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MAIN SECTION

Narrative Cartography: Capturing a Holistic Perspective on Waterscapes

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ABSTRACT
Water territories challenge inherited, land-based methods of capturing their history. They are a vital commons, where social, technical, political and cultural interests intertwine, potentially also causing conflict. Attention is currently focused both on the ecological importance of the water cycle for human well-being and ecosystem services, as well as on the unpredictable aspects of water through the effects of climate change. This paper argues that such interconnected challenges require new tools and methods of conceptualising and visualising waterscapes. Narrative cartography developed with citizen's input, reveals itself to be a highly inclusive methodology which can capture neglected knowledge about the past as well as propose visions for the future. This method is discussed in two different geographic contexts through the academic projects *Streamscapes* in Germany and *Mittelmeerland* in the Mediterranean.

KEYWORDS
Fluvial Environments; Citizen Science; Cartographic Representation; Narrative Mapping.

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Introduction

In the European context, water management has traditionally been steered by rational measures to control water and ensure that vital services including river and maritime transport, drinking-water supply, and cooling of industrial processes are maintained. Water spaces continue to make an important contribution to national revenues through these activities and have performed a major role within the narrative of industrial modernity.[1] But today this narrative is challenged by complex global processes such as climate change and the spread of pollution, which are intricately connected to the complete system of both large and smaller-scale water-spaces. Such processes have wide-ranging effects and elicit broad public concern.

Current tools and planning methods around water are proving themselves inadequate to address the threatening quantitative "unknowns," the complexity of interactions and to provide workable solutions for the transition to a post-industrial, post-colonial and post-oil society. The EU Water Framework Directive (2000) is aimed at the achievement of "good ecological status" of European waters by 2015, with two further management cycles until the final deadline for meeting objectives in 2027.[2] This directive acknowledged the importance of water systems as a "commons"—in terms of ground water, which recognises no legislative borders, in terms of river basins which may cross national borders and also in terms of coastal and estuarine ecosystems vulnerable to the input from river basins. "Water is not a commercial product like any other but, rather, a heritage which must be protected, defended and treated as such."

While water management is generally carried out at the regional or national administrative level, its effective execution depends on a large group of diverse actors, both professional and civil, hence the directive also recognises the importance of public participation in the updating of management plans (art. 46). An important distinction must be made between the "commons" of water itself, and the jurisdiction of the spaces it is flowing *through*. This is the property of water space which most clearly distinguishes it from *land* space and which demands different modes of representation and cartography. Fluidity, temporality and intersecting dynamics are difficult to capture through traditional, Cartesian mapping techniques. We argue that to *represent* the hidden, fleeting dimensions of water-spaces is to take the first step towards sustainable and integrative planning and management.

At the scale of the sea, Marine Spatial Planning is an example which initially largely omitted to take the marine ecosystem into consideration

1. Rania Ghosn and El Hadi Jazairy, *Geostories: Another Architecture for the Environment* (New York: Actar, 2018).

2. Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

and is now turning to a loosely-defined "ecosystem-based" management approach.[3] Awareness of the immaterial cultural value of water spaces is increasing and the development of methods with which to acknowledge these values is the subject of important research.[4]

Water heritage is therefore faced with the concurrent challenges of encouraging public involvement in managing a valuable commons and in representing the pluri-dimensional aspects of water history "in the making." Today's decisions determine tomorrow's history and to forge a pathway towards a more balanced approach to water management and governance is to begin with a more balanced input of knowledge.

How can local social and physical knowledge complete an existing technical appraisal of water territories and inform their ongoing transformations?

Historical cartography provides important references with which to imagine ways of addressing this question. Interconnected water spaces of rivers and seas embody long cultural histories and deep sociocultural meanings have developed around them, alongside the formation of towns, ports and trade networks. They have witnessed intense exchange, radical physical transformations, stagnation, crisis and conflict. While layers of physical artefacts bear witness to these events, some histories may also be swept away or submerged.

Maritime cartography was traditionally a tool used by sailors to map the geographical and cultural discoveries of seas, rivers and oceans, including narrative elements—a combination of fact and imagination. Mapping has always influenced the state of knowledge about the world and cannot be separated from scientific knowledge, therefore mapping evolved with the tools of scientific measurement, while the narrative aspects have been largely subsumed by science. However cartographic drawings can be more than techno-scientific representations of borders, mountains and infrastructure; they can interpret, review and comment.[5]

The Catalan Atlas of Europe and the Mediterranean of 1375 **[Fig. 1]** is Abraham Cresques' "visual story" of the Mediterranean consisting of a compilation of trade routes, sites of raw materials and resources, dynasties and places, including all major cities along the coastline with only a few inland features. Religious references are illustrated as well as a synthesis of the medieval travel literature of the time; "an overlapping set of information that attempts to convey a broader meaning."[6]

3. UNESCO, *Marine Spatial Planning*.

4. Gee et al., "Identifying Culturally Significant Areas for Marine Spatial Planning," *Ocean & Coastal Management 136* (2017): 139–47

5. Medine Altiok, "Poetic Sciences–Territory with a Liquid Border," *Man and Space* 58 (2011): 680-681.

6. Mohamad Ballan, "Cartography, Maritime Expansion, and 'Imperial Reality.' The Catalan Atlas of 1375 and the Aragonese-Catalan Thalassocracy in the Fourteenth Century," *Ballandalus*, August 27, 2014, https://ballandalus.wordpress.com/2014/08/27/cartography-maritime-expansion-and-imperial-reality-the-catalan-atlas-of-1375-and-the-aragonese-catalan-thalassocracy-in-the-fourteenth-century/.

FIG. 1 Map of Europe and the Mediterranean from the 19th-century copy of the 1375 Catalan Atlas, second chart, first cartography

Storytelling shapes the spaces we live in by connecting our individual experiences; narratives link socio-cultural conditions to physical spaces. Perceptions and meaning rely on the morphological aspects of a space and the cultural processes behind it, but most importantly they rely on a dynamic network producing social knowledge.[7] Within this framework, mapping opens a possibility to graphically represent storytelling by allowing collective production and the visualisation of perceptions.

Through a discussion of the two academic projects *Streamscapes and Mittelmeerland*, this paper argues that narration and cartography can play a critical role in creating new solution-led paths of knowledge production for the contemporary challenges around water spaces. In particular in finding a balance between urban production and ecological processes; narration in understanding the genealogy of water spaces and cartography in representing multiple relations. In the two case-study projects, the process of participatory narration steers the production of water-knowledge into a public direction—it is therefore a powerful tool to complete and overcome dominant narratives that may serve particular, official or corporate purposes.[8] The method of narrative cartography served both to capture the fluvial and temporal dynamics of water spaces and to incorporate local knowledge gained from interviews, hence the search for innovative forms of representation was central to both projects. Narratives enriched the territorial representation by allowing cross- and multiple readings; they visualize the collective imagination of both sites.

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7. Sophia Psarra, *Architecture and Narrative: The Formation of Space and Cultural Meaning* (London: Routledge, 2009).

8. The Geesthacht fish ramp described below (*Streamscapes*), serves as an example of a dominant corporate narrative. Individual members of civic society are keenly aware of the strategic production and dissemination of such narratives in order to dilute public unrest around contested political decisions.

The discussion of the two sites presented here enables wider geopolitical questions about the space of the sea to be addressed from two different perspectives; on the one hand, how public involvement with the sea can be encouraged further inland along its tributaries (*Streamscapes*) and on the other, how the Mediterranean can be imagined, and possibly governed as a unified territory, shaped by the central water body (*Mittelmeerland*).

The cartographic basis for the two academic projects was first established through scaled, analytical maps using open source GIS data or Google maps. In both cases, these maps were then modified and completed after site-work, during which additional territorial information and observations were gathered in interviews with local experts and communities. While this methodology was common to both cases, the focus of the two projects differs; in *Streamscapes*, the objective was to articulate and document intangible connections from the rivers Havel and Elbe to the North Sea through collaborative mapping in three regional towns. Based on the hypothesis that the design and management of the (North) sea space requires innovative concepts for greater public involvement, the project examined the network of relations and asked how far the sea penetrates inland according to local experience, and in which ways its presence is felt? Cartographic methods were used both to support communication during the information-gathering process and also as a means of presenting the results, however the project's main focus was the collection and documentation of local narratives.

At a larger scale, *Mittelmeerland* explores the future of the Mediterranean Sea as a territory of water through six distinct Mediterranean metropolises: Dubrovnik, Tangier, Beirut, Algiers, Alexandria and Izmir. The project focuses on finding innovative representation techniques that "poetically" illustrate a territory in transformation, mapping fluid and narrative aspects and using historical maps as a source of inspiration. Narrative representations were able to complete knowledge about the fluvial properties of this space and address conflicting entities through new perspectives and proposals.

The first part of this paper reviews and assesses the potential contribution of narratives in the contemporary production of space, and why current theory in the spatial disciplines is paying closer attention to this method of sourcing local and pluralistic knowledge. Part two draws on fieldwork in the *Streamscapes* project in Northern Germany to demonstrate how narratives were able to capture relations; in both natural daily or seasonal cycles and cultural (political/industrial) development cycles. Part three discusses the power of narrative mapping to analyze and visualize the dynamics of the Mediterranean's urban coastline including the collective memory, the mutual dependencies of land and water, the construction of new ports, which are often in conflict with sensitive sea ground and the transformation of society.

PART I: Narrative mapping and planning; the social background

Waterways are liquid libraries. They are the oldest systems of transport, exchange and sites of settlement hence they are vessels of stored knowledge. Water management is a type of rationality deeply embedded in the territory[9] and around which social, political and technological forces converge. Historical legacies are embedded in the water systems and their extended spaces of reference—partly visible in the construction of banks, bridges, locks and harbours, but also partly concealed from view and always transforming; "the entire river space exists in a constantly advancing, continuous process of change."[10]

According to urban researchers Brook and Dunn,[11] mapping is a critical instrument to understand the individual essences of space, place and networks. Hence, maps and narration have deepened the understanding of territories and completed technical maps of these territories with local knowledge. Narration therefore plays a critical role in understanding the genealogy of water spaces and civic participation steers the story towards greater public involvement. The concept of water resilience, for example, suggests a widespread holistic and multi-scale vision, proposing a nexus of thinking between water resources, the local built environment and the territorial scale. Water resilience calls for a conceptualization of plural spheres, acting both at ecological and socio-cultural levels and triggering a new type of dynamic understanding of water spaces. In water-sensitive urban design for adaptation and mitigation measures in climate-proof urban development, water resilience also means a shift in the relative importance of technical knowledge in favor of locally-produced knowledge.[12]

In order to exploit available potential and to support "on the ground" municipal development, the process of acquiring local knowledge requires committed people and good communication between local actors and impulse generators. Traditional planning instruments, such as master plans or urban redevelopment measures, are becoming less and less suitable for resilient forms of development due to the lack of holistic process approaches which incorporate the participation of different actors and their knowledge of the local environment.[13] An important legal precedent in this area was achieved by the New Zealand Maori in the recognition of

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9. Paola Viganò, "The Horizontal Metropolis: a Radical Project," In *The Horizontal Metropolis Between Urbanism and Urbanization*, edited by Paola Viganò, Chiara Cavalieri, and Martina Marcelloni Corte (Dordrecht: Springer, 2018).

10. Martin Prominski et al., *River.Space.Design* (Berlin, Boston: De Gruyter, 2012).

11. Richard Brook and Nick Dunn, *Urban maps: Instruments of narrative and interpretation in the city* (Farnham: Ashgate, 2012).

12. Jacqueline Hoyer et al., *Water sensitive urban design* (Berlin: Jovis, 2011).

13. Michal Kravčík et al., "Water for the Recovery of the Climate—A New Water Paradigm," Slovakia (2007).

a river as a living being. This in turn opened the door for many indigenous groups with similar worldviews.[14]

Citizen Science: direct participation and self-empowerment of civil society

The difficulty to predict urban developments in many cities and regions provides the impetus for a change of perspective on developmental governance. New forms of governing and organizing commons are playing an important role in urban debates[15] and broader sections of civil society are being activated to participate in questions of urban policy and development. The fundamental idea of the Commons is central to these debates.[16] A field of experimentation for the emergence and testing of new forms of cooperation has opened, supported by new legal regulations between the state, civil society and private-sector actors.[17] Here, the assumption is made that inclusive development is not possible without the incorporation of different types of citizen's knowledge and the trust in the respective ability of "other" members of civil society to act responsibly.

The drive for "Citizen science," which has been adopted by the German Ministry of Education and Research's "Science Year," aims for the common creation of knowledge. The participation of citizens in urban transformation processes and knowledge creation is formulated as a key-task for the future in this research and innovation agenda.[18] A civil society active in building up momentum for science and knowledge creation, in particular through successful networking and cooperation between different groups of actors, is recognized as being vital component to this process. Citizen Science was therefore particularly relevant for the German "Science Year of the Seas and Oceans"—a topic within which a large rift between scientists and the public has developed.[19] Coping with the socio-spatial transformation of water spaces requires not only interdisciplinary and transdisciplinary cooperation of experts from science, municipalities and industry, but also dialogue with citizens in the entire transformation

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14. Eleanor Ainge Roy, "New Zealand river granted same ligal rights as human being," The Guardian, 16 March 2017. Accessed September, 11 2019. www.theguardian.com/world/2017/mar/16/new-zealand-river-granted-same-legal-rights-as-human-being.

15. Elinor *Ostrom Governing the Commons: The Evolution of Institutions for Collective Action*. (Cambridge: Cambridge University Press, 1990).

16. LabGov—the LABoratory for the GOVernance of the City as a Commons, "The City as a Commons Papers: The Founding Literature and Inspiratinal Speeches," in The Co-Cities Open Book. LabGov, 2019. Accessed May 13, 2019. http://labgov.city/co-city-protocol/the-co-cities-open-book/.

17. Mary Dellenbaugh et al., *Urban Commons:Moving Beyond State and Market* (Basel: Birkhäuser, 2015).

18. "Die Wissenschaftsjahre," accessed September 11, 2019, https://www.bmbf.de/de/die-wissenschaftsjahre-229.html (German only).

19. For a more detailed discussion on Citizen Science, see Hauke Riesch and Clive Potter, "Citizen science as seen by scientists: Methodological, epistemological and ethical dimensions," *Public Understanding of Science*, Vol 23, (2014): 107-120.

process, from the problem definition to the final project.[20] These approaches aim to transfer and develop experience and knowledge which is accessible to as broad a section of society as possible. If large parts of society are considered passive consumers of knowledge, then it is unlikely that the knowledge generated will be suitable for society and its needs. This is the way in which science is called upon to produce insights and results for the development of a relevant and worthwhile future that fits the needs of the majority of citizens.

Co-creation of knowledge

The combination of methods from design, social sciences and spatial planning pursues a new interdisciplinary approach that opens up space for experimentation.[21] Design is closely linked to the task of creating knowledge that provides information about what should be (Deontic questions). In the context of design methods, it is crucial that "co-creation" is understood not as "design for user" or "design with user" but as "design by user."[22] In many projects across the globe, co-creation uses mapping as a method of representing and communicating important spatial issues, for example the community mapping lab in the US23 or Iconoclasitas in Argentina and Mexico.[24] Projects such as those undertaken by the "Counter Cartography Collective" formed by cultural studies students and activists at the University of North Carolina, focus on social relations—"the interplay between facts and perception." They produce maps of specific realities which do not appear through official channels, yet capture the critical political dimensions of space.[25] The combination of participation and design in co-creation processes offers a high potential for the generation of accepted innovations[26] and represents a promising basis for designing demand-oriented regional development scenarios. The chosen design-related, participative approach described in the following case-studies thus offers ways of representing both tangible and intangible aspects of complex water-spaces, which can then suggest directions for regional development.

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20. "Bürger schaffen Wissen, Die Citizen Science Plattform," accessed September 11, 2019, https://www.wissenschaft-im-dialog.de/projekte/buerger-schaffen-wissen/.

21. Herlo, Bianca, et al., "Participatory Design and the Hybrid City. The Living Lab Mehringplatz, Berlin, and the Project 'Community Now? Conflicts, Interventions, New Publics'" in *Hybrid City 2015: Data to the People, Proceedings of the Third International Biennial Conference* (Athens: URIAC, 2015).

22. Elizabeth B. N. Sanders and Pieter Jan Stappers, "Probes, toolkits and prototypes: three approaches to making in codesigning," *CoDesign: International journal of cocreation in design and the arts* 10, no 1 (2014): 5-14.

23. http://www.communitymappinglab.org, accessed September 11, 2019.

24. https://www.iconoclasistas.net, accessed September 11, 2019.

25. kollektiv orangotango+, *This Is Not an Atlas (Bielefeld: Transcript, 2019).*

26. Sleeswijk Visser et al., "Contextmapping: Experiences from practice," *CoDesign: International Journal of CoCreation in Design and Arts* 1(2), (2005): 119-149.

PART II: *Streamscapes*—From the Spree to the Sea—a cartographic experiment

The project "*Streamscapes*—From the Spree to the Sea—a cartographic experiment,"[27] began with the hypothesis that important social relations around water may not be captured by technical or statistical data. In particular, how individuals "sense the sea" through their local waterways, was a subject about which little existing research could be found. The exploration under discussion in this section was interested not in producing a piece of historical research, or a chronological reconstruction of events around the waterways, but how experiences are perceived by local inhabitants through the way a story is told. Hence capturing narratives was a key objective. The three sites of local fieldwork are diverse, but together they enabled us to collate a geographically-specific configuration of dynamic social relations to the sea as mediated by the space of the river.

Within the framework of German Science Year 2016*17 "Seas and Oceans,"[28] the content and methodology of this project drew the thematic of the Sea back into the German hinterland and focused on how connections and relations are understood and experienced today. In contrast to the northern Baltic coastal metropolitan centers of Copenhagen, Stockholm, Tallinn, Helsinki and St. Petersburg, after the fall of the Hanseatic League in 1534, the southern Baltic countries of Germany, Poland and Lithuania orientated their capitals inland on the river.[29] The German coastlines to the North and Baltic Seas are relatively sparsely populated, with the coastal region of Mecklenburg-Vorpommern having the lowest income in Germany.[30] To what extent do these demographic conditions contribute to widening the psychological distance and diluting a sense of civic responsibility for the state of the German North Sea—a "commons" of 28,600 km^2 and combined with the German Baltic Sea, an area equal to 10% of the land area?

The investigation chose three sites along the geographically most direct waterway from Berlin to the North Sea in a north-westerly direction from the Spree to the Havel river, the Elbe river and the North Sea. The towns of Garz on the Havel (pop 150), Geesthacht on the Elbe (pop 3000) and Brunsbüttel (pop 13,000) on the Elbe/North-Baltic-Sea-Canal, are each the site of one of the many locks or weirs along this route which testify to the technical and economical project of German river transport. During

27. See online project documentation in "story-map" format: http://www.streamscapes.de, accessed October 29, 2019.

28. *Streamscapes* is a prizewinner in the University Competition "Hochschulwettbewerb" in Science Year 2016*17 Seas and Oceans, funded by BMBF (German Ministry of Education & Research) & Wissenschaft im Dialog (Science in Dialogue). Archive project blog: https://www.hochschulwettbewerb.net/201617/spree-zur-see/

29. Wilfried Görmar and Bärbel Leupolt, "Übersicht Zu Raumstrukturellen Entwicklungen in Der Ostseeregion Aus Historischer Perspektive," *Information Zur Raumentwicklung* 8/9 (2009).

30. Statistisches Bundesamt, "Gesamtwirtschaftliche Ergebnisse im Bundesländervergleich-Ausgabe 2018."

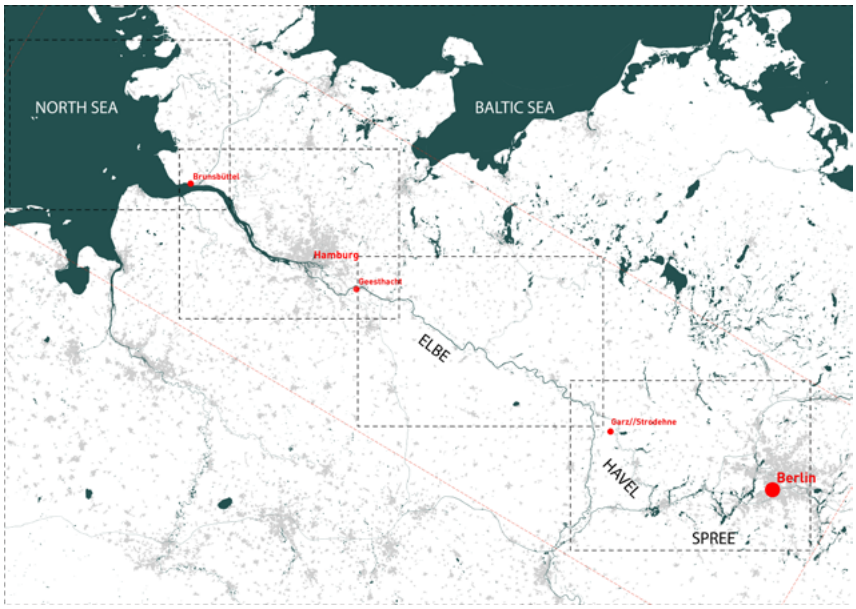

FIG. 2 Area of investigation, (northern Germany), *Streamscapes* project. The map shows a diagonal transect traced in a North-West direction between Berlin and the North Sea, which describes the area of investigation following the flow of three connecting rivers; the Spree, the Havel and the Elbe. The three towns of Garz (on the Havel river), Geesthacht (on the Elbe river) and Brunsbüttel on the North-Baltic-Sea canal, are the sites of three chosen locks where interviews and collective mappings were carried out. The map also shows four segments with different characteristics along this sequence; the Spree and the Havel close to Berlin, which are connected to lakes and renaturalised areas, the non-tidal Elbe river from Geesthacht to the Havel inflow, the downstream Elbe including Hamburg and important shipping functions, and the mouth of the Elbe into the North Sea.

fieldwork in summer 2017, the study group made direct contact with around 450 citizens in these towns, carried out interviews and gathered information through mapping [Fig. 2].

Border relations

While this most direct water route from Berlin to the North Sea had enjoyed marked importance, with towns such as Garz building ports and quays, narratives were able to reconstruct a picture of the complexity of border relations which developed around the political division of Germany and which severed local connections to the sea. While flowing through all borders, the water system was physically and psychologically rerouted through political constructions that determined interrelations between citizens, their rivers and seas. Locals described the economic and demographic decline they experienced as the route from Berlin to the North Sea through the Havel was strategically bypassed. Over 156 river kilometers of this route flowed through the German Democratic Republic (GDR-East Germany). A parallel West-German river route—the Elbe side-canal (1976)[31] then became the busiest waterway. Seamen based in Garz who had sailed both oceanic and inland water-routes carrying coal, grain and other goods through Poland, Czech Republic and from the ports of

31. Linked to the east-west Elbe-Havel canal running to Berlin over the Magdeburg river crossing.

Rostock and Hamburg as far as Australia, now worked locally as tradesmen. Rather than the North Sea, the Baltic Sea, accessible through the GDR, was the local maritime reference and the place for family holidays.

Specific sections of these rivers previously functioned as national borders. Aligned along the river's center-line, stories described how it was possible to paddle up the river on the GDR side, but not cross. Inter-state borders are now still frequently marked by the river, but tributaries from different states comprise a shared river system, bringing material results of conflicting policies, such as polluting fertilizers, downstream. Neighboring towns across the river sharing responsibility for the same ecological system, described how they are subject to differing legislative systems and are distanced by administration.

Historians are well aware of the selective nature of history-writing and how certain meta-narratives gather momentum and dominate their historical period. The effects of border construction on interactions along the river is a story with important implications, but as many experiences from the ex-GDR, has already become fainter and more difficult to hear.

River cycles of production and ecology

The economic importance of the river system for industrial production and transport was transmitted by local people—increasing as we moved downstream into the main transport routes, but the ecological space of the river is understood as a much broader, dynamic system of dykes, floodable areas, cycle paths, flora and fauna as well as bird, fish and animal life. In particular these aspects of the river system are keenly observed by local citizens. Hence making space for a frequently flooding river is an unspoken public contract. At such times, it is only through the assistance of the local community that flood events can be bought under control. Both in Geesthacht and Garz, the 100-year floods of 2013 have left a marked impression—the community in Garz were given 8 hours to build a dyke in order to avoid the environmental catastrophe of a flooded bio-gas plant.

Changes in the ecological balance are immediately sensed by citizens, who reported how, through reduction in river-side industry, "renaturalization" has taken place, encouraging rare wild species such as the wolf to return to some areas, and increasing the frequency of the previously endangered species such as the White-tailed eagle. But locals in the wetlands around Garz have also noticed climate change through increased dryness—less mosquitos, therefore less frogs and less food for the visiting stork population which rests and breeds in the region from March to August before the winter migration to Africa. Citizens cherish their annual stork visits and each village has a "stork-father," who records and monitors their movements.

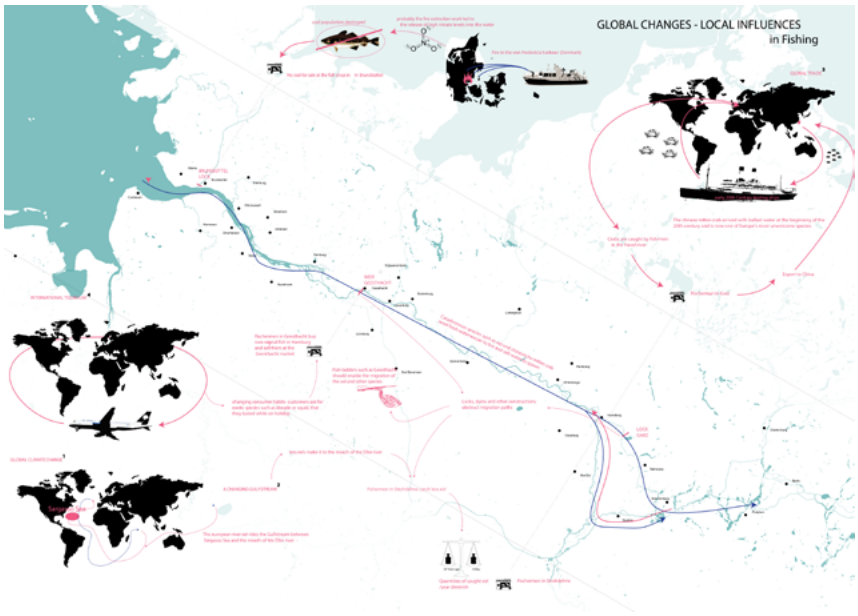

FIG. 3 Global changes—local influences in fishing. This map describes four regional changes which can be traced back to global causes:

1. Man-made obstacles (in the form of locks, weirs) and the decline of the local eel population; the eel was once plentiful in the Havel, says fisherman Schröder in Strodehne, but since the rivers were altered for navigation with channels and locks, significantly fewer eels now make their way upstream.

2. Changes in the Gulf Stream have a direct impact on local waters; eels spawning in the Sargasso Sea "ride" the Gulf Stream in order to reach Europe, therefore due to these changes, eels are arriving in fewer numbers.

3. Changed production chains; according to the fish vendor in Brunsbüttel, the recent decline of the cod supply is linked to a fire in the port of Fredericia in Denmark. The resulting release of nitrate from the fire extinction damaged the cod stock—a fact that is now reflected directly over his counter.

4. Tourism; increasing international tourism is changing consumer habits—exotic fish species including sea bream and squid, are in demand. The Chinese mitten-crab was introduced to the Baltic Sea via commercial vessels at the beginning of the 20th century and despite locks and other obstacles, the crab has made it over the Elbe and into the Havel. Garz fishermen then export them back to China!

The river system is part of, and intersected by, global migration paths. Construction works along the river for the benefit of transport, have made it difficult for fish to move through the system from the sea to fresh water and vice-versa. Fishermen upstream notice the effect of Geesthacht's weir, built in 1960. Despite the installation of Europe's largest fish ramp in 2010, financed by the energy company Vattenfall as ecological compensation for the coal-fired power-station Moorburg by Hamburg, fishermen on the Havel explain how the numbers and variety of fish species that make it through has been drastically reduced and the ecology of the river system transformed. The eel is one example—a fish which migrates annually from the Sargasso Sea to the Elbe, and previously as far upstream as Garz. Vattenfall boasts about the success of the initiative, but local environmentalists criticize the large numbers of fish from the Elbe taken in with the river-water used for cooling the power plant and the resulting rise in temperature of water re-released into the Elbe.

The tangible experience of these cycles is important for local inhabitants. These stories demonstrate how citizen's narratives about the

river and relations to the sea are able to effortlessly capture and integrate the dynamic global cycles of the water system. [Fig. 3]

The narratives move between scales, bringing cycles of time and place together in particular events and capturing the rhythm and elasticity of relations, hence the narrative map avoids contradictions of scale implicit to a Cartesian map. Both natural daily or seasonal cycles and cultural (political/industrial) development cycles are expressed and understood as being intimately interwoven, reaching far beyond Germany and the North Sea.

Intangible Qualities

The resounding appreciation of the river spaces as representing natural cycles was common to people in all three places. The tide is felt in the Elbe as far as Geesthacht (174 river km from the North Sea), where the weir prevents it from being felt further upstream. For participants in our project, the tide has multiple associations, including the uncontrollable force of nature. This implicit understanding was recorded in a "verbal map" where the river space is occupied by associations [Fig. 4].

The sounds, colors, light, movement, space and atmosphere of the river create a direct emotional connection to the sea and trigger memories of certain experiences and events. This connection is affirmed by citizens to be of great value, standing for a fundamental quality of life. Over the

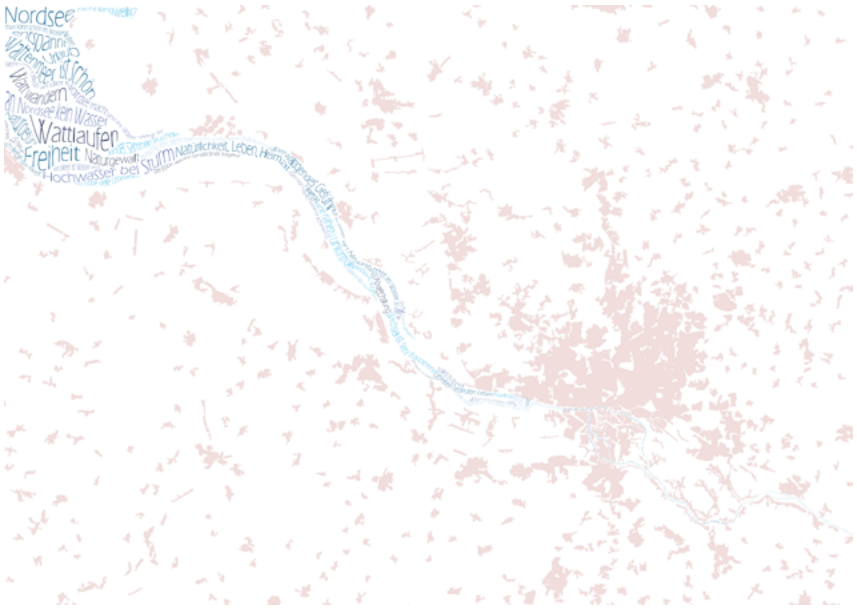

FIG. 4 Local residents described their associations with the tide, which are translated spatially inside the map. Towards the North Sea, the tide is associated with unique beauty of the Wadden Sea (Wattenmeer ist schoen, Wattlaufen), children collecting shells (Kinder sammeln Muschen), holidays and relaxation (Urlaub, Entspannung) the retreat of the water (Nordsee kein Wasser), experiencing nature and its force (Naturgewalt, Naturgefühl), flooding during storms (Hochwasser bei Sturm) and a feeling of freedom (Freiheit). Upstream, along the Elbe, the tide arouses feelings of home and belonging, (Heimat) of being overwhelmed (überwaeltiges Gefühl), of the danger of the unknown tidal movements (vorsicht) and directly feeling life itself (Leben). Observations about the cyclic exposure of beaches and the many life-forms along the Elbe are also recorded. Further upstream the tide means a new start (Neuanfang), is dynamic and associated with the moon but the change can also be striking (frappierend).

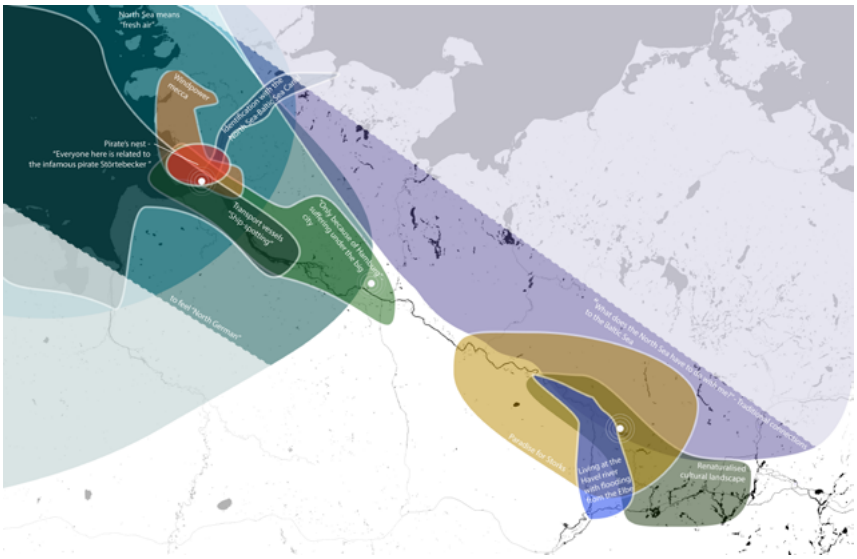

FIG. 5 Identificationscapes. On the basis of the interviewee's statements, a geography of associations can be identified which reveal different relationships along the rivers. Identities around Garz on the Havel are linked to the cultural landscape, to the potential risk of flooding from the Elbe but clearly to the Baltic Sea rather than the North Sea. The influence of the North Sea, on the other hand, reaches as far as Geesthacht. Further important factors are the pirating history around Brunsbüttel, ship-spotting at the North-Baltic Sea canal and the characteristic wind-turbines towards the coast.

"*Streamscapes*" we investigated, strong feelings of identity associated with the water emerged—identities which may not be site-specific but contribute to an expanded sense of belonging around the water and which are able to connect different sites and events of one's own personal history [Fig. 5]. Narratives confirm that the water systems are highly prized socio-cultural spaces contributing to a tangible effect of personal and collective well-being.

Implications for design

The *Streamscapes* investigation led to the formation of specific forms of knowledge about the region and its connection to the sea which would not otherwise be apparent from a technical analysis. Most citizens are closely linked to their river spaces, physically and emotionally, understand and observe its transformations and consider the environment of high qualitative value. Narratives tell the story of the fragmentation and division of the ecological system in the name of improved transport efficiency, which has led to increased separation and withdrawal from the sea.

Narrative cartography represents territory according to alternative knowledge sources and categories, which can serve as a basis for innovative planning processes. In the *Streamscapes* project the spatial reference system which emerged, is represented by the watershed—an ecological definition [Fig. 6]. How would decision—making processes be steered if the water territory was a federal "eco-state" and if citizens participated in the same level of decision-making as the national bodies of interest? It was through the process of constructing narrative cartographies, that

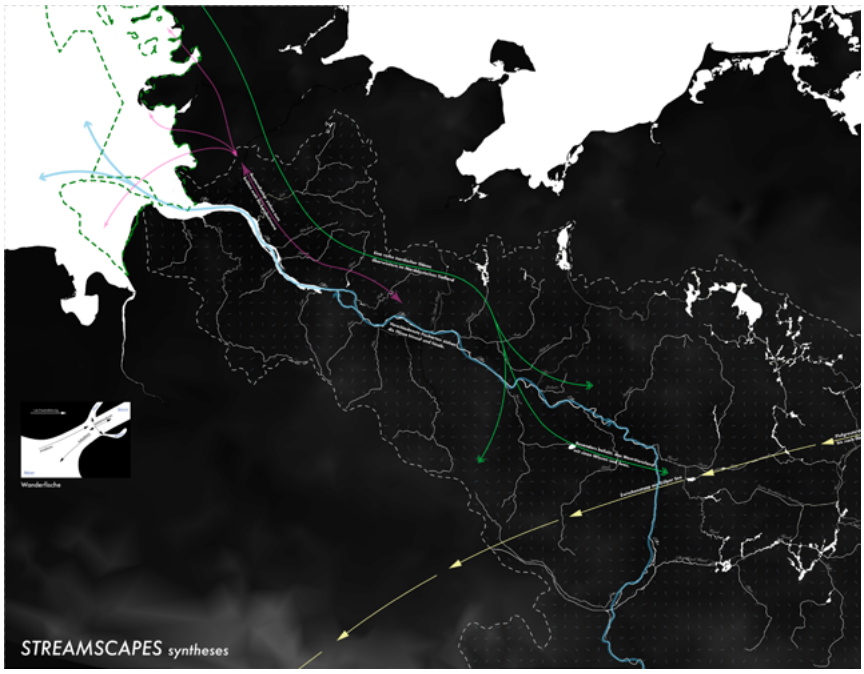

FIG. 6 The *Streamscapes* watershed--a possible ecoterritory. The ecological boundaries of the territory are established through the Elbe, Havel and Spree watershed areas (tributary rivers are indicated), however long-range bird and fish trajectories intersect the space. Different fish species (blue) travel up and down the rivers—anadromous fish live in the sea but return to rivers to spawn, whereas catadromous species such as most eel, live in the river and return to sea to spawn. Many northern geese (green line) from the grey, white-fronted and bean-goose species spend the winter in northern Germany, in particular around the western parts of the Havel river and surroundings. The flight path of the migrating cranes (yellow) passes across Lake Gülpe near Garz, where a stop is scheduled between the Baltic Lakes and Spain or the south of France.

the tangible logic and the physical outline of the Spree-Havel-Elbe ecoregion emerged as a possible future project.

This approach is closely aligned to the Bioregionalism school of thought, which considers territory itself is a common good—a good which has been transformed dramatically through globalization and the dominant "political economy."[32] Bioregionalism therefore also calls for local involvement. Our study revealed that old borders are long-lasting and deeply inscribed. The concept of a large-scale eco-territory based on the watershed, does not compete with local cultural traditions, but just as historical administrative units such as duchies, kingdoms and states reflect the concerns and power-structures of their time, so can ecoregions serve to reflect the ecological territorial concerns of our present century.

PART III: Mittelmeerland

The Mediterranean was chosen as the territorial context for the study because in the last century it has been separated through politics, religions and nation states. The Mediterranean Sea is not only situated between continents, but also acts as a historical and contemporary center and border zone. The social, economic and political dynamics of this zone

32. Alberto Magnaghi, "Draft of the Territorialists' Society Manifesto" (2010).

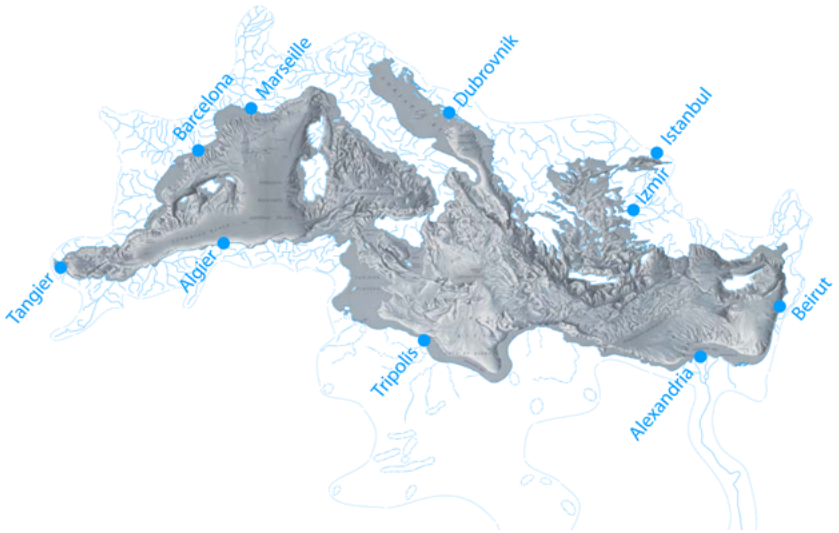

FIG. 7 *Mittelmeerland* Territory (Medine Altiok). The context and the territorial extent of the *Mittelmeerland* Project showing the topography of the Mediterranean Sea ground, major port cities and the extent of the Mediterranean water basin including the sea, the tributary rivers and water resources under the desert, which are also linked to the sea.

are complex. Contemporary political concepts such as the Union of the Mediterranean are only one example of the many dynamics that are driving spatial change in the cities. Unified by climate and the history of civilization, the Mediterranean region has the potential to be understood as a geographic unit, in particular the shared climatic conditions could form the basis for tackling shared environmental problems.

Mittelmeerland creates a territorial view which approaches the cities and coasts from the sea, therefore inverting sea and land and providing a fresh perspective. During strategic wars, the birds-eye perspective from the sea towards the land was used as means of orientation, but during the project this view served as a strategic device to erase boundaries ingrained in the territory and in the imagination.

Mittelmeerland envisions removing coastal cities from their national context and shifting them into the liquid body of the Mediterranean Sea. The sea is seen as a shared resource, a single liquid territory whose port cities function through similar networks with similar shipping routes. Applying a comparative method, the *Mittelmeerland* project conducted workshops over 5 years in the six Mediterranean metropolitan areas Dubrovnik, Tangier, Beirut, Algiers, Alexandria and Izmir. [Fig. 7] Through the study, urban centers in a phase of major transformation and development revealed themselves to be the ones richest in potential. Instead of limiting the study to renewed European Port cities like Genoa, Venice, Marseille or Valencia, the study focuses on the Southern coast of the Mediterranean, where future masterplans are still being developed. Taken out of their national context, these coastal cities stand in dialogue with one another in terms of economic liberalization and cooperation in politics, the environment and energy.

Role of Cartography and Narrative Mapping

An important objective of the project was to redraw the map of the Mediterranean in order to record flows and relationships in a new way and imagine future models of development; models which can incorporate the coexistence of diverse societal elements characteristic for each port city within an overall fluid unity. Narrative cartography was therefore an important research tool, combining investigations into abstraction and different graphical representation techniques.

In each city *Mittelmeerland* looked at the urban patterns found in five selected neighborhoods along the waterfront; an agricultural area preferably including a river, the industrial harbor and immediate surroundings, the historical center, a geographically unique area, and a run-down residential area. *Mittelmeerland* aimed to uncover unrecorded elements of the collective memory, informal interdependencies between water and land uses, incremental societal transformation caused by illegal migration and trade, and the indirect effects on climate, nature and economy caused by the construction of new ports or other coastal projects. Statistical and historical information was also consulted in order to gain a deeper understanding or to clarify questions.

Making Narrative Maps

The method of constructing narrative maps in the Mittelmeer project began with a conventional black and white topographic & bathymetric map as a base. Further information was added during the fieldwork through hand measurements, interviews, photography, writing short scenarios or critical statements. The base-map was transformed step-by-step into a narrative map by the addition of phenomenological situations, specific physical dimensions, informalities, the relationship between house, street and sea, borders, historical traces, vernacular climatic building solutions, patterns of behavior, routes, routines, traditions and the social interaction of local inhabitants.

An important aim of the investigation was to develop sustainable climatic solutions, therefore fluid climatic aspects of the landscape ecology such as the sun paths, wind directions and shadows were incorporated into the maps. Participants created a basic but distorted birds-eye perspective looking at the coast seen from the sea and inserted these features. The final step was to make proposals to improve an existing situation. For this step, imaginative collage was used as a tool to communicate an intervention or a critical statement on conflicting situations.

The resulting dynamics found in the Mediterranean coastal cities are presented through the four examples below. In each situation, narrative mapping helped to uncover and illustrate conflicting situations which lie at the root of the fragmentation and poor ecological state of the

Mediterranean, but which cannot be found assembled in traditional technical maps.

Migration and Trade

The Miniature Painting of the Fall of Constantinople, where the Turkish army of Mehmet II attacks Constantinople in 1453, **[Fig. 8]** serves as a historical reference for narrative cartography. Soldiers can be seen pointing canons to the city and others pulling boats into the Golden Horn. The painting composes the story with the main spatial features of the land, water, hills, weapons, people and ships using different scales and perspectives and exploiting both foreground and background. The narrative map of Ceuta re-interpreted these techniques to illustrate the border condition and conflicts between Ceuta, Tangier and the strategic position

FIG. 8 Bertrandon de la Broquière, Fall of Constantinople, 1453. Bibliothèque Nationale de France, MS fr. 9087 (f. 207v), made in Lille in 1455. Source gallica.bnf.fr / BnF.

FIG. 9 Border-crossing between Ceuta and Tangier, Map by *Mittelmeerland* (2011). The perspective shows the context of the well-protected border between Ceuta and Morocco by exaggerating the walls and the control towers on the hillside that prevent people from crossing. On the hill, a group is erecting the Moroccan Flag, in an attempt to reclaim the enclaved territory of Ceuta. In the background migrant boats are crossing the strait of Gibraltar towards Spain and a helicopter is controlling the sea. The foreground contains both historic and contemporary elements that refer to the flow of people and material exchanges in the area.

of Ceuta in the Straits of Gibraltar—a conflict arising since the creation of the border fence in 1993 to prevent illegal migration and trade. The narrative map shows the physical walls and the process of crossing the border, with the main activities of informal trade simplified and positioned to read from left to right. Moroccans who live in four towns close to the border do not need a visa to cross into Ceuta and can take as many goods with them as they can manually carry. In order to trade without paying taxes, this agreement is exploited and the maximum of goods are physically carried across the border by the traders. The drawing identifies the informal occupation of public space by traders and migrants and new types of spaces created for waiting, hiding and storage **[Fig. 9]**.

Collective memory

In Beirut **[Fig. 10]** the narrative map uncovers the Hotel St. George, which is resisting the construction of the new waterfront and is the last remaining sign of the collective memory. It is drawn larger than its actual size in order to emphasize this role. The new masterplan proposes luxury high-rise buildings arranged in a formal grid and a promenade along the waterfront, all occupying a huge artificial landfill situated just in front of the former Downtown Beirut. The narrative map also articulates the lack of public space and the vanishing relations between sea and land due to the privatization of the waterfront. It describes a proposal to reconnect the promenade by creating a passage directly through the hotel. While the master plan still waits to be executed, the drawing proposes to fill the

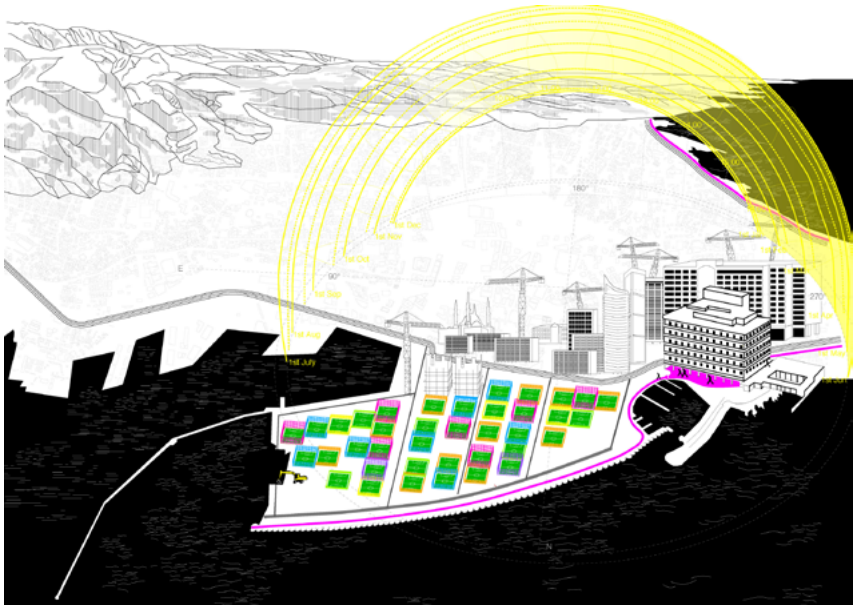

FIG. 10 Privatization of the coast Downtown, Beirut, Map by *Mittelmeerland* (2012). In the foreground, on the right-hand side, the building of the St. George hotel is exaggerated to show its isolated but important position in front of the new construction site and next to the new landfill at the waterfront. The purple line follows the public path along the shoreline to visualize the interruptions and the possibility that the St. George hotel could play a central role in connecting these areas. The drawing contains also the sun's path, shadows in the hills and shows the direction of wind and depth of water represented through the waves on the water surface.

landfill temporarily with football fields in order to create the public spaces that were forgotten in the new planning. Seen as a temporary playground, these fields could follow a dynamic concept that adapts during the construction phases.

Ecological imbalance

The Neretva River Delta in Dubrovnik [Fig. 11] and Lake of Reghaia in Algiers [Fig. 12] are examples of two protected river deltas in the Mediterranean. Both cases are in a state of ecological imbalance with conflicting interests between a protected natural area, industry and agriculture.

On one side of the Neretva River, the industrial port is expanding to connect the water-way for larger container ships into the hinterland. On the other side a tangerine plantation with small buildings and artificial irrigation channels is slowly disappearing due to the decrease of agricultural production. The sensitive river mouth is under protection and located between port, infrastructural nodes and agricultural fields. The narrative map describes how the four areas clash and cause environmental conflicts by showing all major activities simultaneously and with equal importance. Physical elements such as ships, animals, farm houses and raw material stored at the port are all represented at the same scale.

The narrative map of Lake Raghaia uncovers illegal uses in the surrounding area—an information that cannot be found in normal maps. The lake is an important place for goats and migrating birds but at the same time it is surrounded by touristic developments, settlements and farmlands, both

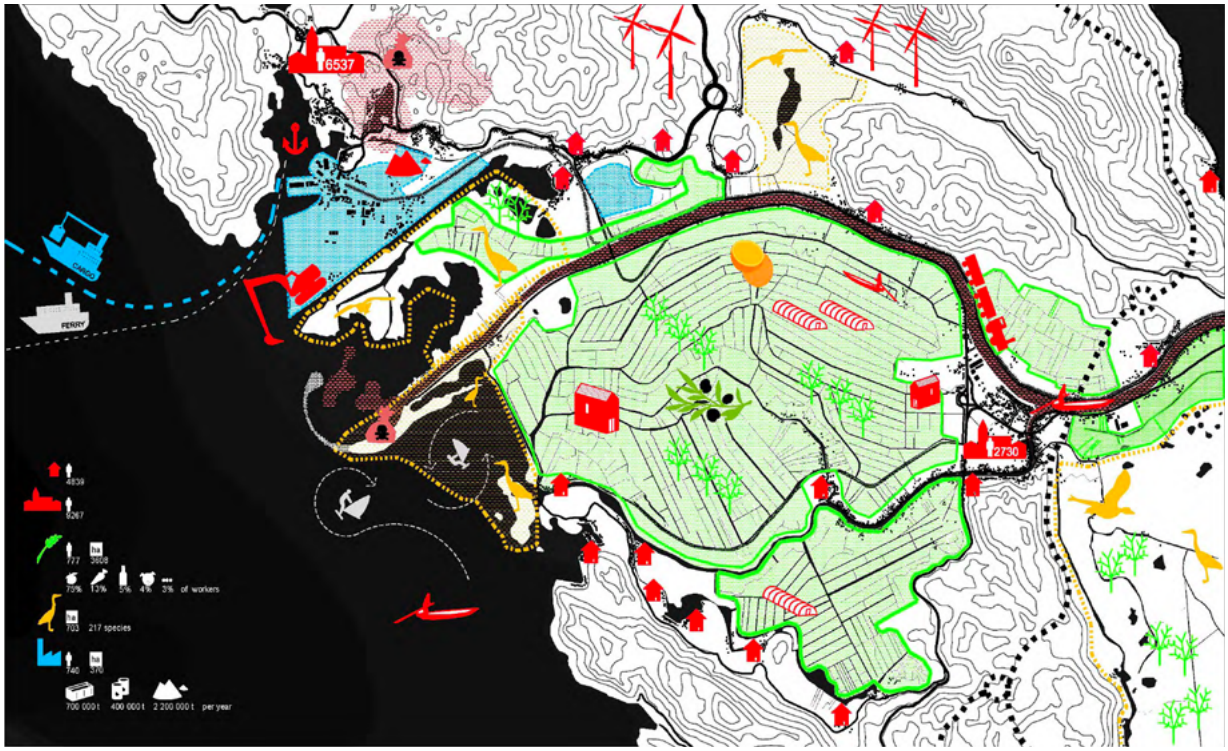

FIG. 11 Protected Neretva River Delta in conflict with the port of Ploce in Dubrovnik, Map by *Mittelmeerland* (2011). The map shows (in blue) the activities and areas of the port near the town Ploce and (in green) the agricultural sites in the Neretva River Delta near the town Opuzen, which is the major tangerine producer in Croatia. Both towns are symbolized by the red building that is sized according to the number of inhabitants. Industrial ships, surfers, trains and animals indicate different types of flows. The map also presents several proposals; to use the strong winds (windmills), to reuse existing historic farm-houses (small red buildings) and to add new conservatories for ecological tourism in order to revitalise the declining agricultural production (greenhouses).

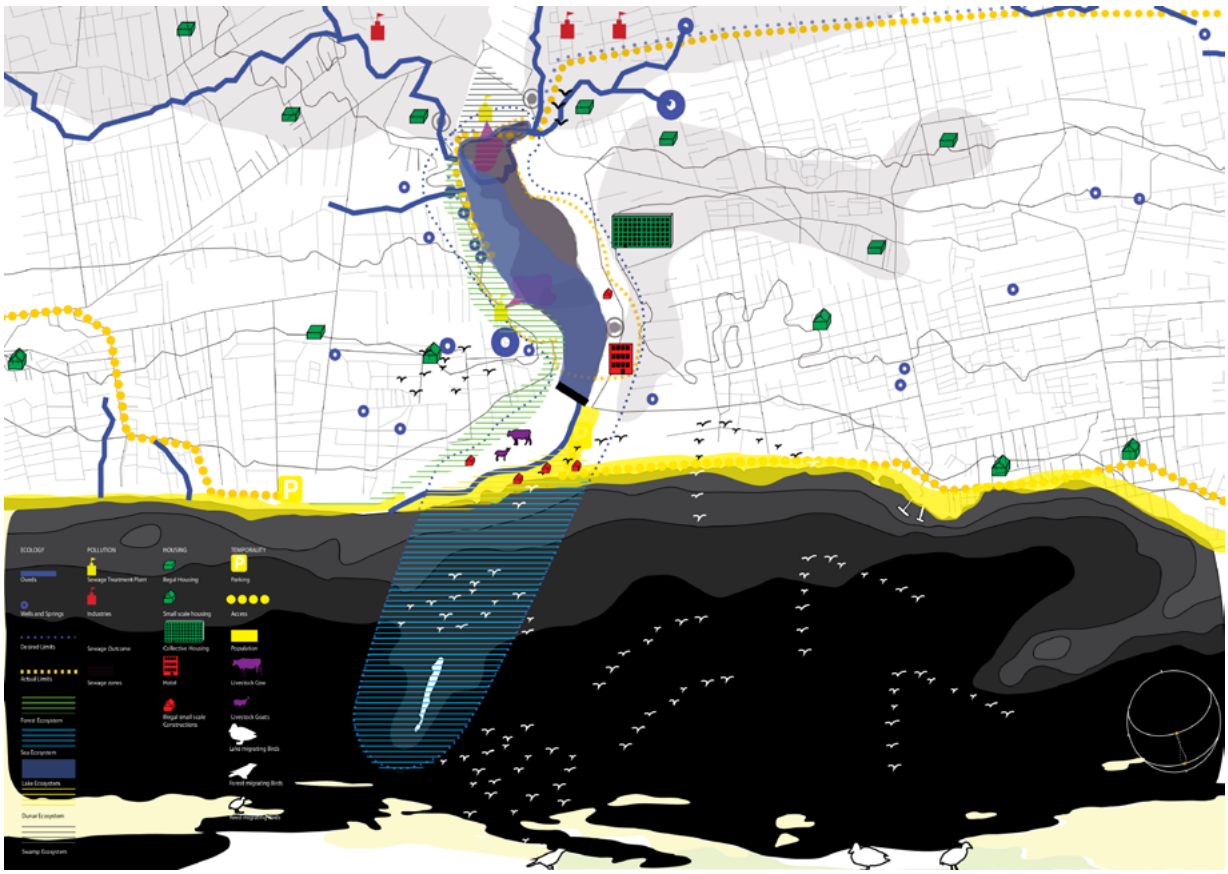

FIG. 12 Protected Lake of Reghaia (an important, Ramsar-recognized marshland) in conflict with pollution by adjacent industries, Algiers, Map by *Mittelmeerland* (2012). Elements of four themes which were observed in the area are shown in the map: ecology, pollution, housing and temporalities. Overlaps between these themes cause conflicts which also signal potential sites of improvement. The grey zones indicate industrial areas and the outline of the Mediterranean is shown in the lower part, including symbols for the larger context of bird migration.

legal and illegal, that are expanding in an uncontrolled manner, pushing into the lake-edge and polluting the water system. These developments are in conflict with the city's official plan to establish a protected nature resort. The nearby farmlands and industries are illegally releasing chemicals into the lake's tributary rivers. Between the lake and sea, the ecologically sensitive and vulnerable area is illegally used as a car park, a football field and by a hotel. Once a building is built, changes requested by decision-makers are difficult to implement. However, the population's awareness of the importance of protecting vulnerable natural areas is increasing and in future, such illegal uses will not be easily tolerated.

Conclusion

The narrative cartography discussed in this paper looked for implicit local knowledge, cultural information, past experiences and observations about changes over time. Both *Streamscapes* and *Mittelmeerland* describe fragile, complex, contested and fragmented water territories. The maps produced help to read and to understand the complexity of waterscapes and to detect locations where spatial improvements could be beneficial for citizens. They were able to link phenomenological observations and physical conditions, qualitative and quantitative research. Combining both scientific and poetic information, they serve as tool with which to tackle common environmental and societal issues and to gain a critical perspective on current urbanization processes. Through the combination of scales and a playful composition of elements, the maps communicate conflicting issues and reveal hidden potentials, which may otherwise be intangible or located beyond the visual edges of the water-basin, but however are key determinants of current conditions.

Narrative maps relate different types of findings and communicate issues and proposals, past, present and future, between a broad spectrum of citizens. They are opening up new and expanded dimensions to the relationship between water and society and are constructing a unique profile of the local space itself, thereby facilitating a holistic territorial development approach. The transition towards water resilience requires an exchange of different types of knowledge to complete existing water cartography, based on the conception of water as a common good. This is critical—both in conceptual as well as in operational terms—for a multi-level and multi-sectorial planning consultation. Narrative cartography represents territory according to alternative knowledge sources and categories, which can serve as a basis for innovative planning processes.

The combined experience gained through the two projects discussed in this paper, demonstrates a range of possible applications, outcomes and territorial perspectives which can be achieved through narrative cartography. Our interest is in promoting this method as being particularly valuable for the understanding of water regions, due firstly to their

inherent "common" nature and therefore their gravitational affect as spaces of conflicting interest and secondly their fluidity which makes them difficult to decipher. While the main principles of this method can be adapted to land-based studies, the aesthetic research into representing the multiple dimensions of water is a central motivation for this ongoing work.

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