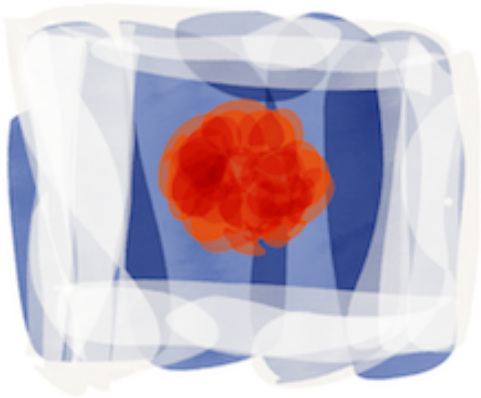
Deliverable 1.2

Chronology and in-depth analysis of weather-related and place-specific narratives of climate change

Author(s) and affiliation(s)	Date	Version
Werner Krauß, Uni HB Scott Bremer, Uib SVT Arjan Wardekker, Copernicus-UU Benedikt Marschütz, Copernicus-UU Juan Baztan, UVSQ-CEARC Charlotte da Cunha, UVSQ-CEARC	Nov 10, 2018	V2



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1 Executive summary

1.1 General overview

CoCliServ explores new ways to transform climate science information into locally meaningful knowledge for action. CoCliServ shifts the focus on narratives of change in order to facilitate decision-making, to identify information needs and to better address local communities' concerns, aspirations and goals. The goal is to jointly empower local communities, stakeholders, knowledge-brokers and scientists to develop and to co-construct new forms of place-based climate services for action.

In CoCliServ, narratives play a central role as a localisation device. Narratives add value and meaning to scientific data about climate and turn 'matters of fact' into 'matters of concern'. Based on the mapping, analysis and interpretation of narratives of change, CoCliServ develops vision-based scenarios, deploying an incremental and community-led strategy. Exemplary collaborative relationships between climate science and local communities will be established in five representative case -studies: in Bergen in Norway; along the Jade Bay in Northern Germany; in Dordrecht in Netherlands; in St. Pierre /Kerourien and in the Golf du Morbihan in France.

1.2 Goal/Purpose and framework of the document

In this report, we present the results of D1.2, the chronology and in-depth analysis of weather-specific and place-based narratives of climate-change. This is the second of a three-step process to identify and to analyse narratives of change as the basis for the production of innovative place-based climate services for action.

In D1.1, we focused on the mapping of meta-narratives understood as widely shared representations of the respective land- or cityscapes. We argued that mapping is more than geographically locating narratives on a map; instead, narratives have to be presented in a social context and in the framework of research. In doing so, mapping of narratives about weather events and climate change made geographical and meteorological data meaningful and shifted the focus on identity formation and senses of belonging. (Krauß et al., 2018)

In this deliverable, we provide a chronology and in-depth analysis of these meta-narratives. Like mapping is more than locating narratives on a map, chronology means more than listing events on a time scale. First of all, there are different time frames simultaneously at work: climate change and geology are measured in millions of years, flood protections have historic time frames, seasons are experienced as cyclical, and weather is a short-term event. In narratives about weather events, these different timescales merge into meaningful configurations of time and space. The chronology and in-depth analysis of narratives about weather events, of landmarks, of habitual practices or literary and scientific reports are a further step towards the co-production of localised climate services for action.

1.3 Main findings

The initial mapping of narratives already provided diverse timescales, for example for the geological and historical past or dramatic weather events which are formative for the shaping of these landscapes. It is commonly agreed upon that science-based timescales are more exact than those memorised by ordinary people; it is the triumph of science and a source for administrative authority that people's memory fails or is incomplete and that they have to be educated about long-term processes like climate change. But the analysis of narratives tells another story: narratives make space meaningful and turn geological,

architectonical and meteorological features or events into markers of memory, of identity and belonging. In our field-sites, specific mountain ranges, historic peak flood levels, housing projects, artworks or public places are landmarks with specific, often contested or ambiguous meanings. As configurations of time and space, the analysis of these 'chronotopes' (Bakhtin 1981) give an insight into the construction of these landscapes.

For the in-depth analysis of narratives of change, we followed the suggestion of Braudel (1949) and others and developed a multi-level structure for the analysis of specific configurations of time and space. Braudel's chronology roughly differentiates processes of very long time, of long time, and of short time; for our purposes, we refined this typology and added seasonal time, geo-political time and lifetime. Furthermore, we do not categorially separate between geology and social and political processes. It is one of our main findings in this stage of the project that in narratives of change, social and political processes are closely intertwined with geological or meteorological processes. The coastal areas of the Golfe du Morbihan and the Jade Bay, as well as the delta in Dordrecht and the mountain ranges in Bergen are geo-political territories; the case of Kerourien explicitely demonstrates that a sense of belonging is a geo-political affair and that people easily can be de-territorialized. In Table 1, we present a chart of interconnected timescales. In narratives of change, there is hardly only one timescale to be found; quite the contrary, they situate events or arguments in specific configurations of time and space. Like tectonic plates unfold mountains, narratives unfold climate-scapes in time and space.

Table 1 Chronology of narratives

Chronology of narratives	

Geo-political time	Ice Age, rising sea level, tectonic shifts formation of deltas and tidal flats etc
Historical time	Settlements, civilisations, coastal infrastructures, WW II
Seasonal time	Flood season; tourist season; cyclical four seasons
Present time	Energy transition, climate politics
Lifetime	Weather, memory of weather events

In coastal areas, geo-political processes play a major role in the imagination of a common identity; sea level rise, geological subsidence, the formation of deltas and mountain ranges are meaningful for the social and political processes. Water regimes and land reclamation play a central role, and the evolution of infrastructures go back many centuries in time; these water regimes and coastal protection measures are at the core of identity formation and social organisation. Geology is in these coastal areas more than an environment that conditions or determines economic or social activities; quite the contrary, geological processes are an integral part of the social and political ecology of these landscapes. Narratives of change do not reflect reality; instead, they are constitutive of the landscapes we shape, administer and inhabit.

In extreme landscapes like the field-sites of CoCliServ, the social organisation is closely linked to the infrastructures that enable permanent life and economic activities in these areas. The normalisation of these practices in the course of centuries makes them appear 'natural' and obvious; however, the challenge of climate change and its effects like landslides and extreme weather, sea level rise

and storm flood bring the close interaction of human and non-human forces back to attention.

The four seasons of the year are common throughout Europe, with diverse expressions in intensity and duration, but in none of the field-sites, seasons are just a meteorological phenomenon. Quite the contrary, for coastal protection, winter is rain and storm season, for tourism managers summer is high season, and all seasons are permanently compared to previous ones. It was colder then, we had more snow, it was like this and like that – the daily weather and the change of seasons are as much discussed as the place called home in a globalised world. Climate change is one of the most striking symbols for global change, and in turn, the daily talk about the weather gains a geo-social and geo-political dimension. Changes in the weather are as symbolic as the scientific news about climate change; there are no facts without values when it comes to changes in weather and climate. Dead whales full of plastic in Norway tell as much about the reality of climate change as the dreams of white Christmas in the Jade Bay or the charts in the energy concepts of climate managers. Narratives are at the heart of what constitutes a sense of belonging, to a specific place and to the world at large. The Kerourien / St. Pierre case study is a primary example for geo-politics; the neighbourhood consists of inhabitants of 25 nations from different climatic backgrounds, with different pasts and dreams of the future. The geology of Kerourien is not identical with home, it is a place on a journey and a potential. The focus is here, more than in any other project, on the neighbourhood, on real people in a transitory place, represented by two towers.

Each of the projects has a different framework: the case studies of Dordrecht and Bergen are more or less embedded in municipal climate adaptation projects; the Golfe du Morbihan project consists of a hybrid site-governance group with local teams to produce climate knowledge for action, while the Jade Bay project

seeks to find out what it takes to build a climate friendly place that people can call home.

The chronology and in-depth analysis of weather-specific and place-based narratives of climate change challenges a linear understanding of climate services; there is not people on the one side and climate-science on the other. Quite the contrary, the understanding of extreme landscapes as chronotopes, as specific configurations of time and space, challenges both the common understanding of climate change and of climate services. As a result, D1.2 suggests that scenario building means meaningful story telling (WP2), that climate science is more than delivering quantitative information (WP3), and that quality assessment of local knowledge is more than comparing facts and fiction (WP4).

2 Relationship to the Description of Work (DOW)

The objective of WP1 'Narratives of change' is to collect, analyze and compare local narratives of local weather conditions from community actors on various levels of agency. Deliverable 1.2 provides the 'Chronology and in-depth analysis of weather-related and place-specific narratives of climate change'. The accomplishment of this deliverable is specified in Task 1.2: 'In-depth analysis of literature, media, historical accounts: chronology of narratives and their changes; chronological reconstruction of main weather events and contexts shaping the narratives; identification of metaphors and semantics concerning local climates, changing weather conditions and place-based identities.' In the light of the ongoing research, we decided to also include material already produced in the field, mainly interviews with key actors and local citizens. Thus, this deliverable consequently follows the findings of D1.1, with a specific focus already on the requests from WP2, WP3 and WP4.

3 Theoretical and methodological approach (Werner Krauß & Scott Bremer)

In D1.1, our focus was on the definition and classification of narratives in the context of our respective field-sites. In D1.2, we will go into more detail and add the dimension of time to the spatial representation of weather- and climate-related narratives in specific places. In this report, 'chronology and in-depth analysis of weather-specific and place-based narratives of climate change' means that we focus on narratives and other representations of the landscapes as specific configurations of time and space. In narrative scholarship, time is not simply an independent arrow that flies from the past into the future, along a numerical, ascending ladder of minutes, hours, days and years. Nor is it a simple ordering of one moment preceding and opening onto another and another. Rather, stories about weather and climate combine elements that simultaneously operate at different time scales, intersecting at important junctures, and redefining each other; they are part of the construction of place-based identities, of senses of place.

The way we represent weather and climate in a place is related to our broader experience of *time*. Time is a fundamental quality of human involvement in the natural world – how we live by diurnal, or seasonal cycles and so on – and in society – how we organise social life. There is a rich literature about human experience of time, traversing fields like geography (Thrift 1977a; 1977b; Harvey 1990), history (Bender & Wellbery 1991), archaeology (Gosden 1994), anthropology (Douglas 1982; Strauss and Orlove 2003), and sociology (Bourdieu 1977), which makes three important points relative to this project. *First*, there is no single, universal coordinate of time, but rather multiple dimensions of time being made and remade at multiple individual, social, and cultural levels. We can think in terms of overlaid biological time (our physical being in the world),

psychological time (our memories, stories and meaning-making), and social time (related to social events) for instance (Thrift 1977a; 1977b; Gosden 1994). In this same sense, there are multiple definitions of seasons (Rayner 2003; Jasanoff 2010; Hastrup 2016). *Second*, these framings of time (or the timed passage of weather and climate) are constitutive of natural and social orders. Different 'chronotopes' provide a rationale for how people move through spaces, captured in the maxim 'a time and place for everything' (Harvey 1990; Thrift 1977b). Bourdieu (1977), for instance, looked at how seasonal rhythms defined the spaces where one particular agricultural community spent time over the year (in the home, or fields…), and how these spaces defined social order; revealing how social time can be intertwined with natural time. *Third,* framings of time are dynamic, with historians (Fleming 1998; Golinski 2003) and literature scholars (Harris 2015) showing how climate representations have changed since the enlightenment. Some assert that by dynamically assembling different representations, operating at different time-scales, people comprehend climate (Hastrup 2016; Rayner 2003), 'to abolish a unidimensional time concept is to restore the richness of social life' (Nowotny 1975 p 33).

3.1 Allochronism

For the purpose of the co-production of climate services, the understanding of different framings of time is crucial. Co-production demands that we discuss climate variability and change across different conceptions of time, beginning by dissolving long-held, false divisions; particularly that between 'real, objective time' as used in science and 'other' framings of time in non-scientific cultures (often labelled as indigenous, folk, or lay people). While climate science has a dynamic concept of time, which is characterised by the evolution of science and technology, 'the others' are portrayed as living in a timeless present time, with unchanging believes and customs, either as noble savages or else as being

backward and in need of education. This is often illustrated by describing 'climate' as an abstract scientific concept that is not accessible to ordinary people, who are imagined as only having immediate access to the 'weather'. This phenomenon is well-known in the history of anthropology. In her article about ecology, alterity and resistance, Tracey Heatherington (2001) describes with ethnographic and linguistic scrutiny how people in Sardinia were presented as backward and criminal when they protested against the declaration of the commons as a Nature Park, which meant that they were deprived of their herding grounds. Instead of addressing the political and economic problem, nature conservationists and ecologists declared local people as still living in the 'Wild West'. Heatherington highlights the role of time in the narrative production of unequal power relations:

'Fabian introduced the term 'allochronism' to name practices of representation prevalent in anthropological writing, where the 'denial of coevalness' was a device used systematically in a given discourse to define the distance between observer and observed (1982: 32). Claims to legitimate knowledge were accomplished by rendering contrasts between the dynamic, present time of the researcher's own culture and the timeless past in which the other cultures were situated as objects of the ethnographic gaze. Cultural alterity was 'mapped' on to passive history. Taken in broader perspective, allochronism is not a technique unique to colonial anthropology, but has inflected many kinds of western discourses on modernization, development and political transformation.' (Heatherington 2001, 290f.)

The co-production of climate services means that science is not set up in opposition to local knowledge or used to debunk local myths and believes. All different conceptions of time are equally worthy of consideration, and can offer complimentary ways of understanding climate. A narrative approach is particularly well suited to reconciling different times. Narratives undermine the

separation of fact and value, of objective materiality and symbolic meaning, and finally of nature and culture. Narratives are where time and space intersect and are imprinted on a place; figuratively, and sometimes physically as where landmarks (cliffs or statues for example) offer specific configurations of time and space and provide an insight into the narrative construction of political landscapes.

3.2 Chronotopes

In narrative analysis, philosophy, linguistic anthropology or geography, the production of meaning comes into focus. In narrative theory, Michael Bakhtin introduced the term 'chronotope' for the representations of specific configurations in time and space in discourse and literature. He defines them as

'*points in the geography of a community where time and space intersect and fuse. Time takes on flesh and becomes visible for human contemplation; likewise, space becomes charged and responsive to the movements of time and history and the enduring character of a people (...) Chronotopes thus stand as monuments to the community itself, as symbols of it, as forces operation to shape its members' images of themselves.*' (Bakhtin 1981:7).

Keith Basso (1984) applied this concept in his research about the political ecology of Western Apaches, where he analyzed geographical landmarks in the landscape as chronotopes. The Apache landscape is full of locations which are charged with personal and social meaning and significance "where time and space have fused and where, through the agency of historical tales, their intersection is made visible for 'human contemplation'". When Basso asked his informants for directions how to find a specific place, they told stories about what happened at this hilltop, that rock formation or at the bend of the river. Through these stories, the travel from one place to another is one along landmarks that 'have become symbols of and for the way of living, the symbols

of a culture and the enduring moral character of this people.' (Basso 1984, 45). Basso attributes a lot of power to the landscape itself. He is fully aware that social change is changing the culture of the Western Apaches under the influence of capitalist consumer culture, and there is nothing to guard against this, in the long run. Roads that once have been meeting places today are signs for mobility. But he states that the landscape itself 'is doing a respectable job'. It is still there, 'stalking' the people.'

In Western philosophy, this reminds one of Marx' famous statement that we make our history ourselves, but not under the conditions of our own making. This is true for the material conditions as well as for the historic names, places and costumes that reappear in times of rapid social change; change, according to Marx, often comes in historic disguise. The field sites of CoCliServ are land- and cityscapes with a long history, and with geographical and architectural features as well as meteorological or geological characteristics that are loaded with personal and collective memories. Their symbolic meaning serves as identity markers and provides a sense of place and belonging. The analysis of these landmarks and their multi-facetted meanings and significances provide an insight into the richness of social life. Sea-level rise or extreme weather events meet in reality not only dams, but markers of identity and of ways of living.

3.3 'Milles plateaux'

In the introduction to their seminal textbook 'Weather, climate, culture', Strauss and Orlove (2003) make use of different concepts of time. They make a distinction between daily weather, which is experienced in the everyday life and serves as the main incense for small talk, between the seasons, which structure the annual cycle for example of agriculture, but also of the urban life, and finally climate, which they associate with generational knowledge. They highlight the role of language for all of these different time concepts in everyday life,

agricultural practices or scientific knowledge, and they list the different genres associated with these concepts. In their overall conceptions, the authors describe different attitudes towards meteorological or climatic phenomena. They employ a perspectival approach, which Bruno Latour (2004) once described as a 'many cultures – one nature' approach, with science still having the ultimate and exclusive access to the 'real' nature – or today, to climate change. Latour instead argues that nature is a co-production of human and non-human actors; nature comes into being or, as Heidegger put it, unfolds. In his recent work, Latour (2017) still insists that climate is, like 'nature', not out there, but it is permanently produced by the interaction of human with the bio-, hydro-, geo- and atmo-spheres. Thus, the many cultures / one nature approach turns into a many cultures / many natures (or climates) approach, which means a shift in ontology.

The French historian Fernand Braudel (1949) made use of a comparable ontological approach in his monumental history of the Mediterranean. He stated three different time levels: the first one is the geographical or geological time of the environment of human cultures. The geological time is slow, cyclical and often repetitive, like tectonic or planetary movements, the tides or sea level rise after the Ice Age etc. Braudel calls this time level of 'très longue durée'. The next time level is 'longue durée' and designates the rise and fall of civilizations and empires, of long-term social, economic and cultural history, like for example the colonization of landscapes. The pace of this time level is much faster compared to the very long timescales of the geological time; it takes a couple of hundred years to form the respective landscapes. And finally, Braudel introduces the level of 'courte durée', which is the time of events, of politics and people with names. The interesting thing about this (very generalized) time concept is that cultures are connected with all of these levels; geology or geography is not just the surface or the environment that conditions life; the rise and fall of civilizations

did not only happen in the past, and finally, the present is not independent of the past.

Braudel's concept of time can be used for the in-depth analysis of climate change narratives. Climate is a phenomenon that has a très longue durée for hundreds of millions of years; it has a longue durée as a historical event which started maybe with the begin of colonization or of the industrial revolution, and it is a current phenomenon in terms of meteorological weather events and of current climate politics between Rio 1992 and the recent Paris agreement. Like Tim Ingold's concept of the weather-world as described in D1.1, climate change is here something that is part of the world we inhabit and not something that is a threat that comes from the outside. Climate change happens as an event as defined by Gilles Deleuze:

"The Deleuzian event is precisely not the 'historical event', the date that the historical sciences are so obsessed with. It is neither the big historical event on the stage of World History, nor is it the culturally produced/represented 'fact/date'. For Deleuze, events take place on all levels of life (and history), on the level of the 'molecule as well as on the level of narration, on the level of the human and of consciousness (individual and/or institutional decisions) as much as on the level of the non-human, unconscious and 'nonhistorical' (materiality/chance)." (Herzogenrath 2012, 4f.)

Thus, weather-specific and place-based narratives combine different plateaus. Of course, three levels are a reduction for didactical purposes – in reality, there are hundreds or thousands levels of different time spans, or, as Deleuze and Guattari (1980) famously put it, there are 'milles plateux' where events happen.

Thus, the chronology and in-depth analysis of weather-specific and place-based narratives is more than only listing weather events and the respective narratives from different observers. Instead, it means an ontological shift, a different way to conceptualize climate change as part of human existence and not something

that threatens it from the outside. Our focus is on chronotopes as specific configurations of space and time in weather-narratives, like landmarks that imprint climate and weather in the field sites.

4 Case Studies

4.1 Jade Bay (Werner Krauß)

4.1.1 Introduction

The Jade Bay is, like the rest of the German Wadden Sea, a constructed coastal landscape. In the history of the Jade Bay, geological and social processes are inseparably intertwined; coastal politics are necessarily geo-politics. The dikes mark the boundaries between land and sea, between nature and culture, and these boundaries are under permanent negotiation. The dikes have a social history, too – where once was the sea, there is now land. The land mostly consists of flat green pastures, geometrically separated by ditches, which lead the water to the Jade, the Warpel and other meandering rivers or 'outer deeps' and finally to the tidal gates, which open during low tide. In short, the landscape is the result of a permanent process of reclaiming and draining land. Currently, the height of dikes is adapted to the projected rise of sea-level; nowadays, coastal politics is climate politics. On first sight, it comes as no surprise that there is apparently almost no scepticism concerning climate change and, consequently, climate politics. It seems only natural to heighten the dike and to keep the drainage system working. Otherwise, the sea would reclaim the land and make life impossible in this extreme landscape.

From the perspective of narrative theory, the story is more complicated. Each dike and polder have a geo-social and geo-political micro-history which links geology, politics and identity in its own and peculiar way. The dikes are

chronotopes, whose in-depth analysis gives an insight into the construction of this coastal landscape and its multi-layered geo-politics. Climate-, weather- and place-based narratives undermine the monoculture of the hegemonic narratives of coastal conservation and climate politics. Underneath the surface, many different pathways and storylines emerge.

In the following, I will present a chronology of coastal narratives based on (1) an analysis of the literature presented in D1.1 and newly acclaimed sources, (2) of 25 interviews and (3) several months of participant observation in the Jade Bay area. Among the main sources are members and observed practices of the main dike and sluice association, of district and municipal administrators, municipal climate protection managers, tourist managers, planners, farmers, a citizen initiative including artists, and everyday conversations.

The guiding line for the following accounts of narratives follows different coastal chronotopes through the multi-levelled layers of time, from the mythical to the historical, from geo-social to historical and present events and processes.

4.1.2 The 'coastal mentality'

In the most part of the 19th century, this part of Northern Germany was still split up into different independent domains, counties or royal houses like the house of Oldenburg, East Frisia and Prussia, which was trying to get access to build a sea port in Wilhelmshaven. They shared an extreme landscape and needed convincing narratives in order to make people stay and to create a sense of belonging. To attract settlers in this wet and unfriendly area, the houses of Oldenburg and of East Friesland guaranteed political and religious freedom; the independent Friesian mentality is proverbial. Metaphors of war characterise the relation to the sea: the fight against the ‚*blanke Hans*', the fierce North Sea, is the mythical core of Friesian identity as an imagined community. Every report from the Romans until today will quote the saying that God created the sea, and the

Friesian the coast – in Latin, in lower German dialect, in Frisian or in plain German. The dike also serves as a marker of the social organisation. Historically, it is the right of the spade: each property owner had to take care of the dike; once the owner could not afford doing so, he put a spade into the dike as a sign that he abandons the land and leaves; if the owner failed to maintain his dike, the dikemaster put the spade into the dike, the owner lost the land and had to leave.

Even though today the dike association takes care of dike maintenance, these iconic stories are retold again and again, contributing to what some scholars call 'the coastal mentality' – and a main obstacle for an alternative, more soft approach to coastal protection in times of climate change (Reise 2017). From the perspective of narrative theory, the coastal narrative is multi-facetted and far from being uniform. Underneath this hegemonic tale, there are slightly differing stories.

4.1.3 Chronotope: Coastal protection

A striking example is a textbook about coastal protection, published by the *III. Oldenburgische Deichband* (Blischke 2001), the dike association which is responsible for the Western part of the Jade Bay. This textbook results from an initiative during the world exhibition EXPO 2000 in Hannover, the capital of Lower Saxony. In honor of the EXPO, the play '*Der Schimmelreiter*' (The Rider on the white horse) after Theodor Storm's famous novel was staged open air in the coastal village of Dangast in plain sight of the Jade Bay, and the Dike association curated an exhibition about the history of coastal protection. This double feature nicely illustrates how the narratives of the mythical history of the rider on the white horse, the dike-reeve, and of the science- and engineering- based history of dike building, perfectly sit side by side. The *Schimmelreiter* fought for modern dike building against the backwardness of the people. Interestingly enough, the

newspapers during the exhibition argued at length that the *Schimmelreiter* actually is based on actual historical accounts from the Jade Bay.

The textbook displays exemplarily the structure and content of this place-specific geo-narrative. The first part is about the '*Naturraum*', the natural setting, in a *longue durée* perspective, including the long history of sea-level rise along this coast and the coming into being of the Jade Bay in the Middle Ages; the second part is about the centuries-long history of human settlement and the development of dike building, followed by the role of storm floods and their seasonal patterns; the fourth part gives an example of modern dike building under the pressure of climate change and in dialog with nature conservation, while the fifth part deals with the history of the institutional organisation of dike (and sluice) management. Finally, the book discussses the threat of more and more intensive storm floods and rising sea level as an effect of climate change.

This engineering-based account is interspersed with historical reports, such as the dramatic report from the 17th century about the loss of the *Rüstringer Land* during a storm flood, which witnesses interpreted as a result of moral misbehaviour, of rivalling municipalities, of negligence of dike protection and of human arrogance. There is still the myth that the bells from a church submerged in the Jade Bay rings when a storm flood is underway.

Two hundred years later on, a local newspaper op-ed wrote at the occasion of the iconic flood of 1962, that coastal inhabitants better keep silent and stay humble in the face of nature's incredible force; only then we should become proud that we claimed the land from the sea and that we once more defended it successfully against the sea.

But the coastal protection textbook reports other threats, too, to the status quo. In 1996, nature conservationists sued the dike association, because a reshaped dike was built into the protected area of the National Park. The impeachment

was successful and the construction came to a halt. It was November, full storm flood season. The dike association mobilised ten thousand inhabitants to demonstrate for coastal protection, and the parties finally came to an agreement. But, as a member of the dike association told me in personal communication, 'we have thousand years of experience, and nature conservation only twenty'. They get along with the nature conservationists, as long as these 'greenhorns' respect the primacy of coastal protection.

Thus, morals, politics, gender, ecology, myths and religion are paired with engineering in this representation of the coast. The textbook about coastal protection transports narratives and knowledge into the present, trying to adapt them to the current needs of climate change, at the occasion of the geo-political event EXPO 2000, with climate change already demanding the leading role.

4.1.4 Chronotope: Dike inspection

My main access to geo-social narratives about the relation between coastal population and their material life conditions was the *III. Oldenburgische Deichband*, the dike and sluice association which is responsible for the Western part of the Jade Bay region (which is more or less identical with the district of Friesland, including the district-free city of Wilhemshaven). The highlight in the annual cycle of activities is the so-called '*Deichschau*', the ritual inspection of the dikes.

The administrations and institutions, which are concerned with dike maintenance, join on a day-long car ride and walk along the main dike line. This dike inspection has a long tradition that goes back to the independent management of the landscape understood as a political entity. The inspection is mostly a ritual event; to be invited to the dike inspection means being part of and having a say in the coastal society. Representatives of the federal state, of the National Park, of the dike administrations, of the sluice associations, of the

municipalities, the district administrator and other honourable members come together for this day-long ritual.

The dike inspection combines technical and engineering expertise, administrative organisation and specific knowledge about the history of the dikes, the land and the sea. Especially the older members and heads of the predominately male association are a kind of archival bookkeepers; they know each parcel of land and land owners, as well as the responsibilities and practises necessary for dike conservation. It is important to transmit this knowledge in practice and personal communication. The contact among the institutions is crucial and one of the main reasons for the dike inspection; many of the participants attended their fifteenth or more dike inspection, while newer members are sometimes critically observed if they take the business seriously. In former times, dike inspection lasted two or three days, with excessive meals and lots of *Korn* (the local *Schnaps*). Today it is only one day, but still occasionally drinks are served, and, during the meals, stories are told. During the walks along the dikes, the soil is touched with the hands and its quality tested; the growth of the salt-meadows where clay soil for dike maintenance was withdrawn are discussed with rangers from the National Park, the work of the water workers who clean the waterways is inspected, the functioning of the sluices controlled, with the responsible actors at hand, and a neat protocol is kept. There are no surprises during a dike inspection, which is already prepared beforehand by the technicians. It is a ritual, where coastal protection as a specific sense of place and belonging is performed and embodied. Historically, Friesians understood landscape as political organisation, and it was the male elders who decided about the politics of the land. The dike inspection still is predominantly male, it is owner and property oriented, and it is conservative in the sense both of dike conservation and of the conservation of a way of life. Maybe they lost some of their political and economic influence, but they still act like keepers of the

Friesian mentality of war against the sea – with climate change and sea level rise as their contemporary legitimisation.

The infrastructures – drainage trenches and dikes – are an integral part of the environment, hardly discussed or noticed in society. The same is true for the work inherent; it is deeply institutionalised and hardly visible to the outsider. The history of coastal management is deeply engrained and trusted by the public; whenever I ask someone if he / she is afraid of storm floods, the answer is no, because 'they take care of it'.

4.1.5 Chronotope: The Dangast tidal gates

The Dangast tidal gate was finished in the end of the 1950s. In Dangast, the mainland reaches the sea, and it is protected by a cliff – the only part of the Jade Bay without a dike, which starts westwards at the Dangast sluice. It is a complicated landscape, as a landmark on the back of the building shows. There is a mosaic on the wall which displays the line of the Ellenser dam, a dam built in the early 17th century. Until then, the '*Schwarze Brack*', the black water had separated this part of the Jade Bay from Jever, the capital of Friesland, as a result from a storm flood. To reach Jever, the people from further south, from Varel, which belonged to the house of Oldenburg, had to travel around the flooded area through the territory of Eastern Friesland, where they had to pay customs, vice versa. To keep a long story short: a dam was built through this extension of the Jade Bay, the *Schwarze Brack*. As a consequence, East Friesian towns like Neustadt-Gödens lost their access to the Jade Bay; as another consequence, subsequent dikes were built on both sides and the sea was turned into land. Another placard shows a portrait of Albert Stindl, who had finally managed to close the dam: it took, as the placard says, thousand workers to build this dam. The Ellenser Dam is today a street, the dikes have moved line after line closer to the sea, and only in the second half of the 19th century land reclamation came to

a halt in order to protect the deep-water trench of the outer Jade for the sake of Germany's first and only deep-sea port – but this is another story.

It takes some time to learn this complicated mix of engineering, coastal protection and political and economic interests. Dikes are chronotopes that tell many different stories; the story of the fight of the Friesian against the sea is only one of them. Others tell of political and economic interests between domains and nations, of geo-politics: dikes protect interests, too. The making of the Jade Bay is an integral and vital part of German nation building.

Figure 1 Mosaic in Dangast (photo by Werner Krauß)

On the green dike beneath the mighty tidal gates of Dangast, there are six stones, each one of them reminding of a major historic storm flood. The stones mark the highest peak levels of the years 1717, 1825, 1855, 1906, 1962 and of 2006. This historic landmark, which first consisted of four stones, is not at the place where it was once erected, close to the Dangast mill; in 1924, a new sea dike was built and the landmark suddenly had stood in the hinterland, far from any sea. Thus, the stones had lost their immediate relation to the actual peak

levels. After an interim station between 1935 and 1971 at another dike, the *III. Oldenburg Deichband* moved the stones to their current place beneath the Dangast tidal gate. The Dangast sluice was built in the mid-fifties of the last century. The stones still show the peak level, but in a different place, on a different dike. They are no longer exact representations of a flood level in a specific place; they are a landmark in a prominent place both in terms of technical construction – the tidal gate – and of tourism, and they provide a sense of awe and respect.

The most recent stone remembers of the All Saints flood of 2006 which had reached the highest peak, with 5,31 meters, higher than the flood of 1962, which is the obligatory reference point along this coast.

Figure 2 Flood stones in Dangast (photo by Gerd Bartels)

When I interviewed a leading member of the *III Oldenburg Deichband* in his office, he had a framed colour photograph of the flood stones at his wall: it shows a line of debris right over the irregular line of flood stones – the highest peak ever reached. He took the photo the day after the All Saints flood of 2006, and he was totally stunned when he saw the debris above the landmarks. There were almost

no reports in the media, he said. The photo at the wall opposite his desk reminds him of the importance of his and his colleagues' work. The photo is also a document that coastal protection is more than science-based knowledge. There is an additional information coming from the flood stones and the debris, in the eyes of a dedicated coastal manager; debris makes climate change more real than any statistics.

4.1.6 Art chronotope

Dangast is a coastal village and has the only natural protection of the Jade bay, a famous cliff with the '*Alte Kurhaus*' on top of it, a family-run institution famous for its cultural activities, its restaurant and as a tourist destination. In the early twentieth century, expressionist painters forming the group '*Die Brücke*' had several stays in this coastal village. They convinced the painter Franz Radziwill (1895-1983) to come to Dangast, and he stayed for the rest of his life. He is a well-known painter who is identified with the '*Neue Sachlichkeit*' and magical or symbolic realism. Dangast was one of his main motives, and the house of Radziwill today is a museum which is managed by his daughter.

Several of Radziwill's pictures are iconic in Dangast. One of them shows the Alte Kurhaus, the sand beach and the Jade Bay, all in bright and dark colours, with an airship flying over the sea. Another one shows the 'island of the blissful', where naked people, strange boxes, machines and other things pile up messily on the Dangast beach. But most of all, it is the light that attracts artists, the famous Dangast light. it is the atmosphere, the weather and the climate. Many of my interviewees confirmed that there is 'something special' about Dangast which has to be preserved.

Currently, several new apartment houses are built (and sold) in Dangast, with 700 beds. It is an initiative of a new tourist manager who was hired to reduce the notorious household deficit of Dangast. A citizens' initiative organised

demonstrations and initiated an art action against what they call the sell-out of Dangast: a photographer made a series of portraits called 'the faces of Dangast', and the photos were shown from a bridge, in Dangast and on public events. When I introduced myself to this citizens' initiative, I spontaneously stated that I conduct research on climate change, both the physical and the social one. And indeed, the activists agreed, there is a connection between climate change and the social climate. For them, the strategy and plans of the tourist manager are neo-liberal and oriented towards growth- and mass tourism. The activists oppose this market orientation and promote ideas of a culture and health tourism, based on the special atmosphere of this village.

Franz Radziwill already engaged in environmental protection and critically argued against Dangast as a mass tourist destination. In his paintings and writings, a specific memory of Dangast as a cultural landscape survives, as his daughter uses to quote him: 'To preserve a landscape is as important and precious as it is to paint pictures'. It is a landscape that produces a specific atmosphere, a special climate as the result of the conscious interaction between people and their environment.

4.1.7 Narratives about seasons, the weather and climate change

For coastal protection, there are only two seasons: summer season from May to September, and winter season from October to March or April. Work on dikes is only possible during the summer season; there are dramatic reports about closing new dikes before winter storms arrive. It takes special expertise to fix, to heighten or to build dikes, and there is only limited time to finish the job. Disaster comes during winter, and it is cold, wet and deadly, as the historic witnesses' reports convincingly tell.

For farmers, there are four seasons, of course, but the seasons do not always perform as expected. Summer 2017 was far too wet, as was winter 2017 / 2018.

National media reported about the endless rain and agricultural land under water; farmers could not get rid of their manure, because the land was too wet. In contrast, spring and summer 2018 turn out to be far too hot; again, national media report about draught and the fatal consequences for farmers.

On the level of a national discussion, these seasonal extremes were easily interpreted as an effect of climate change. Two or three heavy winter storms confirmed that climate adaptation is a sine qua non for coastal protection.

In longer interviews, farmers had detailed opinions; intensive dairy production causes more problem with manure than more conventional or organic production. Furthermore, farmers always have to adapt to adverse weather conditions; the weather in this area tends toward extremes or irregular behaviour. And it makes a difference whether agriculture is seen as a market opportunity or as the art of passing on a heritage – as material object and as a practice – to the next generation.

In his memoir 'Dangast. Grünes Land am Meer. Meine Heimat' (Dangast. Green land at the sea. My home), Albert Schmoll recalls the seasons of his youth. His coming-of-age is full of the smells and fruits of the summer, the harvest in autumn, the frozen lakes and trenches in winter, where children were skating. Sometimes, it seems like the weather is a door to talk about more delicte matters, as for example the rise of the Nazis, of anti-Semitism, of the tale of Nordic superiority, of the need of land reclamation – ideologies that resonated well, National socialists were overwhelmingly welcomed in this area. For the young boy, politics were like the weather and the seasons, it came and went. Except, national socialism was not like the weather, and the sense of belonging and its vocabulary, *Heimat* and *Scholle*, or blood and soil, are specters that still haunt German landscapes, today more than ever since WWII.

Today, people compare their own weather experience to the cultural expectations as outlined for example in this memoir. Many interviewees stated that as a child, they knew how to skate, but nowadays, winters are no longer cold enough to freeze the water. Most people I talked to are not afraid of storm floods; 'they' take care of it. But some mention that the previous generation still had flood experience and was afraid of it. The most remembered weather event in my interviews was the 'snow catastrophe' of 1978, when snow storms isolated the North of Germany for days. 'Those were the best days of my life. I had birthday, my parents could not go to work, and everybody was at home', one woman remembered.

4.1.8 Climate services

Northern Germany is the land of the energy transition. In the district of Friesland, the amount of renewable is five times higher than the energy used in the region. Climate change is a household term that invades everyday life, world views and, last but not least, the institutions. The government runs programs to implement '*Klimaschutzbeauftragte*', a wonderful German cluster word which is best translated as 'climate manager'. There is almost a competition which municipality and district already has a climate manager and which still hesitates. Climate managers are mostly concerned with 'energetic renovation' of municipal infrastructures and with climate education, from e-mobility to reducing the costs for heating in public schools. Climate has become a topic for experts in public administrations who are able to identify programs, to propose a climate protection plan and to apply for subsidies. Climate managers are still 'newbies' in the administration, competing for having their say in the public household and gestation.

Climate change has also entered spatial planning and has become a staple in private regional planning offices. Every planning of a wind park, an industry or

housing project has to consider certain rules concerned with climate, energy or emissions. Private planning offices are specializing on energetic renovation, wind energy issues or climate protection plans.

Many initiatives for wind energy or photovoltaic projects were launched from Agenda 21 projects, which were highly successful on the local and regional level. Many of the private and public climate managers have a background in these bottom up initiatives.

Nature and environmental activists permanently push for more; the head of a nature organization for example complains about the inherent 'cognitive dissonance' – there is a lot of talk about climate change, but not very much done about it when it comes to consequences.

When I explained CoCliServ and my project to another environmental activists with roots in the area, he said that he considers climate change and climate service as weak and fuzzy concepts that means everything and nothing. He does not believe in climate change, but in the rise of temperatures. Temperature is, like weather, something you can deal with, while climate does not relate to people and their practices in the world they inhabit.

4.1.9 Conclusion and outlook

There are two metanarratives concerning coastal climate politics: one is global science-based climate discourse, which is narrowed down to the Northern Wadden Sea coast and informs climate adaptation and mitigation efforts; the other is a regional discourse rooted in the tradition of dike associations and (Friesian) identity discourses. These meta-narratives easily go hand in hand and make coastal protection appear 'natural' and without any alternatives. But in the long run, the war against climate change and the war against the sea do not look like promising strategies. As the geo-political history of this coastal landscape

shows, many of the climate problems are homemade, too. Land reclamation made the coast vulnerable, not nature, and intensification in agriculture and industry actively produce greenhouse gases. This kind of market orientation and land use are not natural laws, they are human made problems and thus negotiable and open to change.

From the narratives of change perspective, Friesian identity, climate change and coastal engineering are cultural symbols with a tendency to naturalize political, social, and economic processes. Historical accounts and current practices give an insight into the construction of a landscape as the result of the interaction of diverse actors, human and non-human. The narrative approach shifts focus on the production of a geo-political landscape, where the physical and the social climate are inseparably merged. There is more to climate change than educating people and administering the problem. There are other challenging questions, too. What does a sense of belonging mean in times of climate change? How do the social and the physical climate resonate, and what kind of geo-politics does it take to actively produce a good climate? The peninsula of the blissed is never short of good ideas, nor is the rest of this coastal area.

4.2 Dordrecht, the Netherlands (Benedikt Marschütz and Arjan Wardekker)

4.2.1 Introduction

In Dordrecht, the CoCliServ team is observing the discussions around climate adaptation planning in the city and one of its neighbourhoods (Reeland) specifically. This includes national, regional and local (city-neighbourhood-street level) discussions on adaptation and water management, as well as practical urban design work and adaptation pilot projects. The Municipality of Dordrecht is a member of the Dutch CoCliServ team, granting access to key local actors and

information. We are examining both organisational narratives, such as those emerging from the municipality and regional actors, and individual narratives, such as those expressed by citizens.

In D1.1 (Krauss et al., 2018), we described first observations based on site visits, secondary sources (literature, policy documents, general information about the area), and exploratory interviews. In this document, we work primarily from the interviews conducted: (1) historical interviews on the city and the region, (2) organisational narrative interviews, and (3) individual narrative interviews. This is supplemented with secondary sources where relevant. In total, 30 interviews have been conducted and analysed.

We are particularly interested in several aspects of the local narratives. Firstly, they can offer insight into the local identities in the context of climate and weather, as experienced by actors. CoCliServ is interested in 'place-based' climate services, co-developed with and for the local actors, and a first step is to explore who is living in that place and how they see themselves. Secondly, local narratives offer insight into how different local actors 'frame' the climate adaptation challenges. Different framing of adaptation can lead to radically different perspectives on what a 'desirable future' would look like and what would be appropriate actions and policies to achieve that (De Boer et al., 2010). This is essential information for connecting with Work Package 2 on scenario development. It also has strong implications for what type of climate information and tools are seen as appropriate and useful (De Boer et al., 2010; Wardekker et al., 2009), linking with Work Package 3 on climate services. Thirdly, we are interested in how local narratives relate to climate resilient urban futures, again linking with WP2. The analysis on chronologies provides a first sorting of the collected data.

4.2.2 Chronotopes

We have identified four key chronotopes in our case study area:

Chronotope: The island and the river crossroads

The geography and geology of Dordrecht is inherently shaped by natural and social processes over time. The river systems are a core part of this. The city is located on a landlocked island; it is surrounded by rivers, forming a riverine crossroads. This situation was shaped by a major flood event, the St. Elisabeth's Flood (1421), and the formation of the island has greatly impacted the historical and socio-economic development of the area. It also became a very prominent part of the city's identity. References to the Flood and the Island were prominent in most narrative interviews, both among authorities and citizens. Consequently, the 'Isle of Dordrecht' itself is a continuous reminder of this historical flood and the changes in Dordrecht's situation that it brought about.

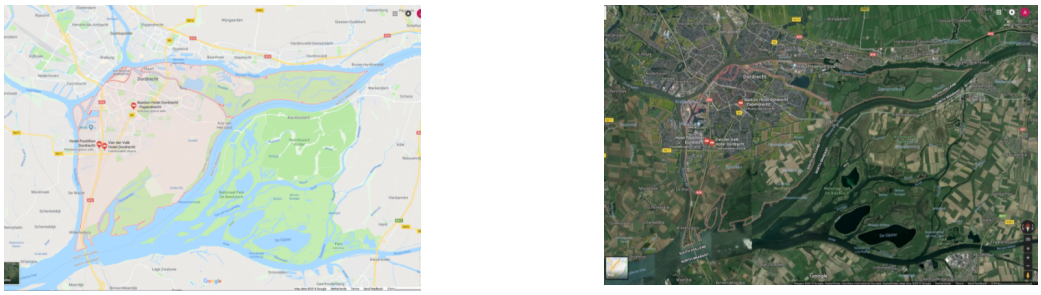


Figure 3. Physical overview of the Isle of Dordrecht (source: Google Maps).

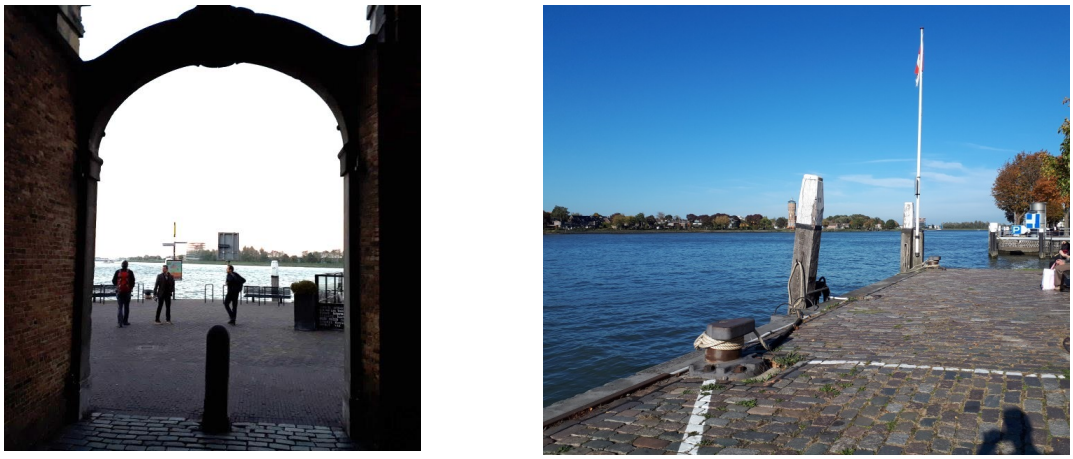


Figure 4 Groothoofd (left: as seen through the Groothoofdspoort 15th century city gate; right: at the dock looking east at the Merwede river). Three rivers meet at this point: Merwede, Noord, and Oude Maas (photos: Arjan Wardekker).

Chronotope: The dikes

The dikes are a physical reminder of the continuous but increasing struggle against water. An unusual aspect in Dordrecht, is that a primary water barrier runs straight through the historic city centre: the Voorstraat street. This presents considerable challenges. The historic dike needed to be heightened (30 cm) due to rising sea levels and increasing river discharge, but the monumental buildings on it could not be touched. Instead, one side of the street was equipped with slots in which the municipality could place mobile flood barriers ('vloedschotten').

Figure 5. Slots in which flood barriers can be placed in case of flood, Voorstraat in Dordrecht. Left: the slots on a front door (photo: Arjan Wardekker), right: policymaker from the municipality showing photos how the barrier works (photo: Zhiwei Zhu).

Chronotope: Floodstones and images

Throughout the Dordrecht city centre, floodstones, memorials and plaques with photographs can be found that document past floods and their water levels. These are often located on historic buildings or along the waterways. 'Flood tours' are organised that walk past these monuments.

Figure 6. Different floodstones and monuments in Dordrecht (photo left: Benedikt Marschütz, photos right: Arjan Wardekker).

Chronotope: The Vogelnest

The Vogelnest (https://hetvogelnest.org/) is a community centre in our case study neighbourhood. It is run by a social entrepreneur, subsidized by the municipality and social housing corporation. The centre has temporary housing in old social houses that are due for demolition. Large scale renewal is planned in the neighbourhood, with many old social houses planned to be demolished. The plan is for the Vogelnest to move from location to location as this renewal takes place, while eventually a permanent location is envisioned. In a sense, this makes the Vogelnest a chronotope that links to the change process (past, present, future, and their temporary nature) taking place in the neighbourhood.

4.2.3 Geo-social narratives

In relation to Dordrecht is the strongest geo-social reference made in mostly scholarly literature, referring to the geological development of the area and the inhabiting by humans thereafter respectively.

The area of the current Netherlands lies in the delta region of three of Europe's main rivers, the Rhine, the Meuse, and the Scheldt respectively. The sediment brought these rivers has been gradually gathering in this delta since the last ice age, 11,000 years ago (Gemeente Dordrecht, 2013a; Jak & Kok, 2000). Land to accumulate from around 5500 BC, with large peatland areas starting to develop initially, until around 100 AD the area becomes more stable (Herrebout et al., 2015). After the Roman period, the population started to grow continuously, and people became technically advanced enough to cultivate this still water-dominated and wet area (Gemeente Dordrecht, 2013; Herrebout et al., 2015). The land became arable and people started to spread around the region. Dordrecht, located in the South-Western Delta region of the Netherlands, was founded around 1100 when advanced dike-systems enabled human settlement of the area. Naturally, the city was heavily influenced by its relation with water from its founding on. The underground of Dordrecht is formed by sediments brought by rivers, such as clay, peat and to some extent also sand.

The country and the Dordrecht region are shaped by dedicated water management, which includes among others the drainage of areas and canalization of rivers. Drainage however leads to ongoing soil-subsidence (Tol & Langen, 2000) and this is expected to continue in the future (Gersonius et al., 2014). Soil subsidence is expected to increase the risk of flooding, exacerbating climate change impacts on river discharge, precipitation, and sea level. Soil subsidence is among others related to Dordrecht being located on partly peat

grounds, which shrink due to the drainage of water, as also conveyed by interviewees:

"It's not really solid ground the neighborhood is built on, it's near the Noordendijk there, so you know what dikes were used for, to keep water out, well and before it was a big swamp. And if you build on a swamp, unfortunately everything starts to get down with the years. So I think it will stay a problem." (Citizen 6, 2018)

"[...] the backyards of the gardens, they are really low. Because this is a swamp area and it keeps sinking down, and then when it was really wet ... it was like all muddy." (Citizen 12, 2018)

The various issues with the underground, brought about by it being made of both clay and peat, is also mentioned in several issues. Clay, which is badly penetrable by rainwater, can lead to local floods in case of strong rains, such as also referred to further below with the reference to Dordrecht being a bathtub:

"There are also projects elsewhere in the country where they are going to take those tiles out of the garden, that will only help in a limited way here because we have a badly penetrable soil. So even if you remove those tiles, the water probably stays there, so you have to come up with other measures to be able to catch the water properly. This is only possible with the inhabitants of the city, with businesses, because we do not have all the greenery in our hands from the municipality, especially a lot of private property and businesses." (Public interviewee 2+3, 2018)

Dordrecht's challenge of living with water can be linked with the present geo-social narrative of anthropogenic climate change. On geologically short time scales (up to 2100), this includes discussions on impacts on water safety, freshwater supply & drought, precipitation & water nuisance, salinization, human health, nature, and recreation & tourism (Ligtvoet et al., 2013; Van den Hurk et al., 2014). On longer timescales (centuries and beyond), sea level rise is particularly prominent in national water safety narratives. For sea level, the national Delta Committee Advice (Delta Commission, 2008) explored 'high end scenarios' up to 2200, based on current assumptions and on paleoclimatological data. Sea level rise includes contributions from thermal expansion (warmer

water has a higher volume), melting glaciers, and melting of the ice sheets, such as those of Greenland and Antarctica. Ice sheet melting is particularly relevant for geological time scales but associated with high uncertainty.

Dordrecht is currently fully surrounded by rivers, a situation that was created by the St. Elisabeth's Flood (1421) (Marschütz, 2018). The region is referred to as the 'Isle of Dordrecht'. Among the conveyed messages about Dordrecht by locals, is the character of an island. This metaphor appears to guide local stories, actions, and to some extend also the character of the inhabitants. It can be described as an 'identity narrative'. This identity narrative captures well all those features of Dordrecht that are conveyed as being special and important to that particular place. Interesting to note is that many stakeholders refer to the "island" of Dordrecht, which appears to be a defining feature for Dordrecht from their perspective as it is voiced throughout many stories, and further appears in many official publications about water, weather and climate change in relation to the "island of Dordrecht" (De Bruijn et al., 2016; Hegger et al., 2014; Hulsebosch & Kelder, n.d.; Raadgever & Hegger, 2018; Trans-Adapt, 2015).

"At the same time … because of the fact that Dordrecht is an island, if something happens, there are only a few places you can get off. It's a bridge, a bridge and a tunnel. A tunnel and a bridge, that's it." (Public interviewee 8, 2018)

Whereas authorities seem to structure their stories around a notion of Dordrecht being an island, citizens are even speaking of an 'island mentality' that some of them seem to notice.

"Everybody who lives in Dordrecht has seen the pictures with, especially the last one, the guy behind the window. … I think that's the relationship we have with the water in Dordrecht… you are on an island, we call it an island, I think that's the main, that describes the whole feeling the people living in Dordrecht are having with water." (Citizen 2, 2018)

"Dordrecht is not so big of course, it's a small island, as the people say we are living on an island. You are surrounded by water, and yeah, how long does it take until it

goes not well anymore, I don't know. … if people continue living like this and are causing problems with the poles, then it can be max. a few years (until this happens) … but very fast." (Citizen 8, 2018)

"I like living on an island (laughing). The people are different, they are more together, I think so. … Totally different than in a city or a village. […] Strange people, Dordtenaren [people from Dordrecht]. I think it's because you are on an island, I think so. …. people from here are a little bit (closed) to strangers. And if you are from an island then you are (closer together) … (explaining an island character). […] But I think there is a difference between island inhabitants and people of the big cities, Amsterdam or Rotterdam. (asking people whether they feel like island inhabitants … some agree some not, especially with the reference to Dordtenaren not being so open people not so much agree, though interviewee thinks that being closed is something specifically for Dordrecht and that she feels that she is an island inhabitant. Other person in the Vogelcafe think that this changed the last years and people are now more open than before.)" (Citizen 9, 2018)

"I feel pretty safe, unless (means: although) we are here around with rivers, we are some kind of island, Dordrecht, but I am not scared." (Citizen 5, 2018)

4.2.4 Historical narratives

The location that is today known as Dordrecht is among the oldest cities in the country, with settlements dating back to the beginning of the 12th century, between 1120 and 1122 respectively, and city-rights dating back to the year 1220 (Baarda, n.d.; Monumentenzorg Dordrecht, 2018; VVV Dordrecht, 2018). Firstly, the city was mentioned in 1120 and started as a small settlement along the river Thure, and was called Thuredriht (Historical interviewee 1, 2018; Historical interviewee 2, 2018; IsGeschiedenis, n.d.). Due to its strategic location of being surrounded by several rivers, Dordrecht received in addition to city-rights also "stapelrecht" in 1299, meaning that all wares that pass by the city need to be offered for sale in the city (Historical interviewee 1, 2018; Monumentenzorg Dordrecht, n.d.). Dordrecht developed around that river, with the current

Voorstraat being the oldest street of the city and forming the centre of it respectively (Citizen 1, 2018).

Not much is known about the time prior to the big flood, the St. Elisabeth flood in 1421 AD, Historians and archaeologists tried to reconstruct the landscape prior to it. This landscape, which was called the Groote Waard, was shaped by many smaller creeks and rivers and some dikes that were constructed in order to make the land suitable for agriculture (Hos & Dorst, 2010). Hos & Dorst (2010) refer further to a lessening chance of floods in the area, as from approx. 1270 AD all rivers in the Groote Waard were controlled and the land drained. This resulted in a lowering of the ground level inside the diked areas, increased the flood risk in case of a potential breach (Nienhuis, 2008; Hos & Dorst, 2010). It is suggested that this regulation of the landscape and its adjacent lowering of the surface increased the pressure on the dikes to such level that the risk of a breach due to a flood increased tremendously. At the same time, political turmoil, a disorganized polder-board and a suggested lack of maintenance increased the chance for a devastating breach even further (Historical interviewee 1, 2018; Nienhuis, 2008). Whereas widespread flooding has been reported from 1287, 1288, 1374, 1376, 1394 and 1396, the famous St. Elisabeth flood in 1421 AD changed the whole region substantially, which was followed by another St. Elisabeth flood in 1424 AD (Nienhuis, 2008; Hos & Dorst, 2010). One fatal occasion in the night of 18-19 November 1421, which basically was a combination of a storm flood approaching from the sea in the West and causing a dike breach, and the rivers Maas and Waal bursting through the northern dams, which resulted tens of villages disappearing from the landscape. Thus, the area around Dordrecht was until approx. 1600 dominated by water, with only a limited number of people remaining in the historic city centre. Thereafter, until the 1930s, people started to yet again create polders and transforming the area into what is now the Isle of Dordrecht (Marschütz, 2018).

Interestingly, history is very present in many narrative accounts and is used especially by authorities to motivate actions. The most relevant events mentioned are the following:

- St. Elisabeth Flood, 1421 (Historical interviewee 1, 2018; Historical interviewee 2, 2018; Public interviewee 2+3, 2018; Public interviewee 4+5, 2018; Public interviewee 8+9, 2018).
- Severe disasters and floods in the region around Dordrecht, 1923 and 1953 (Public interviewee 2+3, 2018)
- Watersnoodramp, 1953, which was the last flood affecting Dordrecht seriously (Public interviewee 6+7, 2018)
- Evacuations east of Dordrecht that lead to a new awareness for water, 1959 (Public interviewee 4+5, 2018).
- High waters in the rivers in the 1990s, leading to major evacuations along the Rhine, Meuse, and Waal rivers. Especially in 1993 and 1995 (Public interviewee 8+9, 2018), with 1995 and 1996 in the proximity of Dordrecht (Public interviewee 6+7, 2018). This resulted in the adaptation programme 'Room for the River' (Public interviewee 1, 2018).
- Severe rainfall, 1998, 2003, 2015 (Gemeente Dordrecht et al., 2016; Public interviewee 11, 2018; Public interviewee 8+9, 2018; Public interviewee 8, 2018; Robbemont & Waals, 2015; Schot & Dijkstra, 2015).
- Closing of the storm-flood barriers across the entire Dutch North-sea coast, January 2018 (Public interviewee 1, 2018).

The relatively recent "Watersnoodramp" flood of 1953, which killed over 1800 people in the Netherlands as a whole, motivated authorities to safeguard the Dutch Delta with many measures, among which are several dikes and tidal barriers. The floods of 1421 and 1953 are the most vivid ones, caused by a

constellation of events (high river discharge from the east, springtide and storm on the North Sea from the west), as was pointed out by both citizens.

"Dordrecht was a city [shows on a map the Binnenstad]. … Then the Elisabeth flooding came of it … enormous flood, worse than we had in 1953… cause you can see all except the city was flooded [shows on map] …. many villages were flooded too … [shows surrounding villages] they all went under water … submerged totally under water." (Historical interviewee 2, 2018)

"[…] so if there is a very high water in Germany, all the melting water from the mountains comes around here and also have to be in the sea, gone to the sea, …. well if that happens no problem, so you can't see water rising really, a bit …. when it becomes a problem is when you get a storm, so that was in 1953, very larger storm here, so all the water went up into the land, and all the water from Germany went here, so you can see everything here, and then you get all the water here and large amounts of rainfall and snowfall […]" (Historical interviewee 2, 2018)

4.2.5 Narratives about seasons and their role

Seasonality is distinct from weather events, as e.g. mentioned by citizens and their perception of a relative increase of summers with more rain, not very strongly emphasized in the narrative accounts. Nevertheless, a sort of cyclical reference is made to e.g. storms. Generally, it is referred to that the storm season is occurring in the winter period, with heavy storms being more likely after October and until spring. In this regard is also the municipality of Dordrecht preparing citizens that are living outside the dikes and disseminating reminders to them.

"Every year the citizens of Dordrecht get an envelope in the mail from the municipality of Dordrecht and it gives you information about the high water. (shows picture of the mail on the phone). We get it in September and it says "High water season 2017-2018, yearly notification". And it gives you all the information what to do and it gives you an opportunity to give your phone or your email to some kind of 'meldkamer' [alarm room]. And interesting fact …. in January, first time I had experienced it, in January there were 3 times after, followed up by a week and a half, 3 times in one month that there was exceptionally high water risk." (Public interviewee 8, 2018).

This seasonality is further exacerbated by the fact that especially the combination of high spring tides, heavy Western storms as well as high river discharges has been causing at least in 1421 and 1953 the mentioned severe breaches in safety structures. Especially heavy is such combination every 10 to 12 years when parts of the city centre that is located outside the dikes gets flooded to a larger extend (Citizen 1, 2018).

Moreover, tidal difference are mentioned to be of much greater magnitude in the past due to absence of the tidal barriers in the South-Western Delta.

"So, they were accommodated to the water and the 'overlast' [nuisance] of the water. Because there was only a tide, and the tide, the difference in tide was more than a metre before the Deltaworks, so they accommodate to the tides and the emergencies." (Public interviewee 8+9, 2018).

4.2.6 Narratives about discrete weather events

Among the main events, as already pointed out above within the list of recent events were the big flood in 1953, the floods of the 1990s as well as a severe rain event in 2015, causing wide-spread flooding on the island of Dordrecht. Some of these floods are enshrined in landmarks within the city of Dordrecht as well as displayed on pictures of the big flood in 1953 in the old city centre.

While it is referred to as mainly occurring in the future, a recent severe rain-event that has been strongly emphasized was in

"[...] August 2015. Cause that was a very, very heavy rain, really heavy rain. ... so that was a very, very extreme one. ... it was on the complete island, also on the Drechtsteden [Drecht Cities – the wider urban area of related cities], and we head really severe flooding. [...] in Reeland, that is such a neighbourhood, is very very vulnerable [...]" (Public interviewee 2+3, 2018).

This extreme rainfall as shown also below and in Robbemont & Waals (2015) is exemplary for an increasing problem affecting urban areas in general as well as Dordrecht, and exemplary for being exposed to water. This particular event was

several times also referred to as causing the city that is surrounded by dikes, as having filled up like a bathtub as the water could not be removed (Public interviewee 2+3, 2018; Public interviewee 8+9, 2018) due to Monsoon-like rains (Public interviewee 8, 2018).

"The regenbui [rain shower]came so in that area … there was a lot of overlast [nuisance] in this area here […] really heavy rainfall […] and I lived there for 70 years, and that was the first time that my wife sent me an image of the basement to clean it because I also had troubles with water in my house (laughing)." (Public interviewee 8+9, 2018).

Such "Monsoon-like" rains have been also mentioned by citizens as increasingly affecting the city and them noticing changes over time, regardless of interviewees' level of education.

Furthermore, being exposed to water became also very apparent as in 2018 the municipality warned the citizens of the old city centre three times about high water levels potentially requiring measures to be taken by citizens, e.g. placing sand bags in front of doors (Public interviewee 8, 2018).

"I live here since now 12 years … remember a lot of precipitation and the houses in the center, they are in the water, and the sewers flooded, … and they had to put sand sacks in front of the doors because the water rose really strong in the city … and also at the harbor the water-level was rising. […] and that it hasn't been long when the weather was that bad, and what happened then in the center, with water disaster, that the water was rising in such a short time so fast. … last year I think this happened, yeah last year. … I also saw a movie how on Instagram that showed how high the water came in the harbour. Then I was a bit (nervous)" (Citizen 8, 2018).

4.2.7 Biography / Lifetime and Weather

Among the conveyed stories in the neighbourhood, which is socially among the city's poorer ones with regard to both economics and education, people do explicitly notice changes in both environment and weather within their surroundings. Interestingly, these changes were noticed by people regardless of their level of education.

"I think there is like a general feeling of, that summers are wetter, and when there is rain there is more rain, and the periods of no rain are longer, … so when it rains it rains more heavily, when it's dry it's for a longer period." (Citizen 2, 2018)

"yeah definitely, I can see the difference. … I like to predict a bit … a real good example is, normally July was quite a good month, it was a dry month, it was a summer month … the spring is getting dryer, the summer is getting wetter, and the winter is also getting wetter, so you see bit of a climate change. … The periods are changing, when it's wet it's wetter, and when it's dry it's dryer." (Citizen 2, 2018)

"I live here my whole life, and lot of people are talking about it, but the only thing when I am thinking about my childhood … I remember hot days back then, and summers full of rain, the only thing I feel that changed, back in the day when I was a child, you could go ice skating every winter at least a week, and that's kind of gone now. I think people went ice skating this winter, but it's not every winter anymore, that's the whole point in that. So I think the winter isn't as cold anymore as it used to be. And maybe it rains more, but that's just my feeling that it rains more in the winter. … you remember the terrible, terrible blizzard in November, and the terrible, terrible wind storm end of January, but what I think, I am not sure about it, and I think of my childhood and I remember terrible storms as well, and then, is it really worse and more, or is it just social media and the whole thing making more of it because exciting news sell … also with the weather that all changed, "Oh tomorrow is code orange", and the whole country goes crazy …" (Citizen 7, 2018)

"yeah I think so. … as a child during the summer holidays … we always 6 weeks away, and now the summer time is more rain, more bad days, and I don't think it has any personal (effect) … [it changes because] All the people are using things that change the environment! Hairspray, stuff […]" (Citizen 9, 2018)

"I see that the water level (means now the one at the rivers/sea) becomes higher every year. The cay at the Merwede is flooding once a year, and this is a real problem.]

B: Why do you think this is happening?

C11: The world changes! (laughing)

B: What do you mean?

C11: Temperature! The temperature, it's now 29 degrees, warmer, and warmer and warmer. The North pole, down under, it's melting. The sea level is higher, higher, higher, also the rivers!

B: How do you think this will affect you here in Dordrecht?

C11: It gets worse here! "(Citizen 11, 2018)

4.2.8 Conclusion / outlook

The narratives in Dordrecht are inherently tied to the city's location (geo-social) at the crossroads of several rivers (the city is fully surrounded by rivers – in many ways an island), close to the sea, and on a foundation of river clay and peat. This means that the city faces water-related problems from all sides: Dordrecht is inherently vulnerable. The historical narratives provide several accounts of major floods that shaped the region, the city, and Dordrecht's perceptions of water to this day, such as the St. Elisabeth's Flood (1421) and the Watersnoodramp (1953). This led to the mentality and motivation, among people in Dordrecht as well as nationally, to be "ahead of the next disaster, and [...] to come to integral solutions" (Public interviewee 1, 2018). Knowledge about specific risks also contributes to this motivation. Both the geo-social and historical narratives lead to a general narrative about local vulnerability, and climate change is attached to this. Recent and lived experiences with extreme weather, such as an extreme rainfall event in August 2015, further emphasise both the vulnerability narrative and the climate adaptation narratives. Consequently, climate change is seen as a very real threat, to which the city is vulnerable and with impacts emerging now. The city is actively moving on adaptation, and several interviewees described adaptation in an 'occurring adaptation' narrative: it is something the city is doing on a daily basis, and the city is looking into realizing concrete projects to adapt neighbourhoods to already occurring extremes. Major concerns include sea level rise and increasing peak river discharge, which impact water safety, and heavy precipitation events, which can result in local flooding – both nationally and locally (Delta Programme Commissioner, 2017; Gemeente Dordrecht, 2013b; Ligtvoet et al., 2011, 2013; McEvoy et al., 2016; Rijksoverheid, 2009, 2017). Soil subsidence (in peat areas) and heat are issues of concern as well. Local actors noted that these issues will exacerbate existing problems and increase risks,

which might result in the population moving elsewhere. The current housing challenge – 10,000-15,000 new houses will need to be built within current city limits – and the energy transition are seen as 'windows of opportunity' for climate-proofing, options for 'vertical evacuation' (high buildings provide refuge during floods), and a blue-green transformation in a participatory way. Consequently, the city is using such challenges and reframing them as positive future narratives.

References:

Citizen 1. (2018, February 21). Personal communication: interview on history.

Citizen 2. (2018, June 21). Personal communication: interview on the ontological narratives.

Citizen 5. (2018, June 21). Personal communication: interview on the ontological narratives.

Citizen 7. (2018, June 22). Personal communication: interview on the ontological narratives.

Citizen 8. (2018, June 22). Personal communication: interview on the ontological narratives.

Citizen 9. (2018, June 28). Personal communication: interview on the ontological

Historical interviewee 1. (2018, February 21). Personal communication: interview on history.

Historical interviewee 2. (2018, February 21). Personal communication: interview on history.

Public interviewee 1. (2018, March 1). Personal communication: interview on the public narrative.

Public interviewee 2+3. (2018, March 12). Personal communication: interview on the public narrative.

Public interviewee 4+5. (2018, March 14). Personal communication: interview on the public narrative.

Public interviewee 6+7. (2018, March 26). Personal communication: interview on the public narrative.

Public interviewee 8+9. (2018, March 8). Personal communication: interview on the public narrative.

Public interviewee 8. (2018, March 9). Personal communication: interview on the public narrative.

Public interviewee 11. (2018, March 9). Personal communication: interview on the public narrative.

Timescale	Examples	Narrative Structures / Sources
Geological / Geographical	Long-term historical: Historical delta formation of the Rhine Meuse Delta (sediments building up the Delta); end of the ice-age in Europe; geological subsidence (post-ice-age reaction and peat-degradation); soil-formation (depositions of clay in Dordrecht) of clay and peat Present: continuous subsidence and sea-level changes as well as river flow-regimes Future: ice-sheet melting (Antarctica, Greenland, various glaciers)	Scholarly literature
Cyclical	Tidal differences much reduced due to Maeslantkering Seasonality of North-sea storms, river discharge, summer heat and extreme precipitation	Historical interviews Public narrative interviews Literature
Historical	Arrival of settlers in the Dutch Delta and in Dordrecht; Dordrecht as founding centre of the modern Netherlands; emergence as a regional trade-hub; St. Elisabeth flood put life on hold in Dordrecht for approx. 200 years; relative decline during middle ages in comparison to other cities in the Netherlands	Literature, historical and public narrative interviews
Lifetime	Change of transportation time; Idea of water as a playful item (playing with the water), water is noticed less because tidal differences aren't as big anymore as in the past.	Historical interviews
Discrete events	Big floods (1421, 1953, 2015): extreme flooding events, storm-flood barrier closing across the Netherlands, severe rain events, 2018 citizens outside the dikes in Dordrecht received 3 times in a month the warning for high water, which usually is referred to 2-3 times a year maximal	List of events according to narratives and data, public narrative interviews

4.3 Bergen, Norway (Scott Bremer)

In D1.2, we interrogate Bergen's narratives of weather and climate according to the scales and types of time that distinguish them. In which different times are the different stories set, and how does that timing define the stories' shape, characters, and meaning? Particularly interesting is to see how these different stories timings provide a unity to the meta-narrative of climate change in Bergen; its emergence as a matter of local concern.

This analysis draws on two sources of narratives: (i) the public and private narratives captured in (mainly) written texts identified in D1.1, and (ii) a series of 18 'narrative interviews' with diverse Bergen residents in May/June 2018. Several questions in this interview framework were designed to elicit narratives of weather at different time scales; from climate to seasons to weather events. The analysis is both (i) structural – analysing how different times structure narratives; and (ii) hermeneutic – looking at the meanings evoked through timings (Bremer et al., 2017). It starts by sketching a unified, synthetic narrative of the emergence of climate change in Bergen, before breaking down this story into its constituent parts relative to the different times evoked.

4.3.1 The emergence of climate change in Bergen

From the narrative analysis, it is possible to sketch a timeline of how climate change emerged as a matter of concern in Bergen. The issue of climate change can be mapped as 'co-produced' by a 'constitutive' combination of natural and social events specific to Bergen (Bremer & Meisch, 2017; Jasanoff, 2004). This type of analysis shows how climate and climate change take on particular meanings in Bergen at the boundary of social interactions with nature, which traverse timescales. It creates a new, synthetic and artificial narrative that

consolidates different stories of different times into a unitary whole. This is social work, not an objective exercise; it contributes to the on-going mixing and layering of narratives in Bergen. The Bergen timeline can in turn be mapped onto a global timeline of the discovery and growing importance of climate change, on one hand to give the Bergen timeline wider context, and on the other hand, to see how this global phenomenon takes local expression. Sketching this timeline means distinguishing between epochs before and after the emergence of climate change in Bergen.

Bergen as 'a city of weather' (pre-2004) Bergen's identity has historically been shaped by its dramatic weather, as both naturally and socially important local phenomena. *Naturally*, much is made of the unique local geology that captures the westerly weather fronts rushing in from the Norwegian sea, and funnels them over Bergen. This relationship between the seven mountains surrounding Bergen and the atmosphere is historically captured in observations from Holberg (Dahl & Bagge, 2015) and paintings (e.g. J. C. Dahl's 'Bergen's Harbour', painted in 1834) for example. More recently, publications like 'The City is Bergen' continue to depict the relationship between the climate and the natural environment – where the mountains capture the weather, and are in turn shaped by the weather – in quotes like: '*Bergen is a city with a dramatic landscape, and due to heavy rainfall, the Spring is especially colourful and beautiful here*' (Bergen Kommune 2018, pg. 8-9). Not least, Bergen's impressive amount of 'weather' is captured in the statistics that record it as the wettest city in Europe (Wikipedia, 2018).

More pervasive still are Bergens *social* associations with weather. There is a persistent public 'identity narrative' of Bergenser's unique relationship to the climate, bridging historic (Dahl & Bagge, 2015) and contemporary texts (Bergen Kommune, 2018; Meze-Hausken, 2007), depicting them as, '*proudly liv[ing] under*

the rain, resilient folk who persevere through rough conditions and make the most out of life, leading outdoor lifestyles in spite of the rain' (Krauss et al, 2018). This identity narrative that has traditionally shaped the modes of transport, clothing, recreation and social interaction in Bergen (Dahl & Bagge, 2015), and continues to warrant constant mention on the front page of local newspapers (Meze-Hausken, 2007), and in other expressions (e.g. the local beer slogan 'Brewed in the rain'). Somewhat appropriately, Bergen is also the birthplace of modern meteorology. As Interviewee 17 noted, the predictable westward approach of weather fronts led pioneer scientists like Bjerknes to better understand frontal systems, and to establish the Bergen School of Meteorology at the Geophysical Institute in 1917, to further this science. Bergen meteoreologists and climate scientists continue to be world leaders in understanding ocean/atmospheric interactions.

4.3.2 Climate change as an emerging concern in Bergen

From 2003/2005 we see Bergensers' perspective on local weather shift in character, 'looking out' with a regard for global climate change, before refocusing on Bergen and discussing what climate change might mean for Bergen. Two parallel events were important in triggering this shift. On one hand, Bergen meteorological and climate scientists began to assume an ever-more significant role in understanding global climate change and in 2003 this was recognized by the creation of the prestigious Bjerknes Centre of Excellence. Since then the Bjerknes Centre has grown from around 30 scientists to more than 220, from 38 different countries (Paasche et al., 2017). These scientists contribute to international assessments by the Intergovernmental Panel on Climate Change (IPCC), and have developed one of the most-used models of ocean-ice-atmospheric interactions in the world (NorESM). The Bjerknes Centre has increasingly shaped Bergensers public understanding of climate change, and its

projected impacts on Bergen, evidenced by (i) increasing front-page coverage about climate change in local newspapers, interviewing Bjerknes scientists (Meze-Hausken, 2007); (ii) the increasing solicitation of advice from Bjerknes scientists to support decision-making by various actors: from local government (Interviews 2 and 6), to non-governmental organisations (Interviews 5 and 13), or private sector consultants (Interview 12); and (iii) the growing number of public cultural events evoking climate change and inviting speakers from the Bjerknes Centre.

On the other hand, in September 2005 sustained torrential rains caused a massive landslide in the Hatlestad residential suburb of Bergen, which inundated a number of houses and killed 3 people. One interviewee (see Interview 11) lived in that area, and remembers being woken urgently by his neighbor in the early hours of the morning and told to evacuate, and seeing the flashing lights of the emergency services through the dark rain. Just two months later another landslide occurred Hatlebakken, which also killed someone. For many (see Interviews 6, 7, 9, 11, 16 and 17) these landslides sparked the public, and perhaps more importantly the political, awareness of local climate change and its terrible impacts. Many considered that landslides of this magnitude in residential areas were beyond anything Bergensers had experienced before, and foreshadowed a new era of weather. Under the political leadership of Bergen Kommune's then-commissioner Lisbeth Iversen, a climate section was established in the commune; dedicated to climate change mitigation and adaptation. Climate policy was developed by Bergen city and Hordaland county Kommunes. Landslides continue to occur, and draw public attention to climate change. A landslide in November 2017 on nearby Osterøy Island, crashed into the bedroom of a house and killed the mother sleeping there, while the father and children were in the kitchen. This has triggered a drastic review of all areas potentially vulnerable to slipping on the island.

Outstanding seasons since 2003 are also evoked as a sign of Bergen's new climate, and seem to signal that some Bergensers see this as a new epoch for the city. Many interviewees (3, 5, 7, 9, 14, and 17) spoke of the exceptionally cold, clear and snowy winters experienced in 2010/2011 and in 2017/2018, and the wonderful experiences they brought; from playing in the snow with a young child, to skiing through the night in Bergen's mountains. But in evoking these winters, some (see e.g. Interviewees 7 and 17) lament the exceptionality of snowy winters in this new epoch, and fear that we will eventually lose the magical Norwegian white winters that used to be the rule, rather than the exception. At the same time, some interviewees (see e.g. Interviews 14 and 16) wanted to talk about the exceptionally sunny, warm and dry spell of weather over much of May 2018. Here again, this was seen as an exceptional and wonderful period, though both interviewees tempered this enthusiasm by noting its abnormality and attributing it to the more sinister cause of climate change; "This is one aspect of climate change that we can say 'welcome' to".

Another event mentioned by some interviewees in connection with Bergen's climate (see Interview 1 and 13), was the discovery of a dying whale in February 2017, washed up on Sotra island south of Bergen with its stomach full of plastic bags. While the link may not be direct or obvious, both interviewees recounted this whale story as a symptom of our more pervasive disregard for our natural environment, with climate change another symptom. What makes this event notable as well is that it relates to two iconic and identity forming elements for Bergensers, namely the sea and whales, and as shown, the weather is another element. In telling this story, interviewees are recounting how environmental decline is undermining some of the iconic elements that form their identity.

This meta-narrative combines many different concepts of time, but it can be useful to structurally unpack these times, and how they contribute meaning.

4.3.3 Geo-social narratives

The physical geography of Bergen provides a dramatic natural setting for the narratives that make and remake this place. Much is made of the city being 'nested' in the bowl formed by seven forested mountains and the fjord, and the closeness to nature this affords Bergensers: *'With the forces of nature ever present, it's only natural that the people of the region are active and like to spend their leisure time in the great outdoors'* (Fjord Norway 2017, pg 25). 'Naturalness' and 'greenness' were also key descriptors used to describe Bergen in the narrative interviews, with some (Interviews 11 and 12) saying the intense greens and forest smells of spring and summer are unique to the western fjords, and distinguish this place. At least two interviewees did note, however, that the physical landscape has changed over the past 50 years due to efforts to forest the surrounding mountains. At least two interviewees (Interview 1 and 9) emphasised that the hills were traditionally bare, and better for skiing in snowy winters, but that they are now overgrown with trees. In this way, Bergen's seven mountains arguably play the role of 'chronotopes'; the passage of time in Bergen can be read in these mountains. Time can be read in how the mountains change, both over the year according to the seasons, flushing red in Autumn or brilliant green in spring, and over decades with afforestation efforts. Time is also read in the relative constancy of the mountains, as a backdrop to the activity and change in the city. They are a bridge between the Bergen depicted in Dahl's paintings of Bergen in 1834, and the city we live in today.

The geology of Bergen is also inevitably linked to the weather funnelled into this bowl and orographically lifted by the mountains, and thus the prevailing climate in the city. Already in the 1600s, writers like Holberg were clear that the mountains captured the rainclouds and saw them settle over the city for months on end; 'Bergens dug'. The 'mild and sheltered', if wet, climate afforded by the

mountains is still widely recognised today (Wikipedia, 2018). The local geology is also linked to another atmospheric phenomena; the poor air quality in the city over periods of clear days in winter when an 'inversion' layer of cold air can trap pollution from woodfires and cars in the bowl formed by the mountains. Interviewee 6, at Bergen Kommune, recounted the winter of 2013, after Christmas, when pollution was so bad that asthma sufferers were hospitalised and a French newspaper labelled Bergen as having the worst air quality in Europe.

Finally, geological time scales are invoked in talking about a long-term warming of Bergen, and the attendant loss of cold snowy winters. This can be seen in historic accounts of Bergen in the mini-ice age in the 1600s, when the fjord would freeze solid enough for people to walk across to the nearby islands. Through to biographical accounts of Bergen's heavy snows by long-time residents: '*When there was snow we made snow-caves. Then we would get a light from home to light up the cave, and sit there and shiver and freeze*' (Rafto & Rafto, 2007; pg. 15). Or interviewees own accounts of snowy winters that are tailing off, both in peoples' memories and statistically (e.g. Interviewees 7 and 17).

4.3.4 Historical narratives

Bergensers' relationship to their local climate is encapsulated in historical events, traditions and identities that continue to provide a sense of place and a context for contemporary narratives. As noted above ('Bergen as a city of weather'), Bergen's climate has long constituted a local 'identity narrative'; seen in writings of early scholars like Holberg ('If it is not raining in other places, it will be raining in Bergen' – Dahl & Bagge, 2015), to the icons seen around the city today, in coffee-shop scribbling's or Brewery slogans. The old city centre is full of chronotopes where time is imprinted on the place, some of which invoke reference to climate and the sea. One of these chronotopes is the UNESCO

Heritage Site of Byggen; the old warehouses from the Hanseatic era. Bergen's historic association to trade and the port live on in these buildings, and they are also testament to the wild wet weather and high tides that Bergen as always faced. It can be read in the weathered wood, and the piles that are saturated with the rise and fall of the tide. Another chronotope is the re-constituted ballast wharf at the end of the Nordnes Peninsula; where ships historically stopped to take on ballast before setting sail. It is a reminder of the last stop before leaving the shelter of Vågen Harbour, and as a recreational area it is exposed to changes in the sea and the weather.

All people interviewed indicated that Bergen's rainfall formed the local place's identity, though some (e.g. Interview 4) were keen to diminish the importance of this identity. They felt that it did not rain much more in Bergen than in other places, and that the rainy identity was the source of tiresome jokes by Norwegians living elsewhere.

Bergen's identity takes shape in numerous place-specific practices. Bergen has traditionally had a more practical (less vain) approach to dressing according to the rainy conditions, even among the upper classes (Dahl & Bagge, 2015). This continues in often-used proverbs, like: 'There is no bad weather, only bad clothing'. It is also seen in the fetishism around the umbrella; which is celebrated every year in Bergen on national umbrella day. Historically, there has been an important trade in umbrellas, as written in Dag Arnesen's biography: 'Dag grew up in a small house where the family ran a small shop [that] sold toys and various other things, mainly umbrellas. His grandfather was a trained umbrella maker from Germany and ran an umbrella workshop in the basement' (Berntzen, 2016; p. 28). In interview 11, the only group interview, interviewees joked about the number of mangled umbrellas that can be found jettisoned around the city, and a culture of 'communal umbrella ownership', referring to the number of

umbrellas left on buses and in cinemas and appropriated by others that come across them. Another important Bergen tradition relates to water management. A Bergen pamphlet notes how the challenges of living with rainfall have built expertise in water and sewage management, noting 'The water works in Bergen are the oldest in Norway, and Bergen has a total of 1900 km of water and sewage pipes' (Bergen Kommune 2018, pg. 9).

As discussed above, since 2003 Bergen has arguably entered a new epoch where its relationship to weather is coloured by associations to global climate change. This is a contemporary historical phenomenon, but the past 15 years of growing concern for climate change impacts in Bergen do provide a context for the stories told today

4.3.5 Seasons, natural and social

Seasons provide an important device for presenting the different faces of Bergen, and situating different narratives at points in the *natural* and *social* rhythms of the city. These natural and social times are historically, and continue to be, closely intertwined; co-producing each other so that it is difficult to invoke one without the other. Life in the city has always been steered by natural seasons, which are in turn interpreted through city life. As noted in the concluding remarks of Dahl and Bagge's historic account: '*If you would like to visit the city, that's best done in spring or summer. Though the city can be gloomy and heavy in autumn and winter, it wakes up as the days get longer*' (2015; p. 144).

Seasons create a setting of expected natural conditions that are used to plan for social activities and routines; they act as cognitive scripts. The interviews and research by Meze-Hausken (2007) indicate that Bergensers have a clear idea of the weather and natural phenomena of each season. Importantly, seasons are often described in terms of light (see e.g. Interview 8), with spring the 'new beginning' that comes with lengthening days, and autumn the return to

hibernation as the light departs. Many interviewees (among them interviewees 7, 8, 9 and 12) discussed the depression that arrives with the darkness and departs in the spring. Some interviewees (see Interviews 1 and 11) argued that beyond the changes in light, Bergen is without any distinguishable seasons; just periods of more or less intense rainfall.

Otherwise, spring is often presented as people's favourite time of the year (in late April/May/early June), when the weather is driest and warmest. In Bergen spring is 'punchy' (Interview 11 and 12), with a rapid change in the weather, and the greening of the forest. Summer, on the other hand (June to August) is often represented as wet, grey and relatively cool. Early autumn (September/October) is Bergensers' other favourite time of the year, when the weather is clear, the air 'crisp', and the colours turning; it is a time for walking in the hills (see e.g. Interview 15). But by late autumn (November/December) the rain and darkness has set in (see Interviews 3 and 14). Winter arrives in January and runs until April. It can be a time of snow, or just rain. When there is snow, Bergensers appreciate winter (see Interviews 1 and 17).

Departures and conformity with seasonal cognitive scripts are important to Bergensers. Meze-Hausken (2007) noted that in Bergens Tidene, seasonal issues receive the most coverage, with winter and autumn receiving almost twice the attention of summer and spring. In the cold months articles focus on clear winter days, or report on 'avalanches, winter storms and accidents due to snow chaos or icy roads', while warmer months bring 'joy about sun or disappointment because of rainfall' over summer holidays (Meze-Hausken 2007, pg. 9). Other seasonal themes related to 'outdoor activities according to seasons, or hopes for weather conditions expected for a season (White Christmas)' (ibid, pg 10), and the long-term impact of seasons on economic activities, like farming or rising energy prices. The interviews also revealed an interest in exceptional seasons,

like the heavy winter snows in 2010/11 and 2017/18, or the sunny spring in May 2018 (see above).

In parallel with these natural seasonal rhythms are the accompanying social rhythms. We can see several socially constructed 'seasons' in Bergen. The farming community around Bergen are guided by planting and harvesting seasons (despite large sections of agriculture moving indoors), informed both by forecasts but also traditional proverbs and calendars (e.g. 'all potatoes should be planted before the national day – the 17th of May') (Interview 2). The Bergen cultural calendar is most full in Spring, coinciding with the 'waking up' of the city, with concerts and festivals planned for May and June (see Interview 4). Summer (July) is the holiday season, when Bergen empties of Bergensers, who travel to their cabins or on a 'syden' (southward) trip to 'find summer' in Mediterranean climes (see Interview 14). Autumn, in October/November, is depicted as a time of hibernation; of keeping 'cosy' indoors and watching films for example (see Interviews 3 and 14). December is the Christmas season, characterised by numerous 'julebord' or Christmas parties (Interview 2). And winter and spring represent the ski season (see Interview 7). Seasons are also punctuated by festivals and public holidays, with normal or abnormal weather judged according to what is experienced on those days. Interviewee 1 discussed parading one 17th of May, the national day, in the snow!

For many in Bergen the seasons are changing as a backdrop to their stories, with this change itself a moral of some of the stories told; narratives are set in a certain season, but in presenting some departure from the norm in that time, they illustrate seasonal change. We see a powerful rhetoric in the climate change adaptation community, of scientists and policy-makers, of seasonal change. A presentation by climate scientists Erik Kolstad at a 'Klimathon' in Bergen, 8-9 January noted a shift in the seasons would affect activities like farming; *'Now that*

spring comes earlier, it will also rain, and as a result it will be difficult to use heavy machinery on the fields'. Presentations by Bergen commune policymakers make the same point, anticipating, *'…(i) increasing amounts of precipitation (especially in autumn and winter); (ii) increasing intensity of the rainfall (summer rain)…'* (Bergen Kommune 2017). Seasonal change was also raised in the interviews. Many perceived Bergen's winter as becoming warmer with less snow than before, including two climate scientists who say they have experienced this and also seen it in the statistics (Interviews 7 and 17). The loss of white winters is lamented as the loss of the winter sports and snow-play that marked interviewees' childhoods and family stories. Another change is experienced in the intensity of weather events, especially torrential downpours of rain in summer and autumn, 'When the streets flow like rivers' (Interview 3). Interviewee 13 lamented the loss of autumn colours. Her birthday is in October, and she remembers her mother used to say that she could mark the approach of her birthday by the autumnal reds and yellows; colours she says are duller today.

4.3.6 The weather events that mark Bergensers lives

Particular weather events, and their impacts, are the subject of the public narratives of the city, and the private stories of its inhabitants. As public narratives, these events can be linked to a particular date and recorded. As private narratives, it is hard to identify a particular time; they are memories that float detached from any calendar, and may even be a synthetic aggregation of numerous real experiences, brought together in one imagined memory. It is from experiences like these that the thread of a person's life story is hung, including their own identity and understanding of how and why the world works. They are at once flashes in time, and an accumulated memory that settles over decades.

As noted above we can arguably distinguish a meta-narrative of climatic change in Bergen; a new epoch of interpreting the weather events that have punctuated normality over the past 15 years. This is seen in the shared shock around the landslide at Hatlestad Terrace, the week of air pollution after Christmas 2013 that triggered widespread bouts of asthma, the near-dead whale full of plastic wasjed up on Sotra island, the bitter-sweet enjoyment of the last snowy winters of 2010 and 2017/2018, or the overshadowed enjoyment of the exceptionally sunny and warm spring in 2018 for instance. Other public narratives occupy the festivals days that punctuate the year (Meze-Hausken 2007); like the snowy 17th of May in 1959 (Interviewee 1).

Interviewees were asked to think about weather events that stood out for them, were important to them, and this elicited a corpus of private stories; personal experiences that can be coded into common themes and meanings of climate in Bergen. One common theme relates to torrential downpours and the resultant flooding (Interviews 2, 3, 4, 8, 10 & 18). Interviewee 4 remembers watching a downpour from an ex-girlfriends apartment window, and wondering where all the water went; seeing streets flow like rivers, culverts overflow, and streams to burst their banks. Two interviewees described the numerous times they were caught in downpours and completely saturated to the core; where you have no choice but to surrender to it, this is a 'beautiful impact' (Interview 10).

Another central theme are stories that relate the strong winds of storms and the aftermath (Interviews 2, 5, 9, 11 & 14). Interviewees recount sitting inside and watching trees battered and tiles ripped from roofs. One interviewee (11), was out running with his dog when a tree blew over in front of them. Picking through the windfall is an impact that marks interviewees memories, with one (9) noting that he is still cutting up the trees blown over on his land by the Nina storm four years ago. Two interviewees (11 & 15) told of their experiences with storm tides,

how they would flow over the old harbour walls and wash through Bryggen, the old Hanseatic quarter.

Other stories centred on happy times. Two interviewees (4 & 10) talked about the pleasures of swimming in warm water in summer, with one remarking on a year where they could swim in the sea near Sotra Island up until October. Three others talked of crisp clear winter days that can stand out like oases in the dark and wet winter months (8, 9 & 15). Two talked about skiing on clear winter nights in the mountains around Bergen, with the lights of the city shining below and the stars above, with one talking about the time he watched the northern lights alone in the snow.

Finally, some stories (Interview 9 and 12) talked about the challenges of lasting the long dark months of winter. One interviewee (9) recounted how after one particularly nasty, wet winter he read in a newspaper that there had only been four hours of sunshine between January and May, and realised, 'no wonder Ive been so depressed'. Another (12) talked about how, after one dark, wet winter when they hadn't seen sun for weeks, he and his family were sitting at breakfast when suddenly a ray of sun cut through the window and hit his 3-year old daughter in the back of the head. He recalls how she hated the feeling of the sun and hissed like a vampire, leading him to remark, 'I made a Bergen child'.

4.3.7 Conclusion

Narratives of weather, climate and climate change in Bergen are set at different time scales, from the apparent eternal stability of geological time, through the echoes of historical time, the constant natural and social seasonal rhythms of the year, to the sudden weather events that punctuate our lives. Three points can be made. First, that many stories of Bergen's climate combine elements that operate at different time scales; simultaneously implicating Bergen's geology, history and seasonal change in a identity narrative for instance. Rarely are

stories set in any one time. Second, public narratives tend to occupy longer time scales (geological, historical and seasonal time for instance), while private stories are more likely set in the shorter-term timescales of seasons or weather events. But all are important for layering a sense of place in Bergen, since even private stories can be grouped into common threads of experience and meaning. Third, we ourselves can synthetically write our own history of the emergence of climate change as a matter of concern in Bergen since 2003.

4.4 Case study: Golf du Morbihan, France (Charlotte da Cunha)

The Golf du Morbihan study site is rooted in the articulation of the CoCliServ consortium and the local teams (Clim'actions), constituting a hybrid site-governance group to validate the proposal to be implemented in the sites for the narratives of change WP1 process. In D1.1 (Krauss et al., 2018), we described first observations based on site visits, secondary sources (academic literature, policy documents, general information about the area), and exploratory interviews. We focus on the description of the Golf du Morbihan, its development and its forthcoming issues in order to produce a first mapping of the narrative of change.

In D.1.2., we interrogate Golf du Morbihan's narratives of season, weather and climate change according to timescale and chronotopes that distinguishes them. The Golf du Morbihan everyday life is linked to season. The Golf is composed of a main city, Vannes, and 12 municipalities composed mostly by secondary housing. The population is rising on summer and weekends, and the socio-economic characteristics of this population influence the economic and social activities of the territory as well as land-use planning. The Golf du Morbihan everyday life is also linked to weather as the economic and leisure activities are

strongly influenced by it. The Golf du Morbihan is undergoing climate change and extreme events. The Golf was an estuary, flooded 3000 years ago, and now expanding. Many housing and economic activities will be impacted by rise of sea level and temperature as well as fresh water shortage and storms.

4.4.1 Chronotopes

We have identified two key chronotopes in our case study area:

Chronotope 1: The coastal pathway

Since recently, it became possible to walk freely on almost the entire coastline of the Gulf of Morbihan. Beyond the traditions of passage (sentier des douaniers - path of customs officers), this is particularly due to the long implementation of the coastal servitude (SPPL[1]). With regards to French law, the coastal path mainly corresponds to 3m right of way on private property along the shoreline.

This coastal path is an interesting chronotope as it visually underlines erosion. Most of owners choose to fence their property, and so do it upstream of the trail. Erosion can so be seen by the moving width of the trail. The erosion of the banks leads, by transition, to erode private land, forcing homeowners to move back their fence to leave the right of passage.

Figure 7 The coastal pathway in the Golf du Morbihan (Photos. Left. Aymeric Autin. Right. Ouest France)

[1] The easement of passage of the pedestrians of the littoral (SPPL) resulting from the law of December 31, 1976 and was reinforced by the "Littoral Law" (January 3, 1986), allowing the creation of a servitude transversal to the shore.

Chronotope 2: Megaliths of Er Lannic

The Golf du Morbihan was a major civilization center with thousands of cairns and menhirs, richly sculptured walls and precious jadeite jewels in the burial cairns. The sea level rise partly submerged certain megaliths, and particularly the one of Er Lannic. The monument stands as two enclosures made of raised stones, shaped like horseshoes, erected on the slight slope descending from the center of the island to the shore to the south. The northern hemicycle, opening on the south-east, is now immersed in two-thirds.

Our second chronotope is so a hypothesis: the two hemicycles were not constructed as a whole but like a reconstruction of megalithic enclosures on a higher point due to the 5-meter sea level rise 3000 years ago.

Figure 8. Cromlech of Er Lannic (photo. © Ellen Kesterton)

4.4.2 Geo-social narratives: from estuary to expanding little sea

The Armorican massif results from the superposition of two orogenic events (cf fig. 7). The formation of a mountain chain occurs under a compressive tectonic regime, which corresponds to the convergence of two continental masses. The Cadomian chain was active between 750 and 520 million years ago. An 'extensive' episode, between 500 to 360 million years ago, led to the creation of sedimentary basins resulting from the extension (i.e., stretching of the continental crust) and deposition in these basins of conglomerates of sandstone, clay and limestone. Then, the mountain chain 'Hercynian' or 'Variscan' effects are present between 360 and 300 million years approximately (SIGES Bretagne, /).

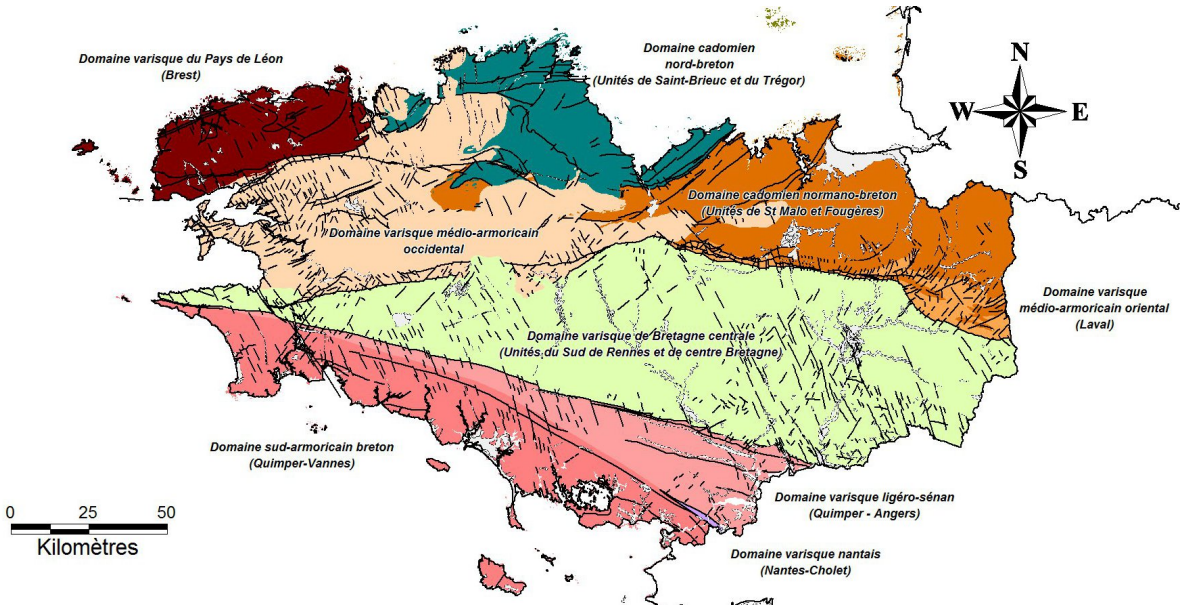


Figure 9 Breton Armorican massif from Chantraine et al., 2001, geological map 1:250000

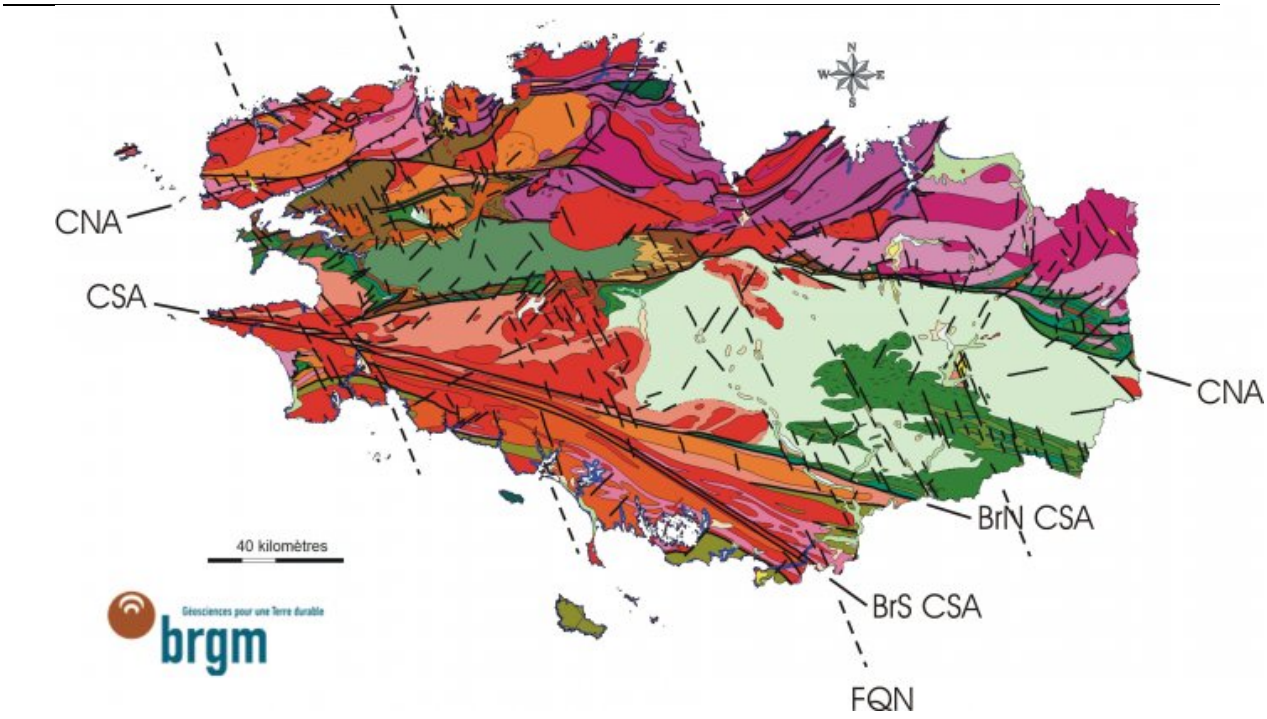


Figure 10. Geological map of Brittany and associated faults, Eds. BRGM.

The 5th IPCC report (2014) predicts that the increase of average temperatures on the surface of the planet could reach 4.8°C by 2100 compared to the period 1986-2005, in the worst-case scenario RCP8.5, i.e. whether the emissions of greenhouse gases continue at their current rate. The sea level rise could reach 98 cm in 2100 (with a rate of increase of up to 1.6 cm / year). That rise would exceed the meter from the beginning of the 22nd century and could reach 3m in 2300. On the same time, the Golf du Morbihan is undergoing a submersion derives from a large-scale tilt and collapse of the West of the Southwest Britanny and its associated continental shelf (BrSCSA – cf. fig. 8), along the fault following the western boundary of Hercynian western mountains (Bos, 1988). A submersion speed of about 1 mm/year is confirmed by radiocarbon dating of submerged oak roots and megalithic menhirs, and gallo-roman houses and roads.

The Golf du Morbihan was thus a small estuary joining three little rivers (Vannes, Auray et Noyalo), which has been progressively inundated 3000 years BP

(Créquer, 2010). **Hence, there is food for a first geo-social narrative during the megalithic period, with the example of Er Lannic (see chronotope 2 above).** The cumulative effect of submersion and sea level rise affects the Golf du Morbihan. **The Gulf will thus undergo in the following years a new geo-social narrative.** Due to sea level rise, the Gulf, its inhabitants and its economics activities will be exposed to increasing risks of storms, flooding, submersion, as well as coastline modifications (ODEM, 2010). The local decision makers (at municipalities and regional scales) have to respond in urgency to the national demand for territorial planning against the effect of future climate change. They do not have the tools to cope with this demand and need data about:

- occurrence of extreme events,
- local future scenarios incorporating changing parameters of the territory (urban planning, economic activities (tourism, agriculture) and the impact of extreme events (heat waves, flooding)),
- mapping of 'climate hot spots', sensitive positively or negatively to climate changes, and
- future demand for drinking water in the touristic summer period and consequence on deep water reservoir in South Brittany.

4.4.3 Historical narratives: from an economy based on agriculture and oyster farming to tourism

The Golf du Morbihan has been developed around agriculture and oyster farming, and an industrial hub around Vannes. The most developed and adapted activity in the Gulf is oyster farming set up in the 19th century. As an intensive breeding place, Morbihan is mainly focused on dairy production and poultry farming. Vegetable and horticultural production remains limited in Morbihan despite the natural and meteorological advantages of the coastal zone (Chambres d'agriculture de Bretagne, 2015). In addition, there remain two salt

marshes operated in the Golf du Morbihan, restored recently. The area was famous for its salt marshes, but this activity has disappeared since the 1960s, due to the reduction of salt requirements for the conservation of food (Ouest France, 2017).

Tourism has grown considerably in recent decades. Infrastructure has grown accordingly; many second homes appear on the outskirts of coastal villages. The gulf turned into a boater's paradise, mainly in Vannes, Auray, and in Arzon, where the port of Crouesty was built in the 1980s, near the old Port-Navalo, a real seaside resort that can accommodate 1,500 pleasure boats and has a Thalasso-therapy center. Holiday resorts and campsites are mainly located on the ocean side on the Rhuys peninsula. Because of pressures from urbanization, tourism and accelerated agricultural devitalization, the gulf suffers problems of occupation and maintenance of the rural area. Tourism also leads to conflicts about tidal zone uses with oyster farmers and about the need of protection for sensible natural zones.

The Natural Regional Park, created in October 2014, aims to protect and to enhance the natural, cultural and human heritage of its territory by implementing an innovative policy of land use planning and economic, social and cultural development, respectful of the environment (Parc Naturel Régional du Golfe du Morbihan, /).

The Golf du Morbihan modern historical narratives result from the development of tourism, mostly based on secondary homes. Tourism shapes a new territory, in terms of economic activities, land use planning and everyday life habits. Tourism leads to a decrease of agricultural farms' number coupled with a very strong increase of organic farms that decide to develop direct sale (by effect of training and sharing of knowledge). Oyster farmers and salt workers also use the significant presence of tourists to sell their products directly. **These**

primary sector economic activities are strongly influenced by climate change, weather and season and could need climate services to adapt (see following narratives)**.** On the other hand, these secondary homes are constructed near the sea and have caused inappropriate river management generating overflows during heavy rains. Some homes are already in flood risk areas and protected only by dikes and dunes, some will become endangered when the sea level will rise. Here, **we can interrogate the risk perception of people and decision makers, who accept to build and live on risky area (**for more details on required climate services, see geo-social narratives).

4.4.4 Seasonal narratives: winter time and peak season

The Golf du Morbihan is characterised by two seasons; winter with its inundation and submersion events; and summer with the arrival of tourists.

In winter, the Golf undergoes risk of inundations due to heavy rain and of submersion due to strong wind and, on a less frequent basis, storms. Southwestern winds accelerate the rising tide, while northeastern winds increase ebb speed (Office National de la Chasse et de la Faune Sauvage, 2011). These climatic events affect economic activities as well as housing, even if the Rhuys and Quiberon peninsulas constitute barriers to mitigate their effects (for more details on required climate services, see geo-social narratives).

In summer, the population increases tenfold. This situation does not facilitate a balanced development of the territory with residents who feel invaded during summer and secondary residents who do not invest themselves in local development. This phenomenon is coupled with soaring land prices, which do not allow people providing service jobs to settle. Lastly, the access to fresh water (for drinking, irrigation and oyster farming) becomes progressively more and more difficult, especially during the summer tourism season**. Two exploratory**

interviews in Sarzeau enable us to document lifetime experiences of change linked to tourism (dairy farmer and a local market manager).

The interviewed farmer switched to organic farming in the 1990s because of environmental motivations and then to direct sale (to stabilise his incomes, to increase client feedbacks and valorise his work). He has an optimistic view of the future in the Gulf, as preservation of the ecosystems will be supported by Natural Regional Park and there will be a local ecological 'revolution' (reduction of the human impact on the environment) led by the economy through the development of organic farming, local trade, transportation, and thermal insulation.

Court Circuit is a shared local organic marketplace, which has been created in 2015, increasing from 7 to 26 producers today. It was created following a customers' perspective, that there was a lack of clustering of local products that could be solved by building a collective selling place, which turned out to benefit both producers and buyers. Their perceived changes in the Gulf are associated to urbanisation, agriculture, youth and culture, leaving climate change far behind in the background noise.

Both interviewees have little perception of a local change in climate, and their major preoccupation regarding climate is to reduce their carbon footprint. The prominent climate issues encountered in the farmer's work are overly dry summers and autumns, excessively wet winters and springs, because it destroys grass necessary to livestock, and he is interested to get seasonal forecasts along with long-term local trends (temperature, humidity, extreme events) for adaptation.

4.4.5 Weather and temperature narratives: two marine economic activities under influence

Beyond the rising waters, a strong impact of climate change, already felt in the Gulf of Morbihan, is **the increase in the temperature of water. The exploratory interviews enable us to expose a first lifetime experience of climate change through an oyster farmer in Sarzeau.** When asked about his work nowadays, the oyster farmer spontaneously evoked climate hazards. Seawater warming is damaging for the production as the swarming of oysters need lower temperature conditions, which is now more easily found in La Manche. This comes in addition to spat mortality (oyster of less than a year) due to a variant of herpes virus oyster that affects since 2008 between 60 and 90% of production in most French oyster sites (Bertran, 2012). Oyster production is hence encountering difficulties during the high touristic season, which takes a heavy toll on the activity.

Highs and lows of oyster cultivation have important consequences on the economy and tourism in the Gulf. The future is worrisome for next generations, as there is a rapid and negative shift in the activity. The oyster farmers have to adapt their practices. For example, they can diversify their culture between different strains of oysters, develop a collective production in a closed loop with water pumps, or even begin to develop algae production for balneotherapy use. The interviewee's needs are local temperature projections (forecasts for the next 2-3 years to adapt way of cultures to keep water-cooled down below 15-16°C), and future sea level and storms (frequency, intensity).

The tides, the sun and the wind set the rhythm of the salt workers. The Lasné salt marsh in Saint-Armel exists since the 15th century and was bought in 1978 by the department of Morbihan. The Paludière's work is to manage water and the production of salt, as well as to educate the public during visits onsite.

The salt is sold directly on a local market and indirectly through a cooperative. Present weather issues for the salt producer are too much rainfall (which drives down salinity in the salt marsh hence hindering crystallization and thus production), especially in summer during harvest, and storms. Climate Change is perceived through a shift in the timing of seasons, weather disturbance, and fewer but stronger hot summers. Climate information needs for the salt worker are seasonal forecasts and long-term trends of summer rainfall for adaptation.

4.4.6 Discrete weather events and emergence of climate change perception

People from Brittany have a long tradition of unity struggle against major threats. **An extreme event, coupled with other factors, helped to start awareness of the local population to climatic change and its consequences.**

The storm Xynthia (end of February 2010) had its maximum impact 200 km south of the Golf du Morbihan (Vendee and Charente-Maritime), but the 50 persons who died, the pictures of destructed piers, boats on the beaches, and wide submerged areas has been an 'electro-shock' for the whole Atlantic coast inhabitants. Polemics about who should have better acted to protect the population have mobilized all persons in responsibility (in particular the state agencies).

On the other hand, the publicity given to the Peace Noble Price for IPCC, the long-term action of local environmental associations (Eau et Rivières de Bretagne and Bretagne Vivante), and the mobilization towards local production of organic agriculture was an opportunity to several local actors to promote mobilization on climate change consequences among the local actors (creation of the association Clim'actions Bretagne Sud and of the climate change actions of the Natural Regional Park).

4.4.7 Conclusion

People working directly in marine environments (oyster's farmers and salt workers) are more knowledgeable in climate and more interested in climate services than those working in terrestrial environments (farmers). This is most likely because the former are more climate-sensitive since marine areas experience climate and climate change more directly (sea level, temperature warming, acidification, extreme weather events) than terrestrial territories (shift in the timing of seasons, disturbance of water cycle).

Therefore, the narratives of a part of the population (inhabitants, farmers) do not necessarily express concerns about the effects of climate change and the need for adaptation. At the same time, the signals of the geo-social narratives are very clear: the adaptation is necessary to avoid seeing hundreds of houses and economic activities disappear. The challenge thus becomes, beyond the modalities of adaptation, the need to lead the population to take hold of this question of climate change.

4.5 Kerourien, Brest, France (Juan Baztan et al.)

(with inputs from the Site-Governance Group, mainly: A. Vincendeau, A. Dupont, A. Benhaberrou and L. Jaffrès, edited by B. Jorgensen).

The Kerourien study site appears uniquely as one where the gravity centre is moving progressively to collaborative social dynamics inside the neighbourhood while also connecting abroad more broadly.

Kerourien's process, as noted in the description of work for task 1.2 and consequently this deliverable D1.2, is that of 'an in-depth analysis of literature, media and historical accounts in order to establish a chronology of narratives and their changes' through the chronological reconstruction of key weather events and the contexts shaping these narratives. The analysis consists of

'identifying metaphors and semantics concerning local climates, changing weather conditions and place-based identities'. This step forms a continuum between WP1.1 and WP1.3. It is rooted in ongoing dialogue with stakeholders and key informants and includes archival work summarizing secondary sources. The intention is to integrate the main results from this phase into the narrative process of WP1 and further efforts within WPs 2, 3 and 4 while reinforcing connections with the preliminary results from D1.1.

The main sources for the chronology of narratives and their changes are:

. The book '*d'une rue à l'autre… couleur quartier*';

. A book project, preliminary draft available;

. The film '*Des graines sur le béton*' (2006);

. An ongoing film project with a version available for internal use;

. 25 selected press releases;

. The CD *Kerourien ça n'est pas rien*, with 16 titles;

. 302 articles published in the local media *l'écho de Saint-Pierre*;

. 3 drafts of papers accepted to be published in the local media;

. The regional climate-energy plan;

. A PhD thesis;

. A Master's thesis;

. Published peer-review papers;

. Minutes from the monthly working group meetings;

. Personal documents and photographs from key informants;

. A full-day workshop to share and discuss the available material from the Archives and Testimonies working group;

. The interviews as support material, their in-depth analysis will be presented in D1.3.

4.5.1 On the way to a chronology of narratives and their changes in Kerourien.

The choice of a linear chronology has strong implications for the tools used to collect data and conduct analysis. Along with these are the implications that arise from the resolution of the data and their analysis. These implications shape assumptions about the studied 'subject' and our epistemological position. Assuming that when we use the word 'time' and think about its measure, 'what we call measuring time is nothing but counting simultaneities. The clock taken as an illustration' (Bergson, 1889). By making this assumption explicit, we hope to clarify that the intention of this approach is to bring a common understanding based in chronology to the end-users of this work, and we have opted for the simplification of linearity as a convention to facilitate understanding, not as a mechanistic epistemological position. One question illustrates our choice:

How do we go back in time?

For one, by knowing that Kerourien's geological substratum emerged under the Hercynian orogeny and brought to this small place on our planet a coastal area along the edge of the super-continent of Pangaea, which held united the majority of exposed land 350 million years ago, and was somehow contemporary with the first three *Eospermatopteris* of 380 million years ago. Kerourien's ancient geological substratum had no trees to begin with; moving through eons and eras, the Last Glacial Maximum saw the region with its coastline far away to the north and west and an ice cap just on the other side of what was at that time the Manche River. In that place today, we have the sea between France and the United Kingdom. The land-and-sea-scape evolves and will continue to do so, but in Kerourien, the focus on profound planetary forces is pulled into the here-and-now of the community and the very recent local memories of its residents. And so it is that each time a narrative requires this or other 'time paths', there is a

movement stretching back in time and projecting that memory of past time into the lived present.

Three primary anchors in time for the community were identified as the time when three farms existed in the area, the time of the Second World War, and the time when Kerourien shifted from a rural to peri-urban area.

The stakeholders engaged in the process, see D1.1 for details, have been working following their own inertias and quotidian constraints, going beyond the common-place '*le local de 50 ans*' with the intention of bringing together various pieces and moving from 'I' to 'we', that is, from individual to collective processes. One challenge has arisen from the fact that unanticipated shifts in priorities and availability of the participants has not allowed the shared time required to feed the collective process. Full group meetings are used primarily for proposing and voting rather than time to deeply engage in the ongoing efforts. For this reason, we organized a day dedicated to the 'archives and testimonies' where each stakeholder presented their tools, findings and intentions to go further into the process. The day allowed us to clarify ongoing efforts, improve our understandings of each other, and identify common goals. This caused a shift in the dynamics and opened the transition to a collective process with a collective intention. The day was structured as follows:

9h, Accueil ;

9h30, Témoignages et archives des jardins partagés de Kerourien à la Fontaine Margot. Nina Thomas.

10h, Le regard d'une personne étrangère au quartier: pour un dossier spécial Kerourien dans Côté Brest. Benoît Quinquis ;

10h30, Véro Pondaven, films et autres ;

11h, Martine Hemidy, Tv, films et autres ;

11h30, Mon Quartier de Kerourien, un certain regard. Exposition de la médiatique de

la Cavale Blanche ;

11h45, Enregistrement de Clarisse Malejacq du Centre Social Couleur Quartier (CSCC) ;

12h, Régine Roué. Différents projets du CSCC donc celui du livre illustré des enfants;

12h30-13h30 On mange :) Auberge espagnole;

13h30, Des ateliers vidéo sur le quartier de Kerourien, Canal Ti Zef, Marie Lebarbier ;

14h, Représentations sociales d'un quartier brestois : Kerourien, Cristian Díaz Gobeaux ;

14h30, Montfort Lucienne, projets passés et livre avec historienne, présentation de la maquette ;

15h, Alain Maillard, Anaïs Cloarec et Guiomar Campos. Leurs approches artistiques ;

15h30, Juan Baztan, CoCliServ et MLTDM à Kerourien ;

16h, Lionel Jaffrès, les Belles Histoires de Kerourien ;

16h30, Vers le Local, affichage de la cartographie des actions…18h, fin :)

A intégrer dans les présentations : Jean Pierre Nicol, et toute personne qui élabore une matière en relation avec la question des archives et les témoignages à Kerourien: échos de St. Pierre, Mairie de Quartier, Don Bosco, etc.

These details are important for sharing the conditions that allowed us to establish the baseline for a collective process related to narratives. Based on the efforts from the last 12 months, we now have the necessary elements and local conditions to conduct in-depth analysis of the available material. Additionally, the other ongoing processes have much more solid ground to build upon.

4.5.2 What do all these sources tell us…and how do we go further in?

We have collected more than 400 different media samples and within them we have identified two main positions: (i) media from central, regional, or national administration perspectives that are disconnected from the local community's values and priorities in their everyday lives; (ii) media stemming from people

participating in identity-building efforts of the neighbourhood, which serve as powerful tools for emancipation and empowerment by taking risks and prioritizing diversity in ways that connect people with each other and with their differences in processes that ultimately bring them closer together and help them compose a world of shared values, of meaningful community (hooks, 1994); the film from 2006 and the book from 2003 are examples of this.

Media on Climate Change and associated climatic services are funnelled to Kerourien's residents through these two positions. Our role, as we were invited to Kerourien and are participating in the forum, is to connect elements that may not at first seem to be explicitly connected and by doing so offer insights to help form common understanding, validated by local community members and those working at municipal and regional governance levels to improve the situation for further steps.

For the analysis of the collected data, we are using modified grounded theory (Strauss and Corbin, 1997; McCreaddie and Payne, 2010; Charmaz, 2006). We base our exchanges with each other on a participant observation / observant participant mentality, as we do with all other stakeholders, which allows us to be full participants in the participatory process and contributes to creating mutual trust.

Based on the critical narrative analysis described in D1.1, a second step of analysis will be deployed for D1.3 that will go into the linguistic detail of the narratives along with an in-depth analysis of the contexts in which these narratives were produced.

From the preliminary analysis, the three code families that emerged and were validated during the June 25 th Workshop are: Time-scale; Climate; Weather.

The initial analysis of available data allowed us to conduct further analysis for additional codes consistent between the three code families. Five codes emerged from this initial analysis: explicitly evoked; implicitly evoked; government representations; community representations and individual representation. These codes are further classified by whether they refer to narratives of the past, present, or future (Table K1).

Table 2 Selected examples from the three code families and associated three codes, by narrative temporality from the three levels of time-scales for representations of (A), climate (B) and weather (C) in Kerourien.

A	**Time-scale**		
	Past	**Present**	**Future**
Individual representations	*'I was here in 68' at the very beginning of the neighbourhood.' S_I_1*	*'At 5am I wake up to go to a low income job; the staggered-schedule life is not easy.' S_M_1* *'In my place, there, it's really hard. I came here from very far to search for a little sun in my life.' S_M_1*	*'Hard to follow a path that is not mapped.' S_ P_O_1* *'I want to travel, a real trip.' S_ P_O_1*
Community K representations	*'Our neighbourhood committee, then the book, the film; back in that time we were stronger.' S_ P_O_1*	*'From one day to another, from tower to tower, we live from day to day.' S_M_1*	*'Never fucked, you lift your head up.' S_M_1* *'We are dreaming of the next 50 years.' S_ P_O_1*
Government representations	*'The first plans were shared in 1964 and the towers were planned to last 30 years."*	*'We manage the emergencies, we do not have the resources to afford all the work that needs to be done." P_O_1*	*'Who knows where those towers will be in 10 years.' S_I_1*
B	**Climate**		
	Past	**Present**	**Future**

Individual representations	*'300 years of tide gauge data.' S_T_1*	*'It is important, the climate; look at how the window flaps are degrading.' S_I_1*	*'Your skills are important for us, useful to tell them to do something.' S_I_1*
Community K representations	*'Climatic conditions influenced the progression of epidemics. So between 1685 and 1729, the region was subject to a phenomenon of mini-glaciation, resulting in harsh winters, rotten summers and bad harvests.' S_LP_1*	*'The social climate is complex and tricky in this neighbourhood.' S_I_1*	*'The uncertainties facing the future bring a deep feeling of distress.'*
Government representations	*'The balance of regional greenhouse gas emissions is dominated by agriculture, which represents 40%.' S_GR_1*	*'Computing power and scientific knowledge evolve quickly … New climate simulations are available.' S_GR_1*	*'Despite the expected GW, Brittany will remain potentially exposed to a sudden cold snap like that of January 1985 with implications for over-consumption." S_GR_1 'Fisheries and forestry will be the most impacted sectors and sea-level rise and storms the most outstanding factors.' S_GR_1*
C	**Weather**		
	Past	**Present**	**Future**
Individual representations	*'Strange such a hot and dry summer; it was not like this before.' S_ P_O_1*	*'Shit, it's always raining here.' S_ P_O_1 'So nice when the weather is so sunny like today.' S_ P_O_1*	*'In my place the weather is perfect and it will be.' S_ P_O_1*
	'Climatic conditions also influenced the progression of		

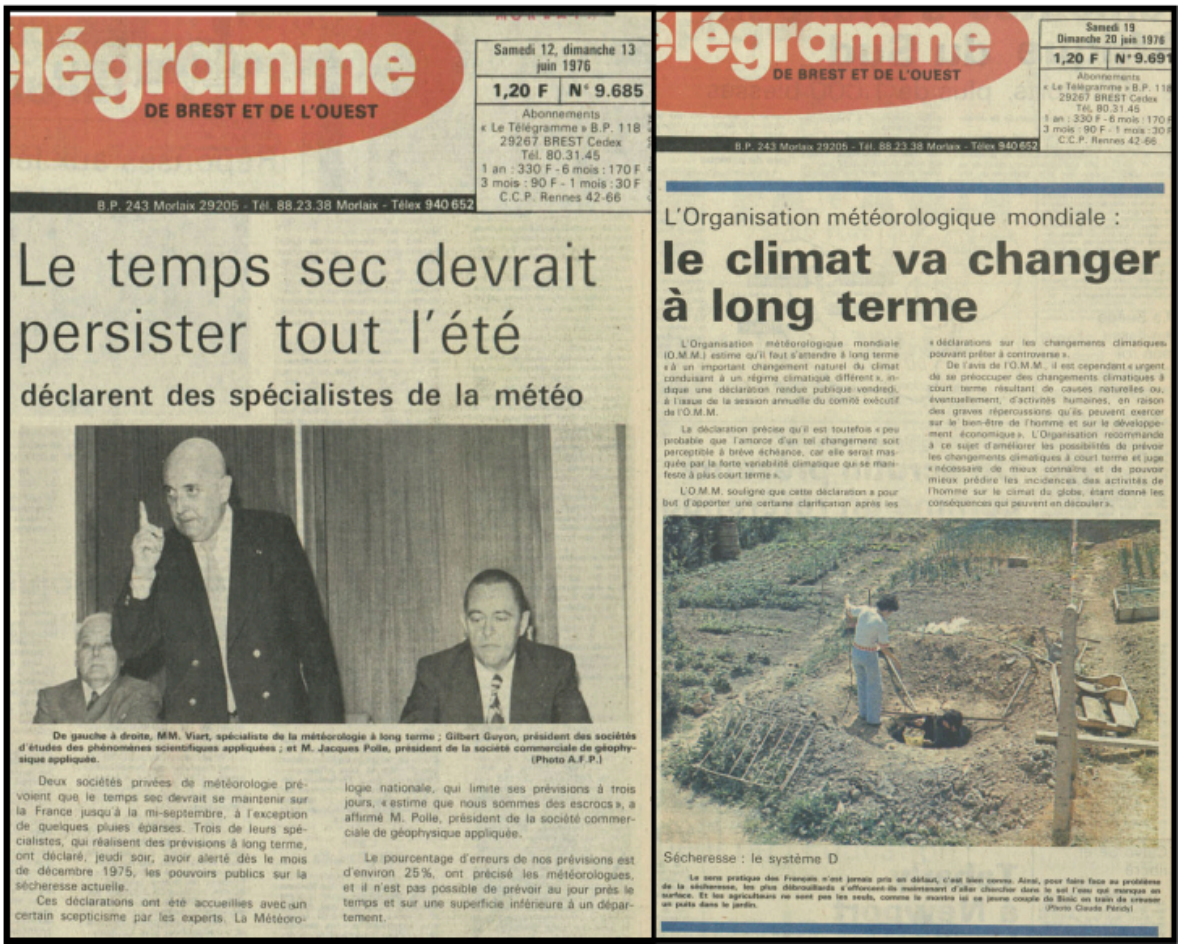
Community K representations	*epidemics. Between 1685 and 1729, the region was subject to a phenomenon of mini-glaciation, resulting in harsh winters, rotten summers and bad harvests.' S_LP_1*	*'In the flat Brest country, through the storm, the rain or the smog, the sun in the heart warms up this cold.' S_M_1*	Not clear examples available.
Government representations	*'Extreme events: Storms (Dec, 1999; July, 1969; Oct. , 1987) Marine Inundations: (Jan, 1924; Jan, 1978; March, 2008) Floods (1936, 1974, 1995, 1999, 2000, 2001 … 2010 …) Droughts and heat waves: (1953, 1976, 1989,2003 …2011/2012) Snow: (Feb 1983, Feb 2004, Jan 2010 and Dec 2010) Cold Snaps:(1987, 1996/97 and Feb 2012 …).' S_GR_1*	*'Faced with a drought as harsh as that of 1976, Brittany would be better armed today. Since then, new dams have been constructed and interconnected through distribution networks. But this situation remains relatively fragile.' S_P_1*	*'Big uncertainty about the rains: no clear scenario but drought during summers. No evidence on the evolution of the other parameters (storms, thunderstorms, average wind, sun, snow …) but these questions can be studied with the help of climate models…' S_GR_1*

4.5.3 Icons and metaphors within Kerourien narratives

4.5.3.1 Water Towers

The 'Two Water Towers' plan was voted on and approved at the municipal level in 1927, after the epidemics of smallpox, cholera and typhoid that occurred between 1869 and 1903. The water towers were constructed in 1930 by François Cordonbring to raise the city's hygienic standard to a new level. After their destruction during WWII, they were replaced by one situated 95m high, which proved vital during the six-month drought of 1976. Following this event other water towers were constructed to prevent further climatic calamities. As was reported by the media, the drought of 1976 was an extreme event and the media

reporting of it featured all the components related with extreme weather events. It was the first time long-term Climate Change was reported in the mass media (Figure 9).



Télégramme
DE BREST ET DE L'OUEST

Samedi 12, dimanche 13 juin 1976
1,20 F | N° 9.685

Abonnements
« Le Télégramme » B.P. 118
29267 BREST Cedex
Tél. 80.31.45
1 an : 330 F - 6 mois : 170 F
3 mois : 90 F - 1 mois : 30 F
C.C.P. Rennes 42-66

B.P. 243 Morlaix 29205 - Tél. 88.23.38 Morlaix - Télex 940 652

Le temps sec devrait persister tout l'été

déclarent des spécialistes de la météo

De gauche à droite, MM. Viart, spécialiste de la météorologie à long terme ; Gilbert Guyon, président des sociétés d'études des phénomènes scientifiques appliquées ; et M. Jacques Polle, président de la société commerciale de géophysique appliquée. (Photo A.F.P.)

Deux sociétés privées de météorologie prévoient que le temps sec devrait se maintenir sur la France jusqu'à la mi-septembre, à l'exception de quelques pluies éparses. Trois de leurs spécialistes, qui réalisent des prévisions à long terme, ont déclaré, jeudi soir, avoir alerté dès le mois de décembre 1975, les pouvoirs publics sur la sécheresse actuelle.

Ces déclarations ont été accueillies avec un certain scepticisme par les experts. La Météorologie nationale, qui limite ses prévisions à trois jours, « estime que nous sommes des escrocs », a affirmé M. Polle, président de la société commerciale de géophysique appliquée.

Le pourcentage d'erreurs de nos prévisions est d'environ 25 %, ont précisé les météorologues, et il n'est pas possible de prévoir au jour près le temps et sur une superficie inférieure à un département.

Télégramme
DE BREST ET DE L'OUEST

Samedi 19 Dimanche 20 juin 1976
1,20 F | N° 9.691

B.P. 243 Morlaix 29205 - Tél. 88.23.38 Morlaix - Télex 940 652

L'Organisation météorologique mondiale :

le climat va changer à long terme

L'Organisation météorologique mondiale (O.M.M.) estime qu'il faut s'attendre à long terme « à un important changement naturel du climat conduisant à un régime climatique différent », indique une déclaration rendue publique vendredi, à l'issue de la session annuelle du comité exécutif de l'O.M.M.

La déclaration précise qu'il est toutefois « peu probable que l'amorce d'un tel changement soit perceptible à brève échéance, car elle serait masquée par la forte variabilité climatique qui se manifeste à plus court terme ».

L'O.M.M. souligne que cette déclaration a pour but d'apporter une certaine clarification après les « déclarations sur les changements climatiques pouvant prêter à controverse ».

De l'avis de l'O.M.M., il est cependant « urgent de se préoccuper des changements climatiques à court terme résultant de causes naturelles ou, éventuellement, d'activités humaines, en raison des graves répercussions qu'ils peuvent exercer sur le bien-être de l'homme et sur le développement économique ». L'Organisation recommande à ce sujet d'améliorer les possibilités de prévoir les changements climatiques à court terme et juge « nécessaire de mieux connaître et de pouvoir mieux prédire les incidences des activités de l'homme sur le climat du globe, étant donné les conséquences qui peuvent en découler ».

Sécheresse : le système D

Le sens pratique des Français n'est jamais pris en défaut, c'est bien connu. Ainsi, pour faire face au problème de la sécheresse, les plus débrouillards s'efforcent dès maintenant d'aller chercher dans le sol l'eau qui manquera en surface. Et les agriculteurs ne sont pas les seuls, comme le montre ici ce jeune couple de Binic en train de creuser un puits dans le jardin. (Photo Claude Péridy)

Figure 11. The 1976 drought in regional media..

4.5.3.2 Farms, land use planing and the Towers as identity

Across the three temporal anchor points, the general trajectory of development in Kerourien seems to have been driven by the objective of improving the living conditions of its human inhabitants. This is evidenced from the examples of the three farms to the presentation of the first building plans for the Kerourien district on January 8, 1964, as prepared by architect Albert Cortellari. In 1968, 21 buildings with 593 dwellings were erected, and along with them came residents who had previously been housed in barracks. Some of the new residents were

reluctant to move into these 'rabbit cages', but others considered this relocation as 'social promotion'. At that time, cows still grazed along the boulevard du Plymouth, which ran alongside this new public housing development.

Today, looking back on the situation at that time, it is easy to see it as a closed-case, simple. If we pause to consider how it could have been more complex, a few questions arise:

What are the links between urban plans and implicit, or at least non-explicit, political choices?

Are there links between the new mobility plan and the progressive privatization of social housing?

Is there a relation between the careless treatment of these public buildings and the sense of insecurity expressed by the media?

Regardless, the towers of the housing development became the icon of the neighbourhood and have been used in several publications. For example, they are the image for the 50th anniversary. We anticipate the interviews will bring details to unravel the simplistic interpretation of this history in order to re-weave a complex tapestry of balance and precariousness in this peri-urban area.

4.5.3.3 Social justice and political engagement

Three salient moments show how deeply social justice is rooted in Kerourien's social dynamics: (i) the response to the environmental crisis of the Amocco Cadiz oil spill in 1978; (ii) the self-organization of community members in 2002 when the right-wing party was close to winning the elections and the inhabitants launched 'J'ai mon mot à dire' to encourage residents to register on the electoral lists, which in turn drove the process in June 2003 to create a book of collected testimonies and establish a neighborhood newspaper of the same name; and (iii)

the currently ongoing processes to shift the portrayal of and living conditions in the area.

Today before writing this text, we passed by Kerourien's community center and witnessed the scars on the city-scape left by aggressions from local drug-dealers in recent nights. Thehoo entrance to the center was seriously damaged by fire, which has resulted in the center's closure for the coming weeks. Such actions perpetuate a strong stigma and functionally inhibit the use of an area designated for communal processes (Figure 10).

Figure 12. July 10, 2018 - the burned entrance of the community center.

When we passed, a group was seated at the entrance with different postures. Some calculating how to move, others following, others just being there because it is the place where they are used to meeting. The day after the fire, a young man said, *'who would be able to do this?'* Later, surveillance cameras showed he was one of the two leaders behind this action. Some residents express signs of

intimidation and denial. Seventy-five percent of the population between the ages of 18 and 25 have been confronted with judicial actions. How do we connect the vulnerability and precariousness of this population with available knowledge and scenarios that can be constructed? The interviews presented in D1.3 will bring key elements to move forward.

4.5.3.4 Sense of place, local identity and connexions abroad

Figure 13. No title.

With more than 25 nationalities represented in the Kerourien community, connections abroad are deployed in daily life through dance, food, and other cultural manifestations. These connections are particularly clear in descriptions of where residents see themselves in the coming years. For example, some continue to place themselves in Kerourien; others in faraway locations such as

Madagascar, Comore, Syria, Algeria, Morocco, Mali – all places climate change will impact and modify. The analysis of life pathways will be stabilized through the in-depth analysis of interviews in D1.3.

4.5.4 Implications for further work within CoCliServ

The five main narrativies confirmed through D1.2 are :

(i) How community priorities such as housing and physical safety are connected with climate narratives in representations of daily life and world-views;

(ii) How participants embody, through their personal trajectories and experiences, climatic histories that bridge regional and global questions;

(iii) Potential connections between expectations and climatic conditions;

(iv) Political choices regarding climatic questions; and

(v) The dialogue between those political choices and residents' dynamics.

After adjusting these five general narratives through task 1.3, we will be able to connect them with the scenario work of WP2, the artistic work of WP4, and the work on the metadata, GIS, and other ongoing processes. The final step for the narratives will be done once the interview analysis is completed and used to calibrate the state of the D1.2 work with that of D1.3.

This document is the July 11th 2018 version, updated from the one drafted on July 8th.

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