regard to the latter: Some of the interviewees reported that the oil and gas industry was partly to blame, but at the same time, others vehemently denied this, often reporting that they themselves or people close to them worked in the oil and gas industry. The double-edged nature of the petrochemical industry in Louisiana is summed up particularly clearly by one of the interviewees: "Oil and gas, it's a gray slope, in my opinion. [. . .] It's very, very much a lucrative business, but it is so dangerous. Louisiana is one of the biggest oil and gas producers in the country. And yes, it helps a lot of us. A lot of us wouldn't have the resources we have now without it. But the way that it's produced, they have pipes going through, you know, our coastal system that ruins it. [. . .] So, it's such a slippery slope because it's important to us as it's one of our biggest exports, but it's little by little ruining our state." (I04). These conflicting consequences of the industry's actions—on the one hand, as a major employer in the region, and, on the other hand, as a contributor to coastal

erosion—point to a clear potential for conflict, not least because of the demand by some that the oil and gas industry should support adaptation measures (see, among others, [59]). This also reflects the importance of the direct experience of land loss in its perception and illustrates differences in the interpretation of coastal erosion by those affected (in both a- and b-modes) and those not affected (in b-mode). In this context, Burley et al. [69] (p. 362) showed with their empirical finding that residents of coastal Louisiana often "do not trust outsiders who they feel make little attempt at including them in restorative processes"; moreover, they are faced with an immense criticism by people that are not affected by coastal land loss, as our investigation based on the YouTube comments reinforced. Thereby, our research findings also highlight the fact that a- and b-modal perspectives on coastal Louisiana differ not only from not-affected b-modal perceptions but also especially from c-modal perspectives present in, for example, the petrochemical industry regarding the respective claims on how to use and protect the coastal areas of Louisiana (Landscape 1).

6. Discussion

The massive loss of land in Louisiana, with the accompanying loss of habitat for plants, animals, and humans, is occurring, not least, in the context of global anthropogenic climate change. Adaptation measures being applied in Louisiana range from the individual level, such as the higher elevation of buildings, large-scale measures, such as the construction of levees, to the abandonment of entire settlements, whereby the increase of resilience through individual measures is strongly linked to the availability of symbolic capital: Individuals with a higher endowment of economic capital are more likely to construct more flood- and storm-resistant buildings and to relocate their residence; a higher endowment of cultural capital helps them to obtain relevant information to construct these buildings or to change jobs at alternative residences, with social capital also facilitating access to assistance on this side of state measures [63,79,80].

The asymmetry of mitigation and adaptation measures in Louisiana is also reflected in Landscape 1 (material elements relevant to the individual and social construction of landscape): instead of renewable energy generation facilities, petrochemical industry facilities and their downstream industries, such as oil production platforms along the coast, refineries, and also aluminum smelters, dominate—especially along the coast and the Mississippi River south of Baton Rouge. The large orientation (including subsidization of the petrochemical industry) is based, not least, on the importance that the oil industry had for the development of the state at the beginning of the 20th century; it brought with it a push for modernization that would hardly have been imaginable with the traditional agriculture that had dominated before, and, to this day, is credited with forming the backbone of the state's economy, which was also very palpable during our talks in Louisiana [81–85]. In this respect, it seems hardly surprising that in the coverage of the periodically recurring hurricane disasters, the connection between these extreme weather events and anthropogenic climate change is discussed in national newspapers in particular and less so in regional newspapers [64,86]. Here, the specifically—in favor of the petrochemical industry—weighted construction of Space 3 (the social construction of space) dominates. In contrast to this, the reactions of individuals on the widespread destruction and damage of Grand Isle by Hurricane Ida reveal significant differences as to where the fault of this destruction lies: in contrast to the discussion in national newspapers, climate change as a cause of hurricanes is only mentioned a very few times; rather, apart from interpretations outside of established c-modal scientific knowledge stocks, the main reason for the damage and destruction of the buildings is seen in structural and static issues as the main factor as to why some buildings were less damaged than others. The role of the petrochemical industry in the loss of coastal wetlands and, consequently, the greater potential for hurricanes to strike and destroy is not mentioned in any way. Thus, the individual focus is put on what the people on-site can do for themselves with a direct influence, hopefully preventing damage in the future. Structures that are greater than the local level, requiring measures over time, are regarded not at all—like the effects caused by the petrochemical industry—or only in a very limited manner, as is the case with climate

change (for more detail, see [14]). Nevertheless, people living in coastal Louisiana told us, in different ways, that they do see the relations between the chemical industry and coastal land loss, although they also know the importance of the industry for the state.

Especially against the backdrop of increasing greenhouse gas emissions, the example of southern Louisiana illustrates the unintended side effects that this can have in regard to Space 1, especially on the specific Landscapes 1a (the elements of the material space that are part of the individual construction of the native normal landscape). In this respect, due to the natural processes of surface subsidence preceding human action, it is already apparent what consequences a delayed transformation of the energy system can have for the low-lying parts of the country. However, the example of land loss in Louisiana also highlights the dysfunctional effects that adaptation measures can have if they are solely planned and implemented from the c-modal perspective without integrating a- and b-modal perspectives into the planning. This ranges from the knowledge of local specifics of Space 1 to social disintegration after the resettlement processes. These people, who have to struggle with the loss of their Landscape 1a, which they did not cause themselves, have a right to continue to live together, if this is desired, in order to at least minimize the loss of lifchances (in the sense of Dahrendorf, see [87]). Not only is the c-modal technocentric construction of Space 1 and Landscape 1 largely characterized by disinterest towards up to devaluation of local a-modal knowledge stocks and emotional references, the b-modal (common sense of landscape understanding) shaped view from the outside, using, in parts, c-modal jargon (the expert knowledge stocks of landscape), is also characterized by cognitive and moral self-exaggeration and thus connected with the devaluation of local perspectives (whether in a-, b-modes or the formation of a locally specific c-mode through the development of practices of dealing with the land–sea hybrid Space 1).

7. Conclusions

Combining the neopragmatic meta-theoretical framework with the three spaces/landscapes theory derived from Karl Popper's three worlds theory provides easy access to the complex processes surrounding coastal land loss in Louisiana. On the one hand, this concerns the conceptual separation of Levels 3, 2, and 1 (the social and individual construction of landscape, as well as the material objects that are understood as landscape from the individual and social points of view) as well as the relationships between the levels. Thereby, it becomes especially apparent which differences in the construction of space and, especially, landscape exist with respect to the different modes and how these have an effect with respect to the inscription in Space 1 or Landscape 1, respectively, connected with collateral consequences resulting from the inherent logical reactions of 'natural' processes therefrom. On the other hand, this concerns the object-appropriate neopragmatic selection and combination of different theoretical and methodological approaches. In our case, the use of results obtained qualitatively and quantitatively on the basis of a positivist and a (social) constructivist theoretical framework was complemented by the results of our own field research as well as cartographic processing. Although this article is only a concise synthesis of key findings from a widely differentiated research project, it highlights the potential of an approach that does not declare the divisive and exclusionary as a principle but rather aims to identify which theoretical and methodological approaches (data, subject perspectives, modes and forms of representation) can be expected to provide complementary insights into complex issues. One challenge of the neopragmatic meta-theoretical framework is not to give in to the attempt to subject the investigation—and not least the presentation of its results—to an increase in complexity that is difficult to comprehend through an excessive number of theories, methods, data, etc., that are not necessarily grounded in the object of research.

Methodologically, it can be said that the triangulation of a detailed examination of the current state of research, the evaluation of historical maps, in conjunction with eroepic conversations and guided interviews, as well as social media analysis, have proved to be fruitful. This is especially true because the specific weaknesses of the methodological approaches could be compensated. For example, the a- and b-modal perspectives very

often find little resonance in the scientific literature, while the c-modal perspective has a subordinate role in interviews and eroepic conversations. This can be compensated reciprocally with the triangulation used here. The social media study was conducted on a sample basis and is, therefore, only in triangulation with the results of the other methods, a valuable building block for understanding the social construction processes around coastal land loss in Louisiana. In comparison to the eroepic conversations and the interviews, the effort to 'set the scene' (see [88]) becomes clear. This is evident, not least, in the c-modal reminiscences of the b-modal access to coastal land loss (see in more detail: [14,89,90]).

The different modes of landscape construction show that very many different landscapes are synthesized into a Space 1, as we could also show in our empirical findings, and the landscape interpretations of the c-mode very often do not coincide with those of the b- and a-modes. In particular, the needs associated with Landscape 1 in a- and b-modes are often hardly considered in the c-mode. Against the background of a socially legitimized handling of landscape, however, it is inevitable to consider the a- and b-mode perspectives constitutively. Additionally, against the background of preventing social disintegration, especially in the case of resettlement, the connection of a- and b-mode needs to landscape is inevitable in order not to further intensify the loss of life chances. The hierarchization of c-modal as well as b-modal perspectives from the outside versus local a- and b-modal perspectives, as well as local c-modal practices developed over generations in dealing with a land–sea hybrid Space 1, has a dysfunctional effect in relation to World 1, World 2, and World 3. In this context, it reduces the possibility of developing appropriate strategies for dealing with a rapidly changing Space 1 because local experiences and knowledge of survival, developed over generations, are not adequately tested for future suitability. With respect to World 2, individual experiences, knowledge, and emotional allowances are devalued. With respect to Space 3 and Landscape 3, hierarchization, especially moral hierarchization, stands in the way of a productive settlement of conflicts. This is due, on one hand, to the fact that a productive settlement of conflicts presupposes the recognition of the legitimacy of the other conflict party's construction of the world [91]; on the other hand, moral communication is not focused on factual or procedural issues or social roles but on the person, who can then, in turn, defend himself solely by means of moral communication, thus setting in motion a moralization spiral that hardly makes compromise possible any longer [92,93].

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