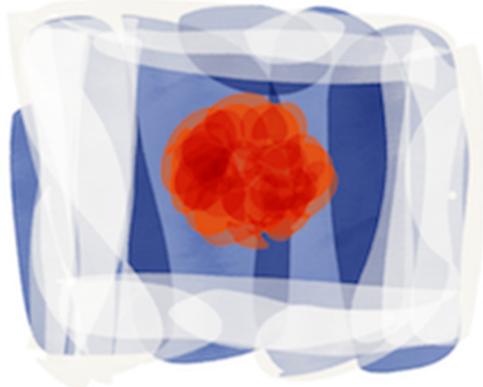


Deliverable 2.2

Incremental scenario case studies

Author(s) and affiliation(s)	Date	Version
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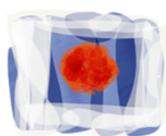


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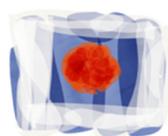
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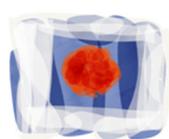
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Executive summary/summary

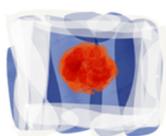
We conducted case studies using a novel incremental scenario approach. With local actors, we co-developed visions of desirable futures, normative scenarios that might lead towards those futures, and inventoried 'hinge points': critical moments in time where things might lead to a better or worse future. To bridge the latter, specific information or climate services might be needed. The cases showed that the new approach could be applied and tailored successfully in a variety of situations. The novel notion of hinge points allowed us to inventory critical challenges and ambitions relevant to the local situation: climate-related as well as key socio-economic, legal, policy/political, and technological ones. It also resulted an inventory of key information and climate service needs.

Goal/Purpose of the document

- Documents the scenario work that has been done in the case study sites: Dordrecht (NL), Jade Bay (DE), Bergen (NO), Golfe du Morbihan (FR), and Kerourien/Brest (FR).
- Details visions, scenarios and hinge points for each case study site.
- Provides first reflections on the (a) methods used for incremental scenario design, and (b) knowledge needs as they seem apparent from the scenarios.

Relationship to the Description of Work (DOW)

This report presents the core empirical work by Work Package 2 (Scenario Design). Each case study site designed local scenarios based on the narratives of WP1. These scenarios in turn provide further input to WP3 to examine the match between local needs for climate services and those that are currently available.

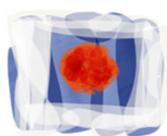


1. Introduction

CoCliServ is about co-producing place-based climate services with local communities. We developed a bottom-up approach, starting with collecting and constructing local narratives of change (WP1), and then using local visions and incremental scenarios (WP2) to explore information needs and services. We approached scenario-building and coproduction as social processes (Garb, 2008; Vanderlinden, 2015), and from the standpoint that they generally serve multiple goals (Bremer et al., 2019). This report details our empirical work on visions & scenarios, and our lessons learned.

Work Package 2 (WP2) focuses on designing new incremental scenario methods, and testing these in the case study areas: Dordrecht (NL), Bergen (NO), Jade Bay (DE), Golfe du Morbihan (FR), and Kerourien/Brest (FR). As methodological guide, we've used the CoCliServ Draft Scenario Protocol (Wardekker et al., 2018). We built on the initial inventory in Deliverable 2.1 (Wardekker et al., 2019a), which established 'situational awareness': what's happening on the ground that is relevant to take into account in the scenario exercises? The purpose of Deliverable 2.2 is to: (a) codesign practical visions, scenarios, and hinge points for the local case studies, (b) test the Draft Scenario Protocol (which will be refined based on our practical experiences), and (c) provide input for WP3 (Local Climate Information), which will use it to compare the local knowledge needs with the currently existing climate information and climate services.

The scenario work is ongoing, and involves local transdisciplinary work, aiming to contribute to local action. Several case study sites increased their ambitions and will be conducting further workshops and other activities. Other sites needed to slow down to better match local events and local processes. Consequently, there is some variation in level of detail between sites. We are aiming to document follow-up activities in informal reports later on.



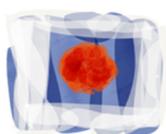
2. Theoretical background and approach

2.1. General theory

CoCliServ develops ‘policy scenarios’, also called normative or prescriptive scenarios, which describe how the future should preferably evolve (Vervoort et al., 2014; Dammers et al., 2013a,b; Dammers, 2017). The aim of these is to describe desired futures and the strategies and actions that could be taken to reach those. The focus therefore is on placing the community in the driver’s seat: *what do they want to achieve and how can they make it happen?* This is different than ‘environmental scenarios’, also called exploratory or descriptive scenarios, which describe how the future is likely to evolve. I.e. *things that may happen to the community*. Policy scenarios consequently describe two core things: the desired future(s) that should be reached (visions), and potential paths towards these (scenarios). Generally, these describe pathways that can be controlled, at least to some extent; e.g. they describe policy strategies or action plans. The scenarios in CoCliServ are also ‘incremental’: rather than following a straight line from present to future, we assume that there might be points or events along the way that could steer things off course. The developments in our case study areas might turn into a more desirable or more undesirable direction (Vanderlinden, 2015; Wardekker et al., 2018). Some of these moments are controllable by local actors, but many others might be less controllable. This is the third key thing we will examine in the CoCliServ scenarios. We refer to these points as ‘hinge points’ (alternative terms that have been coined during the project are: ‘branching points’ or ‘critical moments’).

In the Draft Scenario Protocol (Wardekker et al., 2018), we described a five-step process to co-design the local scenarios:

1. Preparation & scoping
2. Visioning
3. Scenarios & hinge points



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4. Coupling to information & climate service needs
5. Synthesis & dissemination

This deliverable focuses on steps 2 and 3 (visions, scenarios, and hinge points). Several case studies will also provide some early insights for step 4 (links with information needs). These feed into the ongoing work of WP3 and WP4 (Gerkenmeier et al., 2018; Meinke et al., 2019, 2020).

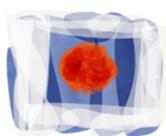
2.2. Visioning

In this step, we codesign a clear set of desirable futures, as the community might see them. If necessary, these can be contrasted with undesirable futures.

However, most attention should be on the desirable ones, as these tend to be more engaging, positive, and empowering. A 'desirable future' is a potential overall situation that might be achieved – it should be ideal, but possible. Note that this is much broader than a single goal target; it is about the total situation, likely involving multiple goals and constraints.

Goal of the visioning step is to ask: *Given the trends in our region/city/area: what do we value, what do we see as problems, and what would we really like to achieve?*

Given the diversity of actors in our case study communities, we can assume that there will be multiple answers to that question. In other words, we will need to develop a set of desirable futures, rather than a single one. These can be contrasting and exclusive, describing radically different values or desires or framing of the challenges ahead, or they can be complementary or describing variants of the same core dreams. How to deal with mutually exclusive visions or visions that might seem unrealistic, strongly depends on the case study and methods chosen. E.g., in a workshop setting, different subgroups could develop scenarios for different (exclusive) scenarios. These can then be discussed to see how they might affect/compete with each other and whether they might constitute a hinge point for each other. Another key issue, is to select one or more appropriate time horizons. The CoCliServ workplan suggests 20 and 50



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year time horizons, but that may not be appropriate to all cases. For instance, neighbourhood developments happen on much shorter time scales and residents may have long moved after 20 years. However, climate change does play on these longer time scales. It is possible to use multiple horizons and purposefully play with these: take a central horizon that is most relevant to the community's needs and contrast that with shorter and longer scales.

The visioning work builds on the narratives developed in WP1 (Krauß et al., 2018a,b, 2019; Bremer et al., 2020; Krauß, 2020; Marschütz et al., 2020).

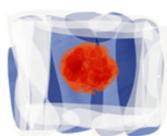
2.3. Scenarios and hinge points

The scenario and hinge point development is the core step in WP2. It should be as interactive as possible, for instance in the form of a workshop or similar event.

Scenarios

The future visions from the previous step set the stage for discussing how to get there: the scenarios for action. The goal of this step is to make the developments over the coming years, working towards a desirable future, more concrete and make them actionable, in order to empower the local community to take steps towards such a future. In relation to Figure 1, the focus of the scenarios should be on *'Things we can control'* (whether climate-related or not). The *'Things we can't control'* can be used as boundary conditions, where relevant. The scenario work will likely be a form of 'backcasting' (Quist, 2007; Alänge & Holmberg, 2014; Brunner et al., 2016; Van Bers et al., 2016) or method inspired on that approach.

The specific setup of such scenarios depends on the case study, and in particular on the specific desirable futures that have been formulated. One example would be to develop an action plan for climate-proofing a specific neighbourhood (for a desirable future of a climate-proof city). Other examples might focus more on how to involve partners and sponsors to enhance community resilience in a city or region (if the desirable future focuses more on e.g. community cohesion) or



D2.2. Incremental Scenario Case Studies

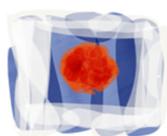
developing communication and networking approaches (if the vision is more about enabling the community to make themselves heard in local or regional decision-making).

The scenario work should by high preference be interactive, for instance a workshop. Some authors have argued that remote scenario development, e.g. via internet, is also possible (Hew et al., 2018), but discussion among community members would seem more appropriate for CoCliServ. Most case studies will however have relatively little time for developing in-depth strategies and action plans. We will aim for an approach inspired on back-casting, in a form that allows for a rapid exploration of potential actions and the timeline for that (e.g. a one-hour exercise). The aim in the context of CoCliServ is not to use this method as an easy and accessible tool for a local community, rather than a formalised policy planning approach (which much of the scenario and back-casting literature focuses on).

Depending on the case study, this might involve multiple subgroups each exploring a separate 'desirable future'. In principle, it would be possible to explore multiple scenarios for each desirable future: there's often more than one way to achieve what you want. We could also develop branching scenarios using the hinge points, e.g. how to recover from an identified potential setback. Given the time constraints, however, we will likely need to limit ourselves to one main scenario per desirable future, unless the community/participants prefer something else.

Hinge points

The hinge points (or alternatively, 'branching points' or 'critical moments') are critical moments in time: junctures in which the developments can lead to/from a specific desirable future (e.g. Dammers et al., 2013a; Haasnoot et al., 2013; Vanderlinden, 2015; Wardekker et al., 2018). The core assumption in CoCliServ is



D2.2. Incremental Scenario Case Studies

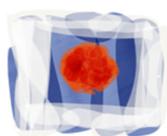
that these are the moments for which information and tools, such as climate services, are needed in order to navigate them and prevent the community's action plans from crashing. We ask the community: *Given the action plan you've developed, what could go wrong in this process? (and when/how/why/etc.?). What could you do and what would you need to keep on track?*

Each vision and scenario provides a storyline of how a community might build a desirable future; a model of the world and actions that could steer it in the right direction. Like any model or plan, this involves a number of assumptions, which can be critically assessed (cf. e.g. Dewar et al., 1993; Kloprogge et al., 2011; De Jong et al., 2012; Van der Sluijs & Wardekker, 2015). Hinge points are such core assumptions. They could be specific decision moments, e.g. "in 2030 the inner city will be redeveloped – this can result in either a higher or lower climate-proof area depending on how it's done". It might also be a more gradual event or trend. They could be issues that we can control (whether the occurrence of the event or the impact it has) or cannot control. They could be directly or indirectly climate-related, or not climate-related (but important for the community in of their vision of a 'desirable future'). See Table 2.1 for some examples.

Table 1.1. Examples of hinge points.

	Things we can control	Things we can't control
Climate-related	<ul style="list-style-type: none"> - In 10 years' time, a new sewer system will be constructed. Will it be sufficiently large to cope with heavy rain showers? 	<ul style="list-style-type: none"> - The Antarctic ice sheet will turn out much more vulnerable and start to melt rapidly, leading to higher sea level rise.
Not climate-related	<ul style="list-style-type: none"> - Social and economic tensions in our neighbourhood increase. 	<ul style="list-style-type: none"> - Tensions in the world impact global economy or lead to large numbers of refugees.

We will explore **what a hinge point is**. Ideally, we develop an operationalisation that is easy to grasp by local actors, and evocative enough to give them some idea of how they could be relevant to their community. Our working definition is:



D2.2. Incremental Scenario Case Studies

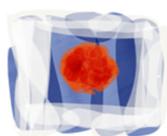
“A hinge point is a development that can steer the system/city/region/neighbourhood” towards either a more desirable future or an undesirable one. They can originate through choices by the actors in the region (internal; can be influenced) or through developments from outside (external; can’t be influenced directly/meaningfully). They can be events (shocks), trends (gradual changes), or combinations of these. They may be easy to pinpoint in time (e.g. a specific decision deadline) or more difficult (e.g. a tipping point in the climate system or wildcard/surprise scenario). Likely, a major choice of options is needed, and information is required to make the right choice.”

We will use a **categorisation / typology** of different types of hinge points, guided by **two core characteristics** (see Table 1 & 2): are they **climate-related**, and are they **controllable** by the local community? Further characteristics can be developed, e.g.: what is the impact, can they be pinpointed in time, are they an event or trend, et cetera. See Table 2.2. Quite often, the discussion might focus on negative hinge points, but we can also imagine that there may be positive hinge points: windows of opportunity that a community could seize.

Table 1.2. Towards a hinge point typology.

	Things we can control	Things we can't control
Climate-related	<ul style="list-style-type: none"> - Potential impact - Graduality of impact - Can we pinpoint the hinge point in time? - ... 	
Not climate-related		

A leaflet was developed to describe the concept of hinge points to collaborators and workshop participants. See Appendix A1.



3. Case study: Dordrecht, the Netherlands

3.1. Case Introduction

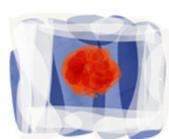
3.1.1. Case study situation

Dordrecht is a city of ca. 120.000 inhabitants in the west of the Netherlands, just east of Rotterdam and close to the sea. It is surrounded by rivers and the sea on all sides; as locals describe it: “water comes from all directions” (north, east, south, west, above, below). Consequently, the city is highly sensitive to issues around weather, water, and climate. It also struggles with socioeconomic issues, and faces a housing development goal of 10.000-15.000 houses within current city limits. We’re focusing on the Reeland district of Dordrecht, with a specific interest in the Vogelbuurt neighbourhood. The area has been affected by flooding through heavy precipitation events in recent years. The municipality and neighbourhood are exploring on how to cope with weather-related issues and climate change through adaptation, with much local energy and active local organisations. Furthermore, large scale restructuring and maintenance (e.g. replacement of social housing estates), sewer replacements, and redesign of public green spaces and sporting facilities are planned. This provides a window of opportunity to explicitly take citizens’ desires and climate change concerns into account when redesigning the area.



3.1.2. Setup of the scenario work

In the previous stages of the project (WP1), we’ve collected local narratives of change for both Vogelbuurt residents and local, regional and national policymakers (Marschütz, 2018; Marschuetz & Wardekker, 2018; Wardekker & Marschütz, 2018; Marschütz et al., 2020). These were thematically clustered into



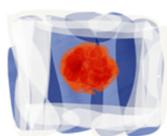
D2.2. Incremental Scenario Case Studies

three themes that formed the basis of the visioning and scenario development in WP2:

1. *Close-knit Island Community*. This focused on social resilience, taking care of vulnerable groups, maintaining local identity and community in a changing neighbourhood and changing climate.
2. *Innovative Connections*. This focused on the interlinkages between climate adaptation and other local themes, such as the energy transition (mitigation), mobility, the local housing challenge, urban renewal, and new technology.
3. *Water Safe & Water Wise*. This was a more classic view on water safety, flooding, heavy precipitation, and the impacts and options for the area. However, it also posited that the Dordrecht people had experience in living with water, and could approach water-related challenges from a positive perspective.

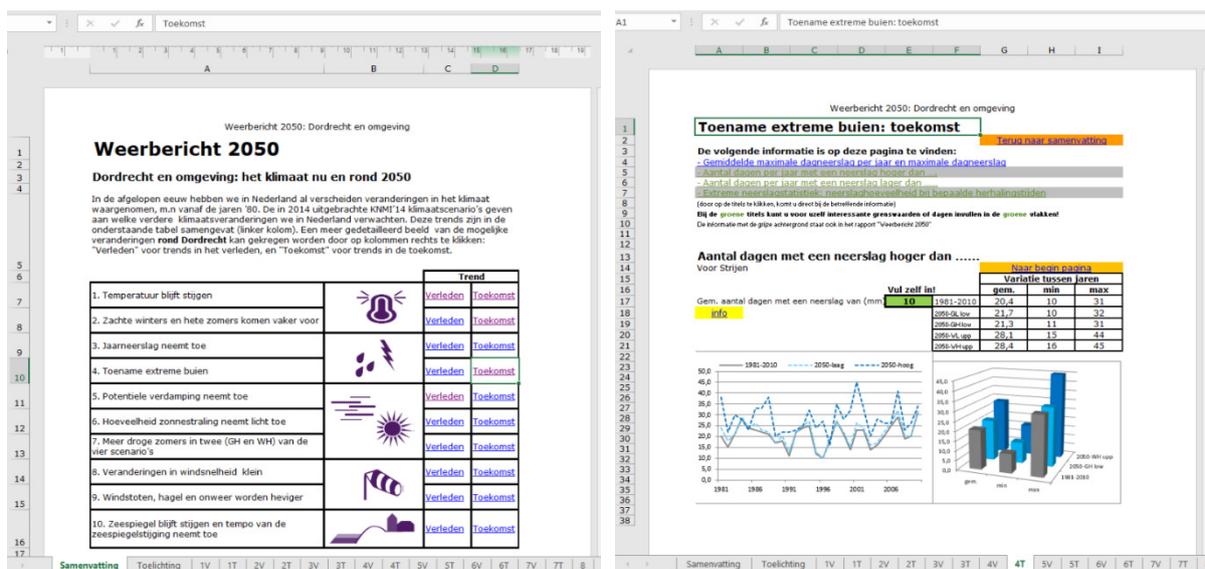
We organised a six-hour workshop in the Spuilab Dordrecht Living Lab on 3 October 2019, gathering twelve participants (4 residents, 4 policymakers, 4 researchers). The goal was to exchange views and knowledge between these three actor groups and design visions, scenarios and hinge points for a 'resilient Vogelbuurt neighbourhood in a changing climate'. These would then provide some early inputs for the neighbourhood adaptation plans that the Municipality is developing. The workshop was a collaboration between Utrecht University, Studio Lakmoes, CAS Climate Adaptation Services, KNMI Netherlands Meteorological Institute, and the Municipality of Dordrecht. A full workshop report is available in Dutch: Wardekker et al. (2019b).

The workshop started with a round of introductions and several short presentations highlighting the goal of the meeting (UU), adaptation work in Dordrecht (Municipality), climate change (KNMI), and the results of the narrative research and themes (UU). Participants were split into two subgroups, each tackling one of the themes. We used two themes during the workshop in order to have a good subgroup size: Close-knit Island Community and Innovative Connections. Each group then discussed: what might weather, water, and climate change mean for the Vogelbuurt and the theme? Two digital tools were designed

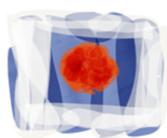


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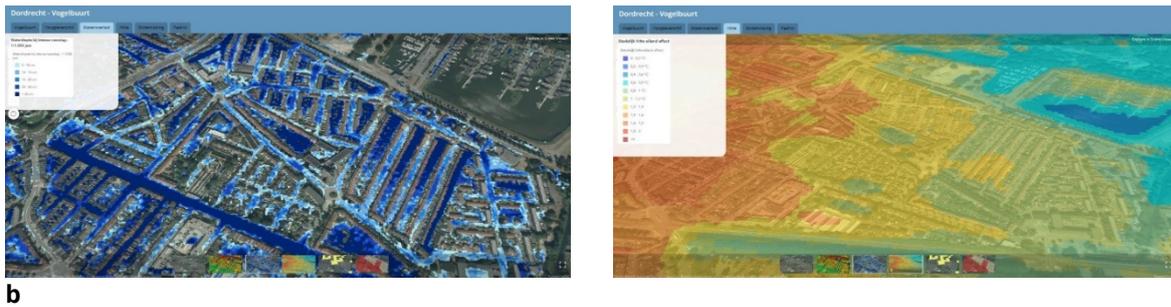
to support this. KNMI developed an Excel tool based on local times series of climate data (stations close to Dordrecht) where participants could tailor various climate metrics to their own needs (based on KNMI, 2014, 2019a,b). CAS developed a map tool based on the Climate Impact Atlas (Klimaat-effectatlas, 2019) that showed a satellite / bird's eye view of the Vogelbuurt and allowed participants to project maps of elevation, risk of local flooding, heat stress, ground subsidence, and rotting of wooden foundation piles. Participants were then provided with wall-mounted designs of a 'typical street' that already included some hints related to the related theme, various cut-and-paste materials (pictures of trees, people, buildings; images from the internet; photos from Vogelbuurt and surroundings, etc.), scissors, tape, pens, and post-its. They also received a hand-out with a short description of the theme and supporting quotes from the narrative interviews. They were asked to (a) cut-and-paste and draw their ideal neighbourhood (related to the theme), (b) to convert these creative contributions to concrete measures and write them on yellow post-its, (c) to score the measures on whether they were 'essential' or 'not essential' (need-to-have versus nice-to-have) and 'short term' or 'long term', indicating this on the post-its with coloured stickers.



a



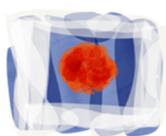
D2.2. Incremental Scenario Case Studies



b
Figure 3.1. Screenshots of the tools developed for the workshop: (a) KNMI Excel-based tool, (b) CAS GIS-based tool.

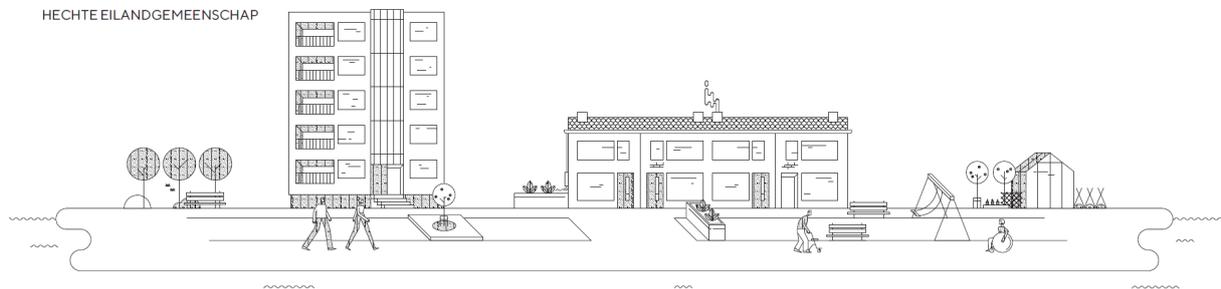
During the afternoon, each subgroup presented their visions and measures, allowing for questions to be asked. Returning to the sub-groups, participants placed the post-its with measures on a large wall-mounted timeline running from 'present' to 2050 and pre-divided into short, medium and long term. They were asked to cluster and connect measures that were similar in nature, and to draw an arrow that connected such groups into storylines that described a sequential series of options along a similar line (i.e. scenarios within their overarching theme). Following this exercise, participants were asked to brainstorm on hinge points. Literally, we referred to these as 'critical moments' where things could go wrong or where one might be able to make use of new opportunities that presented themselves (windows of opportunity). They were provided with a hand-out explaining the concept (see Appendix A2) and the discussion was guided by a series of questions. Hinge points were indicated on the timeline with red post-its. Finally, each group discussed what information might be useful to make sure these hinge points could be navigated successfully.

The day was closed with each group presenting their work, room for questions, and a discussion on the results and on the methods.



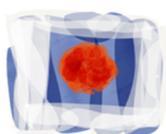
3.2. Results

3.2.1. Theme 1: Close-knit Island Community



Vision

The current residents of the Vogelbuurt neighbourhood are a mix of labour migrants and 'original' residents. There is mostly social housing, but in the ongoing urban renewal, new housing is more mixed. These newer houses are not always affordable to local residents, although social housing only is also not good for the neighbourhood. Residents hope that the composition of the Vogelbuurt won't change too much and particularly that 'shifting people around' will be avoided. There are issues with waste in the streets, and residents suggest that the municipality should invest more in improving the quality of the neighbourhood, having conversations with locals, and building support and trust. Building a stronger sense of community is seen as key. More green spaces are important for both reducing heat stress and as social meeting spaces. Sufficient parking space is also important. Residents already visit elderly, but the limits of participation have been reached.

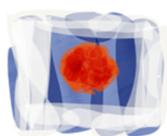


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Various options are discussed, from small to large scale. A shorter work week could allow people to spend more time to contribute to the neighbourhood. De-separating local budgets could make funding more flexible. A neighbourhood janitor is seen by both residents and policymakers as an interesting option. Such a 'professional resident' could be a central figure in the Vogelbuurt, taking care of urgent tasks, spotting issues, and facilitating people in getting more involved in the neighbourhood. This option does require a certain level of mutual trust. There are also many ideas on greening the Vogelbuurt, but this should be done in a step-wise fashion in order to maintain resident support. An awareness campaign would be useful, showing photos of Vogelbuurt streets with and without trees and corresponding temperatures. The neighbourhood's central square and school are interesting options to tackle first. Greening of these areas would reduce heat stress, make them more attractive and re-establish them as central meeting places, build trust, and showcase the benefits of green space for the rest of the neighbourhood. Offering residents help with greening, e.g. by giving them plants or trees or funding, is also interesting. Participatory management of green space currently won't work. Other suggested options dealt with changing house plot layouts (larger front door gardens for people to sit in and interact), below ground parking, car sharing, permeable parking spaces, and a small scale 'sustainability factory' producing biofuel.



Figure 3.2. Vision for Dordrecht Vogelbuurt 'Close-knit Island Community'.



Scenarios

The options were evaluated on essentiality and timing, and placed on the timeline. Several storylines became visible. One involved neighbourhood management by removing barriers between smaller budgets, investing in basic neighbourhood quality and neighbourhood janitor, eventually leading to a 'neighbourhood budget' (medium term) and participatory management of green spaces (long term). Similar lines evolved around co-management and sharing of public space, green spaces, cars, et cetera. However, these first required trust-building and creation of a stronger sense of community in the neighbourhood. A 'green storyline' detailed short term options such as planting some trees and awareness campaigns, to more medium term tasks such as greening the central square and other parts of the Vogelbuurt.

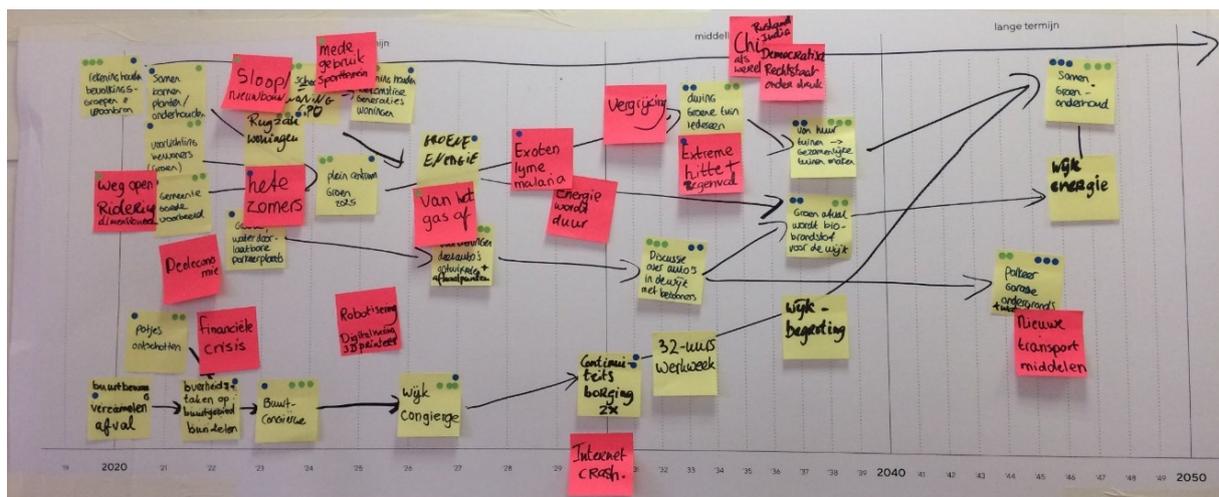
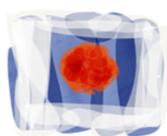


Figure 3.3. Scenarios and hinge points for Dordrecht Vogelbuurt 'Close-knit Island Community'.

Hinge points

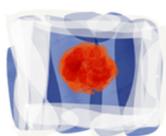
Most hinge points were found at the short and medium term. A short term one was *public roadworks*, for example for *sewer renewal* that will soon get started. This is a moment where you could create some space and quiet for kids to play and for people to experience the benefits of less cars in the neighbourhood. Another *financial crisis* and *further robotization of the labour market* would result in less work being available, but also perhaps giving people more time for



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participation and community work in the neighbourhood. *A further growth of the sharing economy* could increase options such as car sharing, central points for package deliveries, and similar. In many parts of the Vogelbuurt, *old houses will be demolished*, providing an opportunity to tackle multiple options and challenges at once. Within several years, the *local sport facilities become multi-functional/multi-use*, allowing for social activities and sharing initiatives. *National policy trends* such as *increasing energy tariffs and prices*, and *decoupling housing from the public natural gas network*, could force cities and neighbourhoods to hasten the shift to sustainable energy, which in turn might lead to more support for local energy initiatives. *Increasing population aging* is mentioned as a potential risk, reducing the ability of residents to take care of their gardens. Another risk is formed by *climate change-related invasive species* (in connection with gardens, green spaces), which might impact public health, potentially reducing support for greening options.

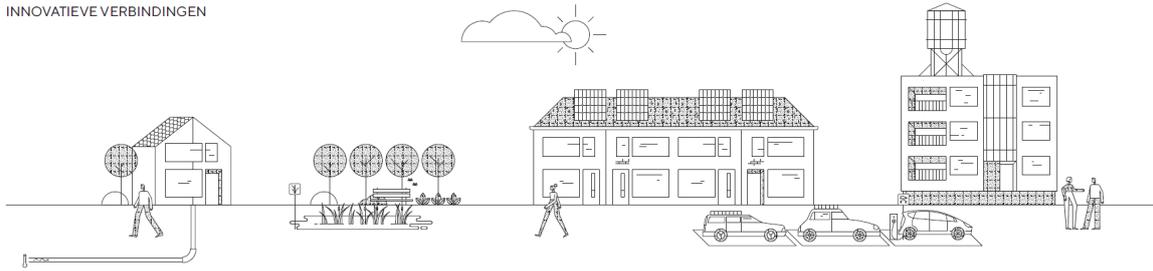
Several long term hinge points are discussed, but participants find these more difficult. *More frequent extreme weather events*, such as *very hot summers resulting in many deaths*, might hasten greening measures. *Extreme rainfall events* might impact sewer design and other water storage and discharge options. A policymaker also suggests that *increasing digitalization and robotization* (e.g. new means of transport, 3D printing) might lead to alternatives for car use, which would make the proposed underground parking garage a bad investment. Furthermore, a *crash of the internet* and the *emergence of new international powers* (e.g. China) could impact the democratic state in Europe, with possibly both negative (reduced democracy) and positive (more attention to the neighbourhood level) local impact. A *dike breach* is also mentioned as long term hinge point, but residents and policymakers have very different views on the chances and potential timing (e.g. residents saw this as possibility before 2050, policymakers did not).



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3.2.2. Theme 2: Innovative Connections

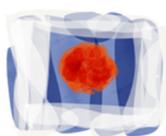
INNOVATIEVE VERBINDINGEN



Vision

Participants discuss the geography of the Vogelbuurt using the CAS tools; the maps and the issues they show are very recognizable: some blocks with older buildings that experience subsidence and have wooden foundation piles, and several streets with very low-lying gardens that experience issues with flooding. Residents, policymakers and researchers discuss what ‘innovative connections’ might mean. They conclude that this is about many things: interlinking issues, but also about connecting people, technologies, ideas, etc. About multi-functional choices and directions, working in an integral way, improving collaboration, clearly dividing responsibilities, and using technology for monitoring problems and for connecting people.

Local freshwater storage on rooftops (shown in the starting design above) might be an option but only for peak demand or watering gardens. There are football fields at the edges of the Vogelbuurt that could be used for water buffering during heavy rain. At the moment, there are few green spaces and green options; residents have little time and interest in maintaining them. In the future, more might be possible. E.g. the Vogelnest (neighbourhood centre ran by local social entrepreneurs and volunteers) could adopt gardens or trees. Shared use and sharing of produce in a neighbourhood vegetable garden might also help build mutual trust between residents, along with reducing heat stress and increasing permeability of the soil to rainwater. Rooftops might function as green



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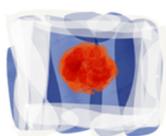
space, community gardens, or heat collectors (warming water through sunlight). Residents suggest reducing space allotted to cars and implementing one-way traffic, to make space for other uses, for instance, gardens. Dordrecht is also working on making connections with climate mitigation issues, for example through heat networks and collecting heat from surface water.



Much discussion is devoted to technological options, such as smart systems, collecting local data, measuring flooding and similar issues through sensors in streets, streetlights, cars and buildings. Participants brainstorm on ideas for apps that could exchange data and provide social connections or resident-municipality connections. Dordrecht already uses a municipal app through which residents can report problems (loose street tiles, broken streetlights, etc.). Water problems and heat could be added. Neighbourhood or community apps and social media might provide options as well. Social challenges are also a prominent point.

Vogelnest already functions as a social facility and contact point in the neighbourhood, connecting residents and could help out with communication, community work, or data collection. It can (and does) also provide an easy connection between residents and municipality.

Economic options seem less of a promising or important option. One suggestion is to hire someone to manage or facilitate several of the options suggested above, such as green spaces, community gardens, placing solar panels and maintaining these. This mirrored the discussion on a neighbourhood janitor in the other subgroup.



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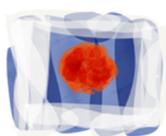


Figure 3.5. Scenarios and hinge points for Dordrecht Vogelbuurt 'Innovative Connections'.

Hinge points

The *design of integral city and neighbourhood plans* themselves form key hinge points. It is essential that it is clearly established and detailed within city and neighbourhood plans how this integral approach should take place. This makes it less sensitive to changes in the political mood over the years. Participants wonder if integral ways of working also increase public support for these plans. Similarly, *establishing how the plans account for potential surprises* and how surprises might be managed is important. For successful plans, *potential changes in EU and Dutch laws, regulations and subsidies* is crucial. These determine to what extent it will be possible (and allowed) to work in an integral way, how you can stimulate or enforce this, and what the boundary conditions will be.

Potential changes in demography are important for the housing challenge are important for housing challenges, though participants see major demographic changes as unlikely. *Major urban renewal* (demolishing and rebuilding of social housing) is currently taking place. Dordrecht also faces a *housing task of building 10,000-15,000 new houses* within current city limits between now-2030. Economic changes, such as *economic crises, economic prosperity*, and the *emergence of new economic concepts such as the sharing economy* are important for how well the plans might be implemented and by stimulating collaboration between the municipality and the neighbourhood. In general, *collaboration (and successes and failures of this)* is important for implementation of integral plans and division of



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responsibilities. *Moments of interaction between the municipality and neighbourhood* and *moments when the connection of the plans with the neighbourhood needs to be realized* are critical moments. If the plans don't account for what residents want and need, local support will fail.

Large scale processes such as accelerated sea level rise, determine whether the integral plans will turn out achievable and sufficient. *Changes in the economic or political tide* also impact availability of funding for measures and implementation of the plans. *Shifts in societal acceptance of risks* can and do take place.

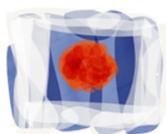
There are also many positive hinge points. For example, *'small disasters' and disruptions* might provide a window of opportunity to accelerate action on adaptation, mitigation, collaboration, and other practical work. An example is a new *oil crisis*, which might accelerate the switch to renewables.

For all data and technology-related options, privacy is a key concern. *Changes in public attitude towards privacy*, and *changes in privacy laws* strongly impact what can be done with technology and what people want to do with it. These are currently already changing rapidly. Similarly, other *societal debates on technology*, as well as *biases in technology and data analysis* (e.g. discrimination embedded in algorithms) could impact the use of technology and data. The *emergence of Artificial Intelligence* can similarly impact this.

3.3. Reflection

3.3.1. Methodological reflection

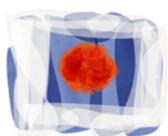
The creative exercise, 'cutting and pasting' the future vision of the Vogelbuurt streets, was well received by participants. While they needed some time to get into the exercise, and the moderators had to lead and tease out the ideas at first, all participants could and did contribute. Participants quite appreciated that the visioning exercise was already quite concrete (compared to visions that are just vague notions or outlines of what the distant future might look like) and that we



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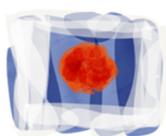
moved to practical options fairly quickly. Participants also liked the interaction between residents, policymakers and researchers. All groups felt that they learned much from this interaction. The two new tools were also appreciated. Policymakers appreciated the KNMI tool, which provided information in a format that they had long been looking for. Residents appreciated the CAS tool, which showcased climate vulnerability information in a very recognizable way. Discussions using the tools immediately linked to things people experienced in the neighbourhood or knowledge that they had regarding the houses, gardens, or residents at locations that were indicated as vulnerable to a particular impact. Participants understood what we asked from them during each step of the workshop, and the process and explanations were clear. The logic behind the steps was clear. Participants indicated that they managed to do a lot of work in the time they had. They had diverging opinions on what was the most difficult step (most often mentioned: visualising the future vision, and assigning hinge points), and what was the most useful step. They all agreed that this type of workshop helped to start a conversation between different actors and facilitated residents to think about the future of their neighbourhood.

One challenge was assigning actual years to measures and hinge points. While the process of placing measures on the timeline was fast, it quite often led to further discussion on exact years. The options and views also ranged from very concrete to more rough plans or proposals. The latter needed further details to place in a specific year. Many measures were labelled as 'medium term', but dated well before 2030 (our interpretation of medium). This could simply be a difference in opinion on what constitutes medium term. However, several options were shifted around between short, medium, long term after redefining what they would entail. The exercise did provide sufficient room for those discussions. Most measures could be placed at intervals of 5 or 10 years.



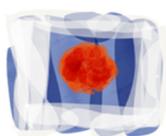
D2.2. Incremental Scenario Case Studies

The hinge point exercise also went very smoothly. After some examples, people understood what they involved and could brainstorm on hinge points for their plans and the neighbourhood in general. In both groups, many (but not all) hinge points related to large scale processes, at national, EU or global level. These cannot be influenced locally, but one can prepare for them. Many local hinge points seem to be short term, related to short term options and developments. In the long term, large scale processes and events were dominant. One could speculate on the reasons (e.g. short term more easy to imagine locally, whereas large scale external events and processes are more imaginable in the distant future?). However, one might also argue that there are important local hinge points at the short-medium-long term that relate to these large scale processes. For example, if shifts in privacy laws and public attitude to privacy (Innovative Connections) is an external hinge point, an internal hinge point would be the design stage and actual implementation of the local smart-tech options and whether those designs are very privacy-sensitive or not. In other words, local and non-local hinge points can be interrelated. It is also possible that it will be easier to spot local hinge points when a more defined plan has been developed. The exact form and implementation of the measures is not yet clear. These matter to how and when things might go wrong. Both groups found hinge points in all four quadrants of our matrix (local/not-local and climate/non-climate hinge points). Also noteworthy was that both groups managed to inventory negative as well as positive hinge points (windows of opportunity). Participants appreciated that we also looked at such instances where you can make use of new opportunities that present themselves. It was also quite easy to link the hinge point exercise with a brainstorm on potential information needs. Participants easily grasped the connection between the two, and developed a portfolio of needs (see below). During the final discussion, participants noted that the time duration of such a workshop was quite a challenge. The approach taken by the Dutch team was to



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involve many people in the narrative interviews (WP1), and then build on this material with a smaller group during the workshop (WP2). The smaller group and long duration (6 hours) meant that focused, in-depth discussion and interaction was possible, but also that fewer people were able to participate. Other options might be to split it up into multiple shorter sessions (downside is that the participants almost certainly differ between sessions, reducing consistency, overview, and sense of ownership), or complementing it with a shorter follow-up session on concrete situations in the neighbourhood. Studio Lakmoes has since designed a setup for a 'flash workshop' (ca. 1 hour) that could be attached to a local event to involve a large group of residents. It focuses mainly on brainstorming options/measures that could be taken. We are looking into options to run such a session. Another potential reason for relatively low participation of residents was that there is much distrust in the neighbourhood in 'the system' (i.e. government), as well as many more challenging problems (e.g. unemployment), meaning that the average resident is unlikely to cooperate in a process such as this. Participating residents were all connected to the Vogelnest neighbourhood centre. For such an 'intermediary' between government and neighbourhood, a scenario workshop worked well. There is clearly a trade-off between the ability to run an in-depth transdisciplinary session (which takes time to discuss things properly), especially on more challenging notions such as hinge points, and the ability to involve large numbers of people from the community. In the end, residents did feel that they learned much from the interactions (between residents, policymakers, researchers), were working on the neighbourhood, and could actively shape local adaptation plans and have impact on policy through this workshop. However, some aspects could benefit from more participants, such as the option scan or further reflection on where certain options might result in problems or run into obstacles in the neighbourhood. Follow-up work will be beneficial. When the CoCliServ Incremental Scenario



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Approach will be applied in later projects, e.g. by scientists, consultants, or municipalities, it will also be useful to reflect on what steps might be possible to do through desktop research or workshop with the program team, and which parts would benefit most from participation (in what form, with what level/numbers) of specific groups within the community.

3.3.2. Knowledge needs

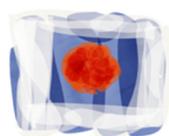
Participants noted that much information on climate change in the Netherlands is available (e.g. Van Minnen et al., 2013; KNMI, 2014, 2019a,b; Klimaateffectatlas, 2019). However, other needs for knowledge and climate services might be present. For each theme, participants reflected on potential knowledge needs.

For *'Close-knit Island Community'*, residents requested visualisations of the neighbourhood that showed climate change impacts and made these more tangible to local residents. For instance, images of streets in the area with and without trees and the impact of that on local temperatures (cf. urban heat islands, heat waves). Communication should not focus only on 'doom stories', but be used primarily to create support for potential options: 'we're improving the neighbourhood, these are our plans'. Visuals of situations where no action is taken also help.

Information on future energy prices is important to show the impact of sustainability measures and the cost of not improving energy efficiency.

According to participants, this could highlight that the future energy bill might be higher than the rent. Future price estimates of hot summers, invasive species and dike breaches could also be useful.

Information on invasive species (plants, animals; e.g. oak processionary caterpillar, highly allergenic plants, etc.) is useful for people planning what to plant in their gardens. Which garden options worsen the situation and are better avoided, and which improve local biodiversity?

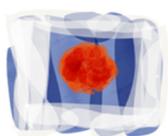


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For *'Innovative Connections'*, participants indicated that a very important need is on information on political trends, social trends, and legal issues. Examples were given on changes regarding energy, water, privacy, and technology (sensors, data analysis, smart applications, artificial intelligence). How might these broader legal-political changes impact our plans for adaptation? Information on the (potential) political and social sensitivity of options is also important.

A second group of needs deals with information that helps the Municipality and neighbourhood prepare for disasters and surprises. For example, probability and risk estimates of flood events and related scenarios (e.g. failure of the Maeslant storm flood barrier in Rotterdam, which impacts Dordrecht). Similarly, more information is needed on the potential impacts of certain types of disasters, disruptions, and incidents on the neighbourhood and city scales. For example, specific local vulnerabilities and vulnerable locations in a neighbourhood. Insight into the impact of options would also be needed. It is also important to have information on 'small disasters' available. Relatively small disruptive events can be a window of opportunity to discuss the future situation and potential options. In that case, information on how such events will change in the future (frequencies, probabilities, impacts) and what might be done to what effect, should be at hand so that it can be used in information and communication.

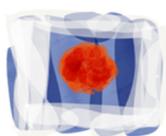
Important questions for the residents and policymakers where: how sensitive is the Vogelbuurt to water-related issues (now and in the future)? What do people find acceptable and what not (info on acceptance and perception of risks (but also of options))? E.g. how long should streets be allowed to remain flooded? Local wishes, desires, and acceptance of specific risks and options are an important information need. These can also change strongly over time, and also depend on whether people know how to deal with such impacts (e.g. if people know what to do in case of flooding, flood risk acceptance may be higher).



4. Case Study: Jade Bay, Germany

4.1. Case introduction

From the beginning, the Jade Bay case study followed an open approach. During a one-year field work (cf. Krauß, 2020), I tried to figure out where CoCliServ might fit in, what the needs of the local population are and what kind of scenario exercises might fit best to co-produce new forms of place-based climate services for action. There is already a lively infrastructure of civic activities, but there was no obvious entry point for bringing in scenario exercises. This changed when I attended a workshop in Wilhelmshaven, which was organized by a regional cultural organization. The question asked was how the coastal population imagines the future of the Jade Bay area in the year 2050. In this workshop I learned that there is a public demand for an arena where citizens concerned about climate change can express their opinions and find new ways to make their matters of concern part of the democratic process. Together with the North German coastal and climate office (WP3), we organized a similar workshop in the coastal village of Dangast, where we asked people to imagine how a climate friendly coastal area might look like in the year 2030. While we failed to organize a follow-up workshop in Dangast, I was invited by a regional NGO to participate in the organization of a workshop in Westerstede, following the same concept which we had developed for Dangast. Here, we asked similar questions, but with a follow-up workshop in mind and the intention to integrate local visions into municipal and regional politics. In the following, I will introduce into the Jade Bay area and describe in detail the setting, preparation and realization of the three workshops. In the second part I will present some of the results and hinge points and add some concluding thoughts in the last part.

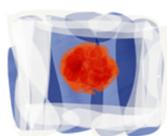


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4.1.1. Case study situation

The Jade Bay (Jadebusen) is situated in Northern Germany, in Lower Saxony, between the deltas of the rivers Weser and Ems and the port cities of Bremerhaven and Wilhelmshaven. The case study and respective scenario exercise of WP1 cover the districts of Wesermarsch and Friesland, as well as the neighbouring districts of Wittmund and Ammerland. This coastal landscape is the result of the interaction between the sea and human land reclamation during centuries. The Jade Bay is contained by an uninterrupted line of dikes, as is the rest of the coast. The coast is highly vulnerable to the effects of climate change; as a response to sea level rise, the dikes are elevated to make them climate proof until the mid or end of the century. The flat land behind the dikes, which had been flooded by severe storm floods between the 12th and 18th century, is a drainage area. Due to centuries of land use, it is getting more and more difficult to get the water off the land and into the sea. Main industries are energy production (mostly wind energy, biogas, photovoltaic, coal plants in Wilhelmshaven), industries, and agriculture. The wet winter of 2017 / 2018 and the dry summer of 2018 imposed major challenges for the infrastructures; in winter, farmers had difficulties to get the manure onto the fields, and during the dry summer, pastures went brown and cattle had to be sold. Both weather extremes were interpreted as effects of climate change.

My research is focused on local perceptions of climate change, its effects and on the measures taken to face this challenge. I followed the traces of climate change in local politics, in administrations, in dike protection associations, in agriculture, tourism, spatial planning and in everyday life. Climate change is omnipresent in daily talk, manifested in form of the energy transition (wind turbines etc), and increasingly as a topic in local and regional politics, administration and civic activities. For example, regional and municipal climate managers are established (which is a contested issue in municipalities such as Varel); there is a shift from



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nature to climate change in some established nature conservation NGOs such as the Nabu or BUND; climate activities are initiated by Agenda groups (a concept originating from the Rio summit in 1992); and there is a citizens' initiative in the tourist zone of Dangast and so on.

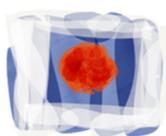
My interlocutors in the diverse fields of coastal society showed great interest in CoCliServ. As a consequence, I participated as an observer in ongoing activities and slowly developed activities of my own to establish a new form of public debate about climate change as suggested by CoCliServ.

4.1.2. Preparation, setting and realization of scenario activities

In the past year and a half, I actively participated in and / or organized three different workshops including scenario exercises about climate change and the future of the coastal Jade Bay area:

1. on November 30th 2018, I participated actively in a workshop about climate change in the Oldenburg – Jade Bay area in Wilhelmshaven, organized by the *Oldenburgische Landschaft*, a regional cultural organization;
2. in May 2019, I organized together with my colleagues from Helmholtz, Insa Meinke and Birigt Gerksenmaier, a workshop about “Global challenges – local answers” in the coastal village of Dangast, and
3. on December 6th 2019, I organized in the municipal town of Westerstede the first of a two - or more step workshop together with activists of the NGO BUND Ammerland (a regional branch of the largest nature conservation association of Germany).

The three workshops represent an incremental process which originates from my presence in the area and from my own initiative, together with Helmholtz in the second and the NGO BUND in the third workshop. Furthermore, each of the workshops was based on the experience of the previous one. This incremental process is maybe the main experience of these experiments of co-production; it is not finished yet, there will be at least one or more follow-ups to the last workshop in Westerstede.



D2.2. Incremental Scenario Case Studies

Workshop 1: “The Oldenburg landscape in the year 2050 – Climate change”

The *Oldenburgische Landschaft* is a cultural organization which was founded in 1961. It is a reminiscence to the previous existence of the Oldenburger Land, which once was a political unit until 1946. Today, it covers among others the districts of Wesermarsch, Friesland and Ammerland. In December 2018, the *Oldenburgische Landschaft* organized a public workshop with the title “The Oldenburger Land in the year 2050 – climate change”.

In the invitation, the organizers called into mind a spectacular idea from the beginning of the 20th century: what might happen when the mouth of the Jade Bay were closed by a dam and the Jade Bay would run dry completely? It could be turned into a place for sport activities or for a futuristic expansion of the city of Oldenburg, for example (see invitation letter below).

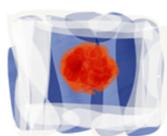
The workshop asked about today’s visions, about how climate change will change the landscape and, consequently, our development. The main questions were:

How do we want to live in future? How will the Oldenburger Land look like? Which developments will shape our future? The main areas to be addressed were coastal protection, spatial planning and water management.

The workshop was organized as follows:

First, there were four invited speakers: the head of the administration for water management, coastal and nature protection; a biologist from the Carl von Ossietzky University Oldenburg, a spatial planner from the administration for regional development, and the director of the National Park and UNESCO world heritage Lower Saxony Wadden Sea.

After their presentations, the audience of about 45 people were split into two discussion groups, where the future of the *Oldenburgische Land* was discussed; main ideas were written on yellow cards. Each group had a moderator who



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pinned the cards on a whiteboard with the and presented the results of the discussion to the plenary.

The workshop was attended by about 45 persons, among them representatives of regional and local cultural organizations and NGOs, as well as interested citizens. The discussions were very lively; in the group that I participated in, the moderator strongly structured the debate and prevented people from talking too much about their specific points of interest. Several weeks after the workshop, the organizer, the *Oldenburgische Landschaft*, sent a short summary of the event to the participants.

Einladung
Das Oldenburger Land im Jahr 2050 – Klimawandel

Anfang des 20. Jahrhunderts dachte man darüber nach, den trockengelegten Jadebusen als Sportplatz zu nutzen oder mit Schwebebahnen in der Hochhausstadt Oldenburg voranzukommen.



Worüber denken wir heute nach? Wie wird der Klimawandel unsere Landschaft verändern, und damit auch unsere Entwicklung?

Die Oldenburgische Landschaft möchte mit Ihnen über die Zukunft des Oldenburger Landes sprechen.
Wie wollen wir in Zukunft leben? Wie wird es im Oldenburger Land künftig aussehen? Welche Entwicklungen werden uns in der Gestaltung unsere Zukunft beeinflussen?

Wir laden Sie ein, mit uns zu den Bereichen **Küstenschutz, Raumplanung und Wasserwirtschaft** zu diskutieren, zu planen und abzuwägen:

Termin: Fr., 30. November 2018
Zeit: 15:00 bis ca. 19:00 Uhr
Ort: Wattenmeerhaus Wilhelmshaven, Südstrand 110B, 26382 Wilhelmshaven

Impulsgebende Sprecher werden sein:

- Ute Schlaumann vom Niedersächsischen Landesbetrieb für Wasserwirtschaft, Küsten- und Naturschutz (NLWKN)
- Jens Spiekermann von der Carl von Ossietzky Universität Oldenburg, Institut für Biologie und Umweltwissenschaften
- Bernhard Heidrich vom Amt für regionale Landesentwicklung (Arl) Weser-Ems, Raumordnung und Landesplanung
- Peter Südbeck von der Nationalparkverwaltung Niedersächsisches Wattenmeer



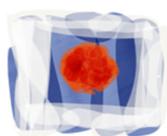
Es wird um Anmeldung bis zum 26. November 2018 gebeten an:
Sarah-Christin Siebert
Oldenburgische Landschaft
Gartenstraße 7
26122 Oldenburg
Telefon 0441- 77 91 8 - 0
Telefax 0441 - 77 91 8 29
E-Mail: siebert@oldenburgische-landschaft.de

Hinweis: Es folgen noch weitere Tagungen unter dem Titel „Oldenburg 2050“ mit anderen Schwerpunkten im nächsten Jahr.

Figure 4.1. Invitation to the Oldenburgische Landschaft meeting.

Workshop 2 “Climate Change at the Jade Bay – global challenge, local answers”

Based on the experience and the structure of the Wilhelmshaven workshop, on May 16th 2019, I organized together with the “North German coastal and climate office” (WP3, Birgit Gerkenmeier and Insa Meinke), a workshop with the title “Climate change at the Jade Bay – global challenge, local answers”. The Climate Office invited some of the administrators and (potential) climates of their service,



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and I invited people that I had interviewed in the course of my field work. In the end, about 30 people showed up, among them two mayors, a pastor, spatial planners, administrators, farmers, members of NGOs and a citizen initiative, the National Park director and the tourist manager of Dangast, and other interested citizens.

The event was split into two parts. In the first part, I introduced CoCliServ and our intention to bring together scientific and local climate knowledge to produce place-based climate services for action. Insa Meinke introduced in her presentation into the scientific basics of global climate change and presented in the following the already measured and anticipated effects of climate change for the region. This presentation was followed by a lively discussion, where people expressed their concerns from their respective perspectives.

In the intermission, participants were invited to discuss the tools of the North German climate office.

The second part consisted of a structured discussion. We provided the following task: "Imagine we live in the year 2030, and the Jade Bay region has accomplished the reduction of 50% of carbon emissions and other climate goals. How did we achieve this?"

The discussion was structured in four parts, following a 1-2-4 model: (1) each participant takes notes by him- or herself; (2) each participant chooses a partner to discuss the ideas as a pair; (4) each pair chose another one to discuss their ideas, to write the results down and to presented the results to the plenary.

This exercise was followed by a final discussion. Each part lasted more or less two hours, including a break of half an hour. Even though we had promised to send a documentary to the audience, we as organizers failed to do so, and this workshop had no follow-up.



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Einladung zur Veranstaltung

„Klimawandel am Jadebusen – globale Herausforderung, lokale Antworten“

Der nasse und stürmische Winter und die darauffolgende Dürre im heißen Sommer 2018 haben auch am Jadebusen einen Eindruck davon gegeben, wie sich Klimaveränderungen regional auswirken können. Obwohl der Klimawandel ein globales Problem ist, manifestiert er sich an jedem Ort anders und erfordert unterschiedliche, lokale Antworten. Daher stellt sich die Frage: Was sind die Auswirkungen des Klimawandels auf die Küstenregion, und welche Antworten gibt es darauf, an der Schnittstelle zwischen Weltklimarat und Gemeinderat, zwischen Klimaforschung und regionalem Wissen über die Küste?

Im Rahmen eines europäischen Projektes suchen wir nach Möglichkeiten, wie Wissenschaft, Politik und Gesellschaft gemeinsam ortsbezogene Klimastrategien entwickeln können. Wir, das sind das Norddeutsche Küsten- und Klimabüro (Helmholtz Zentrum Geesthacht [HZG]) und das artec Forschungszentrum Nachhaltigkeit von der Universität Bremen.

Ziel unserer Veranstaltung ist es, Wissenschaft und Menschen aus unterschiedlichen gesellschaftlichen Bereichen miteinander ins Gespräch zu bringen: Was können wir tun, was müssen wir tun, um eine klimafreundliche und lebenswerte Küstenlandschaft am Jadebusen zu schaffen?

Wenn es um den Klimawandel geht, sind wir alle gefordert und sind wir alle Experten. Wir laden Sie daher herzlich zu unserer Veranstaltung in Dangast ein, gemeinsam mit uns diese Fragen zu diskutieren.

Datum: Donnerstag 16.Mai 2019
Zeit: 14:00 bis ca.18:00
Ort: Weltnaturerbeportal Dangast
Edo-Wiemken-Str. 61
2316 Varel/Dangast

Programm

- Einführung:** „Gemeinsame Entwicklung von ortsbezogenen Klimaservices for action“, Dr. Werner Krauß (artec)
- Vortrag:** „Überblick über die veränderten Klimabedingungen an der Nordseeküste“, Dr. Insa Meinke (HZG)
Mit anschließender Diskussion und der Möglichkeit, die Angebote des Küsten- und Klimabüros zu testen
- Diskussion:** Lokaler Klimawandel am Jadebusen: Erfahrungen und Perspektiven aus der Region

Um eine Anmeldung bis zum **02.Mai** 2019 wird gebeten an:
Birgit Gerkenmeier (Norddeutsches Küsten- und Klimabüro):
birgit.gerkenmeier@hzg.de oder 04152 87 1558

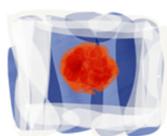


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Figure 4.2. Invitation letter to the Dangast meeting.

Workshop 3 “Climate change in the Ammerland – what can we do?”

After the Dangast workshop, a participant, Susanne Grube, the head of the NGO BUND Ammerland, invited me to co-organize another workshop in Westerstede, in the district of Ammerland (which is neighbouring the district of Friesland). The Dangast workshop served as a role model for this follow-up workshop in a different setting. Susanne Grube announced the workshop publicly during her speech as an activist at the occasion of the FridaysforFuture demonstration in Oldenburg. The BUND Ammerland provided the location in Westerstede and



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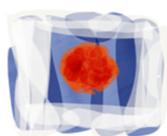
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organized the invitations. On the 20th of September, about 60 people attended the workshop. We also had asked Insa Meinke from the “North German coastal and climate office” to present again on this workshop, but she was not available.

In the first part, I introduced into the workshop with a short contribution entitled “Climate protection needs climate democracy”, followed by a ppt presentation by Susanne Grube about global climate change and its effects in the North Sea area of Lower Saxony, on a scientific basis.

In the second part, we followed the script of the Dangast workshop, except that we provided seven different themes: energy, mobility, nutrition, health, land use, water and habitation. After taking notes individually and discussing them with another person, people chose one of the topics. Across the room, we had prepared whiteboards and yellow cards; each one with a moderator from the organizing team. Participants had 20 minutes time, after that they could switch to another topic for 20 minutes. In the end, the moderators presented the results to the plenary.

Different to the previous workshops, there was no final discussion of the topics. Instead, we discussed how to proceed to the next step: we decided that the moderators will work out the results from the respective themes, with the help of interested participants, in order to make them presentable to the administration and local politics. In a follow-up workshop in January or February, representatives of both institutions will be invited to discuss the results. The intention is to establish an arena to complement



D2.2. Incremental Scenario Case Studies



Einladung zur Veranstaltung

„Klimawandel im Ammerland – was können wir tun?“

Anlässlich der weltweiten Demonstrationen für den Klimaschutz am 20. September 2019 hatte der Bund für Umwelt und Naturschutz (BUND) Ammerland in Westerstede die Organisation eines Treffens aller Interessierten in Aussicht gestellt, um konkret über Klimaschutz im Ammerland zu diskutieren und Vorschläge zu erarbeiten. Der Klimawandel ist ein weltweites Problem, das sich an verschiedenen Orten jeweils unterschiedlich auswirkt. Der Nordwesten zählt dabei zu den besonders verwundbaren Regionen Deutschlands.

BUND Ammerland und artec Forschungszentrum Nachhaltigkeit, Universität Bremen, laden zu einem ersten **Klimamarkt** im Ammerland ein. Dabei sollen gemeinsam ortsbezogene Lösungen gesucht, entwickelt und diskutiert werden.

Nach einem kurzen Überblick über die möglichen Folgen des Klimawandels im Nordwesten und im Ammerland sollen im anschließenden Workshop Menschen aus verschiedenen Bereichen und mit unterschiedlicher Lebenserfahrung miteinander ins Gespräch kommen. Mit dem Sachverstand und der Erfahrung der Teilnehmer*innen wollen wir themenbezogen herausfinden, wie eine klimafreundliche Zukunft im Ammerland konkret gestaltet werden kann. Wir fassen die Vorschläge zusammen und diskutieren sie bei einem Folgetermin gemeinsam mit Vertreter*innen aus Politik und Verwaltung. Ziel ist ein konkretes Handlungskonzept für den Klimaschutz im Landkreis Ammerland.

Datum: 9. November 2019

Zeit: 14 bis 18 Uhr

Ort: Jaspershof, Zum Stiftungspark 27 (Navi: Seggenriedenweg), 26655 Westerstede

Programm

Einführung: „Klimaschutz braucht Klimademokratie“, Dr. Werner Krauß, artec Zentrum für Nachhaltigkeit, Universität Bremen

Vortrag: „Klimawandel im Ammerland?“, Dipl. Biol. Susanne Grube, Vorsitzende BUND Ammerland

Workshop und Klimamarkt: Austausch von Erfahrungen und Aspekten zum Thema Klimaschutz im Ammerland

Resümee: Zusammenfassung der Ergebnisse und Ausblick

BUND Ammerland und artec freuen sich über zahlreiche Interessierte. Die Teilnahme ist kostenlos. Für Getränke und Kuchen ist gesorgt. Da die Plätze begrenzt sind, ist eine formlose Anmeldung bis 3. November erforderlich unter info@bund-ammerland.de.

Erste Ideen für eine klimafreundliche Stadt

UMWELT Reger Austausch beim Workshop in Westerstede – 60 Teilnehmer

NWZ
12.11.19

VON HILDBURG LOHMÜLLER

WESTERSTED – „Westerstede wird eine Klimastadt“, „Auto-freie Innenstädte“, „Keine neuen Industriegebiete im Ammerland“, „kompletter Verzicht auf Plastikverpackungen bei Lebensmitteln“ – diese und viele weitere Ideen wurden am vergangenen Samstag beim ersten Klimamarkt zusammengetragen. Susanne Grube, Vorsitzende des Bundes für Umwelt und Naturschutz (BUND) Ammerland, und das Forschungszentrum artec von der Universität Bremen hatten zu dieser Auftaktveranstaltung in den Jaspershof eingeladen.

Rund 60 Teilnehmerinnen und Teilnehmer interessierten sich für den Workshop zum Thema „Klimawandel im Ammerland – Was können wir tun?“ und erarbeiteten in Kleingruppen verschiedene Themenvorschläge. „Wir haben die Visionen vorgegeben, wie ein klimafreundliches Ammerland im Jahr 2030 aussehen kann“, erklärte Susanne Grube den Workshop, der in



Erster Klimamarkt in Westerstede: Susanne Grube erläutert die Themenvorschläge für den Bereich „Wasser“. Die Resonanz war sehr positiv.
BILD: HILDBURG LOHMÜLLER

sieben Themenfelder unterteilt war. Die Oberbegriffe Flächennutzung, Wasser, Bauen und Sanieren, Mobilität, Energie, Ernährung und Gesundheit füllten die Teilneh-

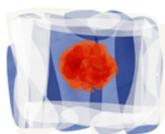
mer, die sich jeweils nach ihren eigenen Stärken für einen Bereich entschieden hatten, mit Ideen und Vorschlägen.

„Zunächst hat sich jeder

seine eigenen Gedanken gemacht, dann im Zweiergespräch diskutiert und schließlich in der Gruppe die Vorschläge zusammengetragen“, so Susanne Grube, die positiv überrascht war von der guten Beteiligung. Das Ergebnis der einzelnen Gruppenarbeiten wurde von jeweils einem Sprecher oder einer Sprecherin abschließend vorgetragen.

Die Themenvorschläge seien sehr bodenständig und realisierbar, freuten sich Susanne Grube und Dr. Werner Krauß, Wissenschaftler von artec.

Die Teilnehmer mit überwiegend älterer Altersstruktur, aber auch einige junge Gäste, hätten intensiv mitgearbeitet und zu einer guten Gesamtstimmung beigetragen. Insgesamt sei noch viel allgemeine Aufklärungsarbeit erforderlich. Die erzielten Ergebnisse sollen nun ausgewertet und zum zweiten Klimamarkt, etwa Anfang 2020, vorgestellt werden. „Dazu werden wir auch die Politik einladen“, verkündete Susanne Grube.



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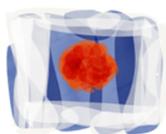
4.2. Results

4.2.1. Scenario exercise: Wilhelmshaven

The audience was split into two large groups. Discussion time: 40 minutes. The questions for discussion were: The *Oldenburger Land* in 2050: Which developments do we want to influence / support most? How do we want to live in future?

The results of the two working groups were presented by the respective mediators of the groups and written on a blackboard, based on the yellow cards that were filled in by the participants. For the purpose of this deliverable, I list the results along the CoCliServ / WP2 terminology. The identification of hinge points results from my summary of a heated discussion in the working group in which I participated. The real crash- or hinge point is the working or better: non-functionality and impenetrability of politics on all levels, including the municipal and district level. Another argument that stuck with me was the factor of regional identity: we do not do it that way in Friesland, we did not learn it this way (in respect to more defensive ways to deal with the interaction of sea, land and climate).

	Things we can control	Things we cannot control
Climate related	<ul style="list-style-type: none"> • Climate adapted spatial planning • Intelligent water management / reservoirs • Re-sealing of soil / • Re-naturalization • Climate friendly construction • Climate-Sensitization • Reduction of energy consumption • Holistic thinking • Becoming climate neutral • Becoming renewable energy production hot spot 	<ul style="list-style-type: none"> • Sea level rise • Extreme weather events • 2-degree goal • Coal plant Wilhelmshaven
Not climate related	<ul style="list-style-type: none"> • Conservation of cultural landscape • Digitalization • Regionalization • International networking • Regional production/ 	<ul style="list-style-type: none"> • Groundwater salinity • EU policy / Agrarian subsidies • Lowering of ground level (below sea level)



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	Consuming of food • Clean groundwater	
Hinge points	Regional decision processes	Political path dependency / routine
	Regional democracy	Elections / interests
	Changing attitude towards coastal protection / land	Regional identity, traditional ways to manage land

4.2.2. Scenario exercise: Dangast workshop

Along the 1-2-4 method, the audience of 30+ people was split into five discussion groups. The results were written on cards and presented by a member of the group to the plenary. The guiding assumption was that we are in the year 2030, and that the Jade Bay region has achieved all climate goals, including 50% reduction of emissions (the official German climate goal). The question to discuss was: How did we achieve this goal? What did we do right?

In the following, I list some exemplary answers in English from the second group which listed the results under 6 different topics.

Mobility	Agriculture	Energy	Habitation	Consumation	Tourism
E-mobility; Public transport; No Autobahn; Transport on trains; Bicycle lanes	Less manure; No emissions; 10% biotopes; Renewal of farmers organisation and education	Energy saving; Power-heat coupling;	Heat insulation; Communal living; Lawn / green instead of stone	Quality over quantity; Regional products; Repairable products, Longevity of products	Arrival of tourists without cars; Soft event quality; Walking, biking

In total, the results of all groups do not differ too much from the Wilhemshaven results. Here an overview in German language (provided by Birgit Gerkensmeier):



D2.2. Incremental Scenario Case Studies

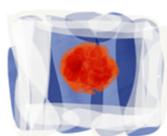
A	B	C	D	E	F
Weisse Karte / weisse Gruppe	Grüne Karten	Grüne Karten	Blaue Karten	Rote Karten	Karten, die auf Nachfrage ans Fleisum ("kühlt etwas") hinzugef.
Bürgerprojekte "Blenengemeinde Sande"	Mobilität E-Mobilität kleinräumig ÖPNV ist ausgebaut und modernisiert Gütertransport über Schiene und Wasser AZV ist beibehalten Fuß- und Radverkehr ist "in" und Städte dafür ausgebaut	Windkraft in Bürgerhand	Energetische Neuorientierung (solare Autonomie z.B.)	Kostenfreier ÖPNV alternative Konzepte	Demokratieproblem
Biogas mit Abfällen füttern	Landwirtschaft (Abschied von eingeschränktem Produktivitätsbegriff) emissionsarm, keine Gülletransporter artenreich Bauverbände haben umgedacht Lehrpläne für Landwirte sind komplett umgestellt 10% Ziel Biotopverbund sind erreicht	Deichausbau 1. Gelderöme Umlänken	Verkehrskonzepte (Beltysteme...) Carsharing	EQ Intelligente Speicherung von Ökostrom (Häuser)	Tourismusindustrie
Landwirtschaft ökologisch mit höherem Ertrag durch Intelligenz	Energie Menschen sind im Energieparan geschult - Verhalten dezentrale regenerative Energiegewinnung ist auf Normarsch Kraft-Wärme-Kopplung	Baum Dämmung / Fläche	innerstädtischer Verkehr: gleichberechtigter Nutzung des öffentlichen Raums	Emissionen reduzieren Energiewende (erneuerbare Energien) Verkehrsrückführung (Kopplung Arbeit, Wohnen)	Glück Wohlfühlen
ÖPNV Wasserstoffbusse Gaserzeugung aus Wind	Wohnen Trend zu gemeinschaftlichem Wohnen Innenbereiche sind verdichtet Grünflächen statt Scholle	E-Mobilität	minimierter Individualverkehr (z.B. H ₂ O Busse)	Vernässte Moore	Bildung
"Konzentriertes Wohnen / Leben"	Industrie Kreislaufe, Systemkartonagen	Umweltstations Offens = Kommandozentrale	Energieversorgung: Speicherung, Wind, Solar, Wasserstoff	CO ₂ Bindung	
ENERGIE leben	Konsum Konsum erfolgt regional Qualität statt Quantität langlebig Produkte reparierfähige Produkte	Biosphärenreservat = Glück	Kein Fracking	alternative Verkehrsformen (Wasserstoff) (E-Mobilität) Infrastruktur (Leihwagen) Leihfahrader Car-Sharing	
jedes geeignete Dach mit PV belegt Windenergie	Tourismus autonome Anreise es wird gewandert und radfahren sanfte Erlebnis-mobilität		Bewusstsein hat sich verändert! Regionalität gestärkt	Bio-Landwirtschaft Reduzierung Intensivtierhaltung	
Bürgergenossenschaften			50% ökologische Landwirtschaft und regionale Vermarktung	Verstärkung angefangener Projekte wurde erreicht	
			Minimierung von Individualverkehr (Vorsicht bei E-Mobilität)	Belohnungssystem für klimafreundliches Verhalten (Klimataler)	
			Flächenverbrauch minimieren Reaktivierung von Altbaugebieten	lokale Strukturen stärken	
			positiver Umgang mit demographischem Wandel (z.B. Zuzug und bezahlbarer Wohnraum)	Förderung der Biodiversität	
			innovative Bauweise und Architektur (konkret: Wasserverbrauch minimiert etc.)	Dialog gefördert gemeinsame Basis Zivilgesellschaft beteiligt	
			(nasse) Flächennutzung als CO ₂ Senke Biodiversität-Maschine	Best Practice Projekte autofreies Döngast Siedlungen (ökologisch) Wärme-Frucht-Kreuzlinie	

Hinge points

The question of hinge points was prominent on a meta-level, among the organizers. The "North German coastal and climate office" was interested in the mutual knowledge gaps between science and the participants concerning (regional) climate change. In the actual discussion, participants permanently mixed climate related and not climate related issues. For the Climate Office, the hinge point was the difference between climate related and not climate related issues, as illustrated here – from the perspective of climate science:

	Things we cannot control	Things we can control
Climate related		Weather, climate, storms, floods, energy etc...
Not climate related	Biodiversity, bees, organic agriculture, bicycle lanes, tourism, repair products, etc	

"Things we can / cannot control" in the table above refers to WP3 and "the North German coastal and climate office". WP3 focused on the knowledge gaps and local climate knowledge, while WP1 is generally interested in local statements, independently of the scientific definition of climate change. Thus, WP1 follows the political, social, economic or cultural dynamic of the statements of local



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actors, their opinions and concerns when they talk about climate change. From the Dangast workshop resulted a follow-up workshop, in a different setting and different local actors, but based on the Dangast methodology and experience, with the focus increasingly on questions of climate protection and climate democracy.

4.2.3. Scenario exercise: Westerstede workshop

The Westerstede workshop resulted from a co-operation with the head of the NGO BUND Ammerland, Susanne Grube, who had participated in the Dangast workshop. As an activist with long experience in the politics of the Jade Bay area, she was enthused by our concept to organise a public meeting. At the FridaysforFuture demonstration in Oldenburg in October she publicly announced a climate market / workshop in Westerstede, and she asked me if we want to participate and help to organize the workshop.

This workshop is intended as part of a longer process. The first workshop, which was held in November, served to collect ideas. The next workshop will be staged in January or February, with the participation of regional politicians and administrators, in order to discuss the results of the first workshop and to make more intense scenario exercises about how to put the ideas into practice or to incorporate them into the municipal agenda in some way. In the meantime, we started to analyze the results from the first workshop.

We structured the scenario exercise along seven topics, which were nutrition, health, land use, energy, water and habitation / construction.

The main question was: **How does a climate friendly Ammerland look like in 2030?**

In a separate meeting after the workshop, the group of organisers evaluated and grouped the yellow cards along common topics. A group of participants will work



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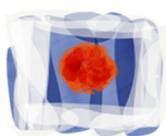
out how these intermediary results are best presented to the public and at the next workshop. Other working groups will be formed, too.



After the workshop, we listed the cards on each of these tables under common headings; this interpretative process will be refined in a meeting on December 6th in Westerstede among the organizers (see an example next page, in English translation).

We already sent a feedback letter to all the participants, and the BUND Ammerland will keep people updated via their website.

It is important to note that the participation of artec / University of Bremen and CoCliServ adds some sort of objectivity and authority to these scenario workshops; even though the BUND has a good reputation in this area, they follow a narrower agenda. Discussions among us are whether we should single out not-climate related issues, or if we follow the opinions of the participants and what they consider as climate relevant. We all agree on the importance of bringing a democratic input into municipal policies and to break up with a long-established routine. This is what I identify as one of the crucial hinge points:

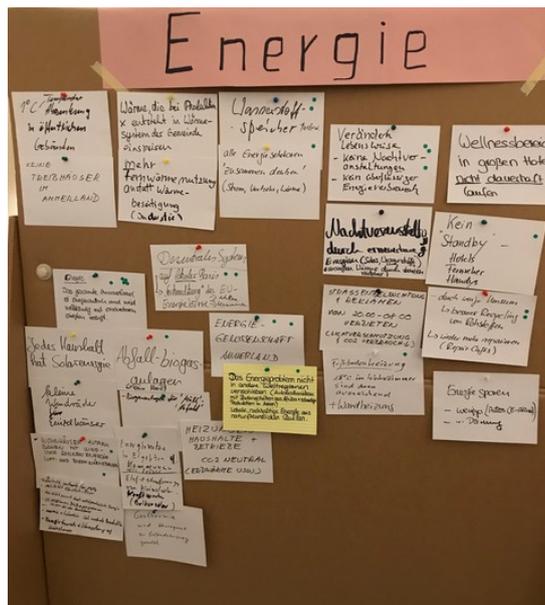


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	Things we can control	Things we cannot control
Climate related	The presentation of all climate related issues presented in the exercise	Municipal politics, administration
Not climate related		Public integration of non-climate related issues

Climate market, 9.11.2019 in Westerstede

This is how a climate friendly Ammerland looks like in the year 2030:



In 2030, the energy transition is finally accomplished. Many energy intensive areas are optimized

The Ammerland is energy independent and completely served by renewables (6 points)

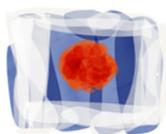
- Energy production / consumption is de-centralized on local basis. Ammerland is independent of the energy stock exchange. Energy networks are communally owned. (2 points)
- There is an energy cooperative Ammerland (2 points)
- There is no transfer or import from other world regions (i.e. batteries). Energy in the Ammerland is from local and nature friendly sources (1 point).
- All energy sectors are linked (energy, traffic, heating) (1 point)
- All people accept wind energy close by.
- Individual houses will have small wind turbines.
- Every household owns photovoltaic.
- Photovoltaic will be licensed easily, on micro-level (balcony-solar).
- Night events will be served by renewables. Does dancing produce heat?
- 20 million rooftop program – 50.000 for the Ammerland

Technological innovation of energy systems:

- Biogas from manure and garbage (no corn)
- Climate neutral heating in households and industries.
- Long distance heating will be optimized. (2 points)
- All buildings have floor and wall heating. This makes 18 degrees C enough for comfort. (1 point)
- Houses are autonomous with wind and solar. (2 points)
- Industry and trade are climate neutral.

Optimization of energy systems.

Etc.....



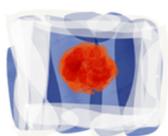
4.3. Reflections / Synthesis

The open approach to the field helped to avoid following a predefined agenda; there was a long period of anthropological field work in and about the Jade Bay region before I figured out how to apply the scenario methodology. My participation in the Wilhelmshaven workshop, which was organized by a regional cultural organization, opened my eye for a specific need in the climate debate in this area; the need for a public arena where concerned citizens can express explicitly their matters of concern. The workshop format with introductory notes followed by discussion groups turned out to work pretty well, as did the focus on visions as the guiding principle.

In the follow-up workshops, which I organized with others, my focus was on the timing, the moderation and the set-up of the discussion groups. It turned out that a (1)-(2)-(4) method is highly effective. One of the problems in the first two workshops was the report to the plenary; as it turned out, lots of content gets lost. Installing moderators for the groups, who also report, turned out to be more effective – of course, this depends on the quality of the moderators (some of them had professional moderation experience, which helps a lot).

Concerning hinge points: the differentiation between climate related and not climate related issues turned out to be a crucial point of discussion, especially among the organizers (CoCliServ, BUND) of the workshops. Who defines what is climate relevant? Climate science? Anthropology? The nature conservation NGO? Or is everything that participants suggest relevant, or, climate relevant? As an analytical category, it does not really work, exactly because of this problem: what is climate relevant and what not in the Anthropocene?

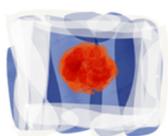
One problem of my approach is time; the project only runs for three years. People in the area are familiar with the “slash and burn” methods of science; scientists appear for a short time, mess up things, and then they disappear



D2.2. Incremental Scenario Case Studies

again. At least, this is one of the reactions I experienced. The Dangast workshop unfortunately was a negative example in this respect; participants were really disappointed that we did not follow up the route. The workshop was highly appreciated by the participants and considered as a new form of democratic intervention; but in the end, we failed to meet these expectations. The Westerstede workshop instead is, up to now, a positive example, where chances are good, that in the remaining time of the project we will achieve an incremental process and follow-up workshops with results.

The concept of “hinge points” will become more relevant when the scenario exercises will narrow down to specific issues and to the actual political process. Up to now, “hunches” were more important for the implementation of the scenario exercises with a specific public; I realized during my field stay that there is less an information need (even though the presentation of the “North German coastal and climate office” about regional climate effects was highly welcomed), but an articulation need. Municipal, regional and national politics obviously do not express the whole range of public climate concern. With CoCliServ, we can at least contribute to staging arenas where people can articulate their concerns, as a first step. The second step, the integration of these concerns in the agenda of municipal politics, will be the task for the remaining time of the project.



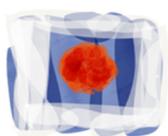
5. Case study: Bergen, Norway

5.1. Introduction

On the 19th of November 2018, researchers at the University of Bergen held a workshop with 18 diverse participants, as part of CoCliServ. The workshop built on previous research on narratives of climate and weather in Bergen city (Bremer et al., 2020), asking participants to use these narratives for building ideal scenarios of how Bergen should develop to be more resilient to climatic change by 2050. The scenarios were in turn used to plan steps toward these ideal futures, and identify the resources needed to move along this trajectory. In this way, the workshop contributed to on-going discussions about how Bergen can cope with climatic change with fresh approaches and perspectives.

The workshop had three broad goals. First, it sought to broaden the participation and thinking around how Bergen should develop over the next 30 years to be more climate resilient by 2050. Second, it sought to build visions for Bergen's future that are anchored in an appreciation for Bergen's past; the features, culture and identity that make Bergen particular. In CoCliServ, this was about linking the workshops to the narrative research. Third, it sought to identify the knowledge needed to plan for Bergen under climate change to help steer climate-related research in Bergen. In CoCliServ, this was about linking the workshops to the work on enhancing 'climate services.'

This report is about what we did in the workshop, and what we found out. Section 2 goes through the workshop activities, and discusses how well the workshop worked toward our main goals. Section 3 presents the main findings from the workshop, distilled as six main themes that participants discussed as important for Bergen's future, and a discussion on what this means more broadly for how we think about climate services elsewhere. The actual group work from the workshop is digitised and included as an appendix.



5.2. Workshop method stage by stage and critical reflections

5.2.1. Welcome and introduction to the workshop

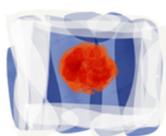
(09:00–09:30)

Workshop participants began arriving at the venue from 8.30am where they were welcomed with coffee and snacks, and could meet and talk with the facilitators and other participants. At 9.15am we convened the workshop with a short welcome by Lisbeth Iversen in Norwegian, followed by an introduction to the CoCliServ project and the workshop by Scott Bremer, in English.

The introduction started by introducing the CoCliServ project researchers present. Three researchers – Lisbeth Iversen, Scott Bremer and Anne Blanchard – worked as facilitators. In addition, Jeroen van der Sluijs moved around the three groups providing support and ensuring all groups progressed at a similar rate. There were also two overseas observers who joined Group 3: Anne De Rudder and Birgit Gerkenmeier. The introduction went on to present the role of the workshop in the CoCliServ project and how the findings would be used. It finished by explaining why participants were chosen and encouraged them to embrace an open, creative and critical attitude to the day's work.

5.2.2. Group composition and facilitation style

Participants were then asked to consult the list of groups, and seat themselves at the appropriate table where they began with a short round of introductions. To ensure consistency between WP1 and WP2, as well as to allow creative, new ideas to be voiced during the workshop, we recruited six participants from the narrative interviews in WP1, and another 12 participants who were recommended either by the workshop facilitators or by the WP1 interviewees. In total, we had 18 participants in the workshop, nine women and nine men, across a broad age range (from students to retirees). Participants were split into three heterogeneous groups of six, as follows:



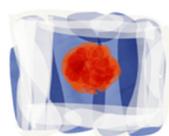
D2.2. Incremental Scenario Case Studies

Group 1: Lisbeth Iversen (Norwegian)	Group 2: Scott Bremer (Norwegian)	Group 3: Anne Blanchard (English)
Climate scientist	Climate scientist	Climate scientist
County council planner	Municipality planner	County governor planner
Municipality planner	PhD candidate in geography	PhD candidate in geography
Member of the 'grandparents for climate action'	Member of 'Friends of the Earth'	Researcher in clinical medicine
Member of the Norwegian Climate Foundation	Consultant architect	Leader of a creative writing group for retirees
Librarian (Bergen public library)	Student member of 'Climate = Health' NGO	Student member of 'Climate = Health' NGO

In designing the workshops, the rationale was to contribute to on-going discussions about Bergen under a changing climate, but to extend this discussion beyond the normal network of science and policy actors. This is why all groups had a climate science expert and an actor working in local government, but also included participants with other backgrounds.

Two groups ran the workshop in Norwegian, and one group in English, as some participants were more comfortable in that language. The two observers were sitting with the English group.

We chose to adopt a facilitation style that was mainly not very interventionist. The objective was to let participants lead their own discussion and come up with their own creative ideas; to allow them the space to speak freely, not too constrained by the workshop's structure. The intervention of the facilitators was about questioning why participants chose a certain dimension card, and prompting them to reflect further on the resources needed in the back casting exercise. In addition, facilitators generally ensured participants remained on-task

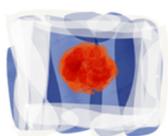


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and at times encouraged less vocal participants to share their views. As it happened, the scenario development work was mainly steered by the groups, but the back-casting work was more difficult and demanded more active facilitation and support.

This minimalist style of facilitation seemed to fit well the group size (6 people), and allowed for active discussions to take place, where every member felt they were heard. Indeed, according to the observers and some participants who made a special note of it, the group size was optimal and allowed for everyone to take an active part in lively discussions, while at the same time allowing, through the diverse backgrounds, for a broad range of perspectives and ideas to be raised. A participant notes in their feedback form: "A very interesting day, great people, good connections, learned new things!"

However, this type of facilitation posed two main problems. First, we realised afterwards that some participants didn't endorse their professional role and talked more from a private perspective (which was useful too, but we should have prompted them to talk from both perspectives). Second, some of the discussions remained at the general level; in particular during the back casting exercise when exploring the resources needed to achieve steps towards the 2050-future. Not many detailed discussions occurred then, or if they did, not all were reflected in the scenario and back casting written work, even if facilitators encouraged participants to write them down (for example, there was a discussion in Group 3 about establishing bike lanes in zones like Bryggen with a historical heritage, the space required and whether historic pebbles could be removed, but this was not reflected in their written work). This is mostly explained by the feeling participants voiced that they didn't have enough expertise to say something legitimate about these issues. Facilitators have additional notes of these detailed discussions.



5.2.3. Developing climate scenarios for Bergen in 2050

(9:30–10:45)

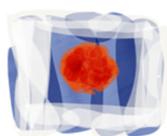
Assigning the three climate scenarios

The first working session randomly allocated to each group one of three broad, prepared scenarios for 'Bergen in 2050', and asked groups to craft these into more detailed scenarios that they endorsed. The session started with instructions in English, and groups were subsequently helped by their facilitator in this task.

The three scenarios were not mutually exclusive, and rather represented three aspects to the same challenge of Bergen adapting to a changing climate in 2050. The intention was to have the three groups approach this adaptation challenge from three different points of departure: control the climate, live with the climate, or make the most of the climate.

In order to streamline the workshop work and ensure continuity between WP1 and WP2, the scenarios were prepared in advance of the workshop based on findings from WP1 narrative interviews, when interviewees were asked to describe their future vision for Bergen under climate change. Scenarios were deliberately left very broad – including just a title, a photo and a short mission-statement – with the intention that groups would add their own details and dimensions to the scenario and 'make it their own'. This also made for scenarios that were better grounded in the actual concerns of Bergen as a place.

Scenario A was titled 'A 1.5 degree city', and was drawn from the municipalities Green Strategy, which has a mitigation focus on reducing Bergen's emissions in line with global climate governance to control average global warming to no more than 1.5 degrees Celsius. Scenario B was titled 'Let it rain' and embodied an attitude of living with the climatic change, which is anticipated to bring increased rainfall to already rainy Bergen. Scenario C was titled 'High-tech haven' and



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emphasised the need to make the most of climatic change, by exploring economic and other opportunities, in renewable energy technologies for example (see also the appendix).

One member from each group drew a scenario out of a hat, and the groups began work. We deliberately chose not to present the three scenarios in advance, so that in principle participants did not know what other groups were working on. This was done to ensure that groups focussed on their assigned scenario, instead of wanting to choose another scenario that better fitted their visions. This noted, facilitators did intimate that the other groups worked with different scenarios, and some reference to their content. In reflection, by failing to deliberately present all three scenarios in plenary, we caused anxiety among some participants, who were not satisfied with their own scenario framing, and were concerned whether or not one of the other groups worked on a scenario that they were more interested in. A better strategy would have been to present all three scenarios to all participants at the beginning.

Critically reflecting, the prepared scenarios introduced a number of disadvantages. Most significantly, it introduced a tension between participants' preferred future scenario and the scenario their group was allocated. There is a difficult balance between providing a relatively narrow thinking space – pre-defined scenarios and methods for example – while also offering participants the freedom to voice what's important to them. Some felt that the scenario was so at odds with their own vision, that it was difficult to 'make it their own' and voice their concerns in that framework. How could, for example, neo-liberal Scenario C also open up discussions on local participatory democracy? This noted, participants were in this way encouraged to be creative in re-crafting scenarios towards their visions, and ensuring a diversity of discussions across the three groups.



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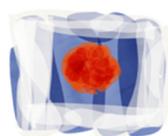
Related to this, the prepared scenarios carry their own assumptions, about the existence of climatic change for example, and their own framing of appropriate responses, which meant some solutions were excluded as beyond the scenarios scope. One participant noted in their reflection form: “Could have had a bit more focus on energy supply scenarios”. Moreover, by starting out quite broad, the scenarios made for a quite general-level of discussion that made it difficult to drill down to more concrete, focused measures. However, having broad scenarios ensured that participants had an open enough space for free thinking; which was one of our objectives.

Developing detailed scenarios along five dimensions

Participants were then asked to choose five ‘dimension cards’ among a set of 16 pre-written cards (including a blank one), to flesh out their scenario with supplementary details and make it their own. They chose cards that both fitted their allocated scenario, and cards that they, as a group, found most relevant and important.

To continue ensuring continuity between WP1 and WP2, the dimension cards, like the three scenarios, were inspired by WP1 narrative interviews and reflected the most important elements that lend Bergen a sense of place. In the table below are the headings of the 16 cards (they were all further detailed with two or three concrete bullet points):

1: A compact city	5: A climate science city	9: Freeing the waterways	13: A city linked to nature
2: Climate-proof buildings	6: Resilient Bergensers	10: Safe from climate impacts	14: Diverse and international
3: A port city	7: A historical city	11: Rain-friendly spaces in the city	15: Green spaces in the city
4: Walkways and cycle-ways	8: A local democracy	12: Busses, boats and ‘bybanen’	16: Blank card



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The three groups read the 16 cards and voted or debated which five should be added to their scenario. We limited the number to five cards, so that participants would have time to discuss them in thorough details. Participants were allowed to amend the cards (combine them, or add/remove/rewrite bullet points), and to use a blank card to add a dimension of their choice (one group did).

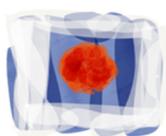
The dimension card exercise was an engaging step that launched lively discussions in the groups about what they liked, disliked, and felt was missing in their scenario. It also encouraged participants to voice climate-related dimensions they found particularly important for Bergen, whether it fitted their scenario or not. It was in that sense a good introductory round too, as the participants got familiar with each other's diverse backgrounds.

The scenario and card exercise validated the WP1 narrative interviews in many ways, as the cards were recognised by the participants as valid, and there was no sign that any scenario was missing (apart maybe for a stronger focus on energy). As discussed in the result section, this step was interesting as it showed which dimensions were chosen across the three groups (for instance Card 5: 'Bergen as a climate science city' was chosen by all groups).

Bergen today: mapping Bergen's progress toward their future scenario

After developing a detailed future scenario, groups were asked to complete an assessment of the situation in the 'Bergen Today' task, relative to that scenario. It asked, along what trajectory is Bergen developing now, and to what extent is that trajectory likely to see Bergen give effect to their detailed scenario by 2050? In this way the assessment was not static, but mapped today's point on a trajectory that we are travelling on now.

Participants wrote on A3-sheets that had five blank cells their assessment of 'Bergen today' relative to their five chosen 'dimension cards'. They went



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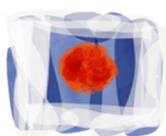
dimension by dimension and asked for example: 'to what extent is Bergen becoming a climate science city, as of today?' All groups ended up using this A3-template. In the five cells they noted characteristics of Bergen today that corresponded to their future vision, and to what extent they represented 'progress' toward their vision.

5.2.4. Back-casting ways to the future

(11:00–12.15)

By the second session, groups had before them on the table: (i) an A3-size detailed scenario sheet, with five cards stuck to it; (ii) an A3-size assessment of 'Bergen Today', separated by (iii) a large A2 sheet of blank paper. Groups were asked to identify steps that Bergen needs to take to move towards a trajectory that achieves their detailed scenario in 2050. First, they wrote down steps on green post-its which were stuck to the blank sheet of paper, in no particular chronological order; simply to note all particular processes, actions, and decisions that group members thought needed to be taken. The second task was to chronologically order these steps broadly, with attention to the short, medium and long term. This was also a moment for groups to revisit each post-it and ask if this step was absolutely necessary for progressing Bergen towards their future vision and remove it if it was not.

Groups found the back-casting of steps toward their vision to be more difficult than defining the vision itself, with all facilitators reporting some hesitation about how to approach this task. As one participant noted in their feedback form: "In our group the first part (defining the scenario) were easier than the last part (back-casting). It was very clear that it was easier to define goals than how to reach them." Groups adopted their own rationales for ordering the steps; Group 1, for example, mapped steps for each of their five-dimension cards against a picture of a mountain, while Group 2 came up with three main goals or streams

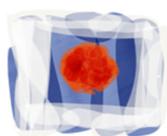


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of work, which translated into three parallel sets of steps. All groups noted a large number of steps, which were a mix of actions, decisions, processes, resources and so on.

There were two inherent challenges to this back-casting work, noted by the facilitators and participants alike. First, the steps were largely anchored in the current challenges and solutions offered for climate adaptation and mitigation, rather than unlocking participants' fantasy and opening a creative discussion about possible future challenges and solutions that we may not yet know. As one participant noted, "It was difficult to keep the focus on the 2050 vision and how to get there. The discussion mostly revolved around the status quo and difficulties with trying to change the course". This was at least partly because the scenarios were built from dimensions that emerged in the narrative interviews, discussing place-making elements of Bergen today; the unique ways in which Bergen already faces climate change, and what makes this place special. By anchoring the work in current narratives, this made it difficult for groups to detach from these and adopt imaginaries of the future; to think truly creatively. On the other hand, the anchoring of the work in current lived realities and sense of place is also an advantage, in that it grounds what can otherwise be a highly fantastical and unrealistic exercise.

A second challenge was to get to highly detailed and concrete steps, because much of the discussion stayed at a more general level. There were various possible reasons for this. One may be because the scenarios themselves were constructed in quite a general way. Another reason may be because the groups were highly diverse so the discussion went in various directions, when homogenous groups may have drilled down into one line of inquiry. A third reason may be because the groups did not feel like they had the expertise to discuss the technical requirements for, for example, designing cycleways or open stormwater systems. A fourth reason may be the non-interventionist facilitation,



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which allowed groups to think and discuss freely, rather than tying them to one technical issue. A fifth reason may be because groups were not experienced in this type of task.

5.2.5. Identifying resource needs, obstacles and writing a wish list

(13:15–14:15)

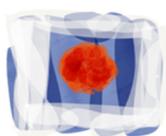
The final part of the previous session was for groups to go from green post-it to green post-it, from step to step, and ask what we needed to achieve this step. These needs could be anything from climate science and information, to material resources and finance, political will, experience and expertise or laws and policies for example. These 'needs' were to be written on yellow post-its and attached to their corresponding green post-it (step). Because the back-casting took so long, this task of identifying needs was postponed until the third session after lunch.

Getting to detailed discussions on the resources needs for achieving the various steps, and on the potential obstacles that could come up, was found difficult for the reasons mentioned above. This is why we prompted the participants to distil those needs into a wish list, in order to encourage them to think about these needs in more concrete ways, and to prioritise those needs that they thought were most important. In the result section, we give an overview of those identified needs and obstacles.

5.2.6. Plenary session and evaluation forms

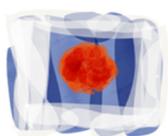
(14:15–15:00)

We finished the workshops with the groups presenting their work to the others, particularly focussing on the wish lists and potential resources to get to these. We then gave time to the participants to fill out evaluation forms, and planned to keep them all updated about the project's progress and invite them to a subsequent meeting in spring.



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Overall, participants gave very positive feedback about how the workshop went: it was seen as an opportunity to meet “great people from other sectors”, “hear all their good ideas” and “learn new things”. The facilitators and observers also were positive towards the unfolding of the workshop and the richness of the discussions and results that will be drawn from it. However, many felt it was a lot of work for one day. Indeed, we didn’t have time to discuss hinge points, and one participant regretted that there was no time for further, in-depth discussions about the resources needed and potential challenges related to the wish lists: “we didn’t have time to discuss the problems that have to be solved if we are to have our wish list fulfilled”. As noted in the section above, the discussions were very lively and mostly self-led in the first half of the day, but participants needed more support towards the end of the day, especially for the back casting and wish list exercises, when discussions needed to be more concrete and technical. Keeping participants updated on the project’s progress after the workshop is very important. Participants voiced a strong wish to stay connected with each other and to meet again to pursue these discussions. This is why the project members are planning a coffee meeting with all participants in the course of Spring 2019, to feedback results and ask for comments, as well as to discuss a repertoire of useful actions or platforms that could be implemented to present climate information to a broader audience in such a way that it could be easily used (accessible climate models and maps, short movies, and pictures or posters in public spaces...). Along those lines, project members aim to investigate whether there are similar initiatives in different cities in Norway or Europe, and establish a small catalogue of actions that could serve as an inspiration source for Bergen. Finally, participants asked that, as a follow up, an article be written in Norwegian about the workshop in the local newspaper Bergens Tidende (BT). We have planned for project members to give an interview to a BT journalist about the project and the workshop, and invite the journalist to our Spring meeting.



5.3. Findings and discussion

5.3.1. Analysis of the research results

This report does not analyse the workshop results step-by-step for each activity (scenario-building, back-casting and identifying resource needs), but identifies six key themes that cut across the day's activities, and were important for how all three groups talked about Bergen's future under climatic change.

These themes were not decided before-hand. They emerged as categories of recurrently referenced and linked concepts in the analysis of the groups' work, and notes of discussions among the research team following the workshop. After identifying the themes, the analysis went back over the workshop results and coded them according to the six themes. Within these broad themes, we in turn identified sub-categories and coded for them. For example, under the theme of 'a climate science city' there was discussion about an interdisciplinary science-sharing platform, measures for sharing science with local government, how science can be better integrated with education institutions, how to more generally disseminate science, and specific science needs; each a different sub-category under the over-arching theme. A digital version of each group's work is included as an Appendix for reference to the exact findings of each activity.

The six themes are presented as meta-narratives, compiled from statements from all three groups work in all different activities, interpreted by this reports authors, and re-told as a single composite narrative. They are not directly reproduced as told by participants, but they are directly anchored in all that was said and written, and are likely recognisable to participants as a version of what they discussed. To ensure this, the report will be shared with participants for comment and discussed in a meeting in Spring 2019. Finally, the themes seek to at once show the diversity of the workshop discussion, while also looking for shared visions/links across the groups and participants. The report does NOT try



D2.2. Incremental Scenario Case Studies

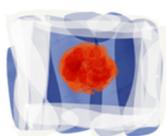
to record the precise frequency with which themes and subcategories were discussed as an indicator of their importance. This noted, the six themes are roughly in declining order relative to the share of discussion they took up, so that Theme 1 was more often discussed than Theme 6 for example.

5.3.2. Theme 1: Bergen as a 'climate science city'

All three groups saw climate sciences, and related scientific disciplines, as an essential dimension to their vision for Bergen in 2050, under climate change. All groups added the 'A climate science city' card to their scenario; the only card that appeared in all three scenarios. But beyond simply demanding new science, workshop participants talked more about how science could be better integrated with the way different groups of people talk about and plan for Bergen's climate. Participants discussed this theme in five main ways.

First, they voiced a desire to bring together scientific and other knowledge from across disciplines and sectors into an "interdisciplinary climate science platform for informing education and dialogue." A common virtual and physical space for presenting and discussing different scientific research, and building a comprehensive understanding of Bergen's climate. *Second*, participants saw this platform as a forum where experts – particularly working in local municipalities – could ask questions of the science; to strengthen cooperation between science and policy-making communities. This forum could lead to more climate science-based policies and decisions – "climate projections to make understandable (policy) scenarios" – and educate public sector employees about the climate impacts they will need to face. But as one climate scientist noted, policy-led research is not valorised in the scientific research community, so there need to be incentives put in place to encourage scientists to work in such fora.

Third, participants discussed how climate-related science could be better taught in education institutions, particularly schools, but also for older age-groups. For

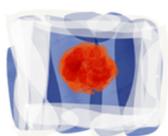


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some this came from having obligatory courses on climate in schools and higher education, and that perhaps all scientists working on climate should be required to teach for one year in schools. Others talked about more practical-oriented education in schools with implications for climate, like teaching people how to grow their own organic food.

Fourth, looking beyond education institutions, participants proposed more active dissemination of science and technical information for climate adaptation in the public sphere; “to make knowledge available to all”. This could be through climate scientists appearing in the media, or conferences on how to plan for Bergen’s public spaces under climate change scenarios, drawing on what other cities have done.

Fifth, participants did voice needs for further Bergen-specific science. Particular calls were made for science of waterways and run-off, rain, sea-level rise and flooding, to inform surface water management. Other calls were made for science of extreme weather, “and how we can protect humans, animals and buildings”. In parallel, there was interest in learning more about Bergen’s ecosystems and biodiversity for planning the city’s green spaces, and advice on what kinds of food-plants Bergengers can grow under a changing climate. At the same time, to support our mitigative action, participants wanted more scientific information on the city’s demography, transport needs, “consumption levels and resource supply and real needs”, as well as robust information on emissions. Finally, participants saw a need for more research on how to effectively communicate climate information to different social groups in Bergen, particularly for convincing them of taking necessary adaptive and mitigative measures. Beyond these explicitly voiced science-needs, we can interpret other needs as underlying their discussions, like further research on how to establish the kinds of social spaces implied by a scientific platform.



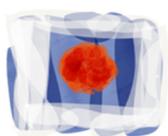
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5.3.3. Theme 2: Engaged citizens in a healthy democracy

Participatory democracy was a prominent theme in all three groups, who argued for more opportunities for Bergensers to discuss what climate change means for Bergen, and what kind of city people want to live in. Two groups used the 'A local democracy' card in their scenario work, and all three groups included considerations for democracy in back-casting and identifying resource and information needs. Discussions went in five related directions.

First, participants called for more physical and virtual 'social spaces' where people can discuss how Bergen should change in response to climatic and other changes. These spaces should be open to all to nurture dialogue, and build networks, across different groups and sectors; from climate scientists to municipality experts, local politicians, education institutions and students, businesses, and active local citizen groups including NGOs for example. These spaces would be arenas for sharing climate science, but also other ideas about what climate change means for Bergen and measures for mitigating or adapting to these changes; inspired by other cities for instance. Such dialogue will make visible the value conflicts in the city – for example between intensification into a more compact city versus having more green spaces – while at the same time moving toward agreeing on, "A shared vision for the future that cuts across sectors of society, political ideals, socio-economic status, education level...". For some this started very locally, from "a need for neighbourhood visions; a local vision of what we want to do with our neighbours". Finally, participants saw 'solutions' as having many dimensions – not solely focused on climate mitigation for example – such as solutions that promote 'public health and a better climate', like promoting cycle-ways.

Involving politicians and municipality experts in these social spaces could ensure that the things discussed would be translated into public decisions and policy. But this raises an important barrier related to the perceived legitimacy of these



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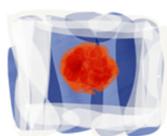
spaces, and how accountable politicians would be to giving effect to the things decided. These spaces must have the power to shape the city.

Second, participants wanted Bergen to be a ‘just’ city, in the context of climatic change. Our public-decision-making must consider which groups or neighbourhoods will be worst affected by climate-related impacts, with the poorer areas of Bergen worst affected by air pollution for example. It must also consider what climate mitigation and adaptation measures will mean for the least advantaged people of Bergen, and ensure our focus on the climate and environment is not at the expense of fair living conditions for all. For example, Bergen has incentivised electric cars as a means of mitigation, but as one group noted electric cars are mostly owned by men over 40, as a second car. Many adaptation measures imply an active outdoor lifestyle, but this is not a lifestyle that is desirable (or possible) for all. As one participant reflected:

“Most of the suggested solutions [...] would put further burden on individuals (road tax, spend more time outside and be equipped for that, pay more tax, charge the ships more so the imported goods will get more expensive). I think we should consider the (actual) economic status of the regular person before implementing more rules that would make it even more difficult for her/him.”

Discussions about a just society also zoomed out from a ‘climate-based discussion’ to more generally call for affordable housing in the city centre and around green areas, a city that is more practical for families with kindergardens in every neighbourhood for example, incentives for local shops in the centre, or more free public events open to all, for example.

Third, participants called for changes in the current frameworks for decision-making. Particularly, they saw a need for more “bold politicians with clear green visions”, who can push for, “concrete plans and policies and outcomes that are



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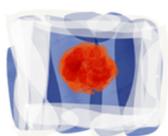
followed up” and make money available in a ‘climate action fund.’ At the same time, existing planning and decision-making processes need to be amended to allow for earlier public participation.

Fourth, in parallel with the social spaces, participants favoured more active spaces where individuals and groups can work on small projects, related to improving the quality of life and the environment in Bergen. This could take the form of ‘repair cafes’, where people can repair broken household items rather than throwing them away and buying new ones, or ‘makerspaces’, where people can experiment with new forms of artwork or technologies. Fifth, and related, there was a lively discussion about changing the shape of Bergens economy, towards a ‘circular economy’ with relatively little waste, and a ‘shared economy’, based more on the collective use of things like cars, rather than their private use.

5.3.4. Theme 3: Resilient Bergeners

Participants discussed how Bergen and its residents could be made more resilient to climatic and other changes. Some discussed resilience as ‘engineered’, such as by building covered walkways around the shopping centre to keep people dry when facing projections for even more rainy days. Most, however, discussed resilience as Bergeners attitude to living with the weather. One group used the ‘Resilient Bergeners’ card in their scenario work. Another group wrote “promote values, education and support for outdoor activities” on the ‘A city linked to nature’ card. A third group wrote ‘playgrounds’ on the ‘A compact city’ card, interpreted as promoting an outdoor lifestyle. Discussion in this theme went in three main directions.

First participants sought more active and volunteer-led “public climate awareness campaigns”; communicating what climate change means for Bergen, and what measures individual people can take to mitigate their climate impact and adapt. This, for some, served as a more general complement to the targeted social

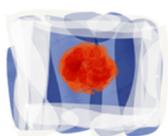


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spaces for more participatory democracy (see above). Such public awareness campaigns face barriers however, such as peoples' fatigue toward climate change stories, or the negative overtones to climate change when it can also be seen as an opportunity or a fact of nature to live with.

Second, participants sought to re-emphasise how Bergen's climate contributes to a sense of place, culture and identity, and how this identity can promote 'living in the rain' as resilience to climatic variability and change. A number of suggestions were put forward for celebrating and marketing Bergen's identity as 'the Rain City'. One group in particular talked about Bergen's rain as an attraction for visitors, and wondered why the tourism sector did not highlight this; why for example most postcards show Bergen in the sun? On one hand, participants suggested organising rain festivals and events, and on the other hand, competitions for designing art and architecture for Bergen that interacts with rainfall and water as a key element in the city; noting, "the water sculptures [in Bergen] are a magnet for people." Living by this identity means framing weather – and Bergen's rain particularly – as a positive thing, or at the very least a fact of nature, and by extension promoting an outdoor culture in all weather. This culture was expressed relative to improving cycle- and walk-ways, by enhancing outdoor education in schools, and through creative enterprises like having rain clothing and umbrellas to rent.

Third, the discussion of resilient Bergengers turned to changing the local economy, and attitudes toward consumption of all age groups in the city. This included by introducing regulation and incentives to lower consumption and reduce waste, such as by lowering taxes for 'low-consumers' or introducing laws to limit on-line shopping. Participants also talked about main-streaming 'shared economy' initiatives, like car-sharing schemes for example and the way they are changing attitudes to private car ownership. Finally, some participants saw climate change as an opportunity for a drastic shift toward a 'green economy'; for



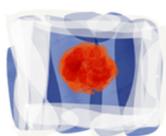
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example by using Norway's oil fund to spark the transition to a technology-driven economy, like that embodied in 'high tech haven' scenario.

5.3.5. Theme 4: A city linked to nature

One of Bergen's defining features is its 'closeness to nature', surrounded by seven forested mountains and the fjord, with this link to nature an important dimension of all three groups visions for the city's future under climatic change. Two groups used the 'A city linked to nature' card in their scenario work, and a third group wrote 'green lungs' on their 'Compact city' card. The discussion went along three lines.

First, participants emphasised the dual climate adaptive and mitigative functions of "attractive green urban spaces", and how they improve the quality of life and the environment in the city. Participants discussed the role of green spaces for addressing emissions and air quality ('green lungs'), as natural reservoirs for run-off and flooding, as ways for bringing plants and animals into the city, and as 'meeting places' for recreation and social events. Groups discussed 'green roofs' in the city, or opening up 'green corridors', for example along waterways and cycle- and walk-ways. Linked to this was a discussion around re-opening the natural waterways in the city, many of which currently run through piped infrastructure, as so-called 'blue corridors'. Opening the waterways was discussed as a measure to reduce flooding risk from under-designed infrastructure, as a natural amenity, and as a measure to improve the ecosystem in the city. Importantly, even though many groups emphasised the need for a compact city, they were quick to point out that this should not be at the expense of green spaces. There was also a desire to leave the mountains as 'natural', with one group emphasising renewable energy but arguing for "no windmills on the seven mountains."



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Second, the workshop highlighted a desire for urban food gardens in the city. Some participants demanded “Provisions for agricultural plots in compact urban areas”, as a source of locally-produced, organic fruit and vegetables. This implies not only making available the amenities for these gardens, but also the information and expertise for people to grow their own food. These gardens should preferably be communal, rather than private plots, and could be in public spaces. For example, one group discussed replacing some of the ornamental trees in public parks and streets with fruit trees.

Third, there was a discussion of how these green spaces should be planned and managed. This starts with municipality policies and plans, with participants recommending concrete regulations for a minimum of green space in the city centre, for incrementally opening the waterways, and for “Proper zoning for public space, buildings, green areas and roads”. This was seen to go hand-in-hand with developing the municipalities’ experience and expertise with this kind of green planning, and the prestige of planning for green areas. Some participants saw a lack of political will, boldness and concreteness as a major barrier to putting green spaces in place. Finally, some participants asserted that these green spaces should be publicly owned and managed, with opportunities for stewardship by certain public institutions like schools who ‘adopt a waterway’.

5.3.6. Theme 5: Transport in the city

All groups had long discussions about transport; how we move people and goods into Bergen and around the city in 2050. Transport was an important dimension of participants vision for Bergen, with two groups using the card ‘Busses, boats and bybanen’ in their scenario work, and a third group writing ‘rain-proof walk and cycle ways’ on their ‘Resilient Bergensers’ card. People saw transport as an important place to start reducing emissions in Bergen, while also



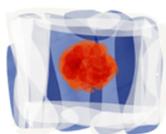
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improving the quality of life and the environment in the city, with the discussions going in five main directions.

First, participants talked about the need for high-level strategic and structural planning for transport, starting with concrete targets for emission cuts in the municipalities' transport plans. There were also large-scale measures proposed for redesigning or restructuring the form of the city around transport. One proposal was to stop work on the E39 highway, which many considered would only promote more private car usage along the Norwegian west coast, in and out of Bergen. Another proposal was to design the city, and provide incentives, for rewarding short commutes; building housing near workplaces, and having financial incentives for employees who travel least. However, participants foresaw a barrier to such fundamental transport re-planning in a lack of political will or economic means to put in place the wide-ranging changes needed.

Second, and in parallel with the structural planning, the municipalities' must further promote public transport, and design the city around cheap (even free) and frequent public transport routes, that tightly traverse the city. Moreover, this public transport, from buses to the bybanen or boats, should have zero emissions as soon as possible. There do remain technical barriers to this however, because even electric technologies have an important environmental impact elsewhere, through the mining of rare earth elements for example.

Third, participants sought important changes to the culture and infrastructures for car usage in Bergen. They argued for "more 'car-free' areas, especially in the city centre, with a simpler decision-making process" for establishing these areas. A complement to this was to reduce parking spaces in the city centre, to discourage commuting to the centre. At the same time, there is an argued need to change attitudes to private car ownership, both through regulation and taxes which discourage people from buying private cars, and through clear information and incentives for alternatives, like through the existing car-sharing platforms in

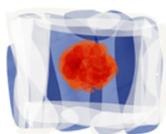


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the city. Here again, participants foresaw a lack of political will to keep cars out of the city centre, based partly on a fear of decay in the city centre, if people stop visiting.

Fourth, there was a lot of discussion about improving and extending the network of cycle- and walk-ways in the city, and making them as 'rain-proof' and 'cycle-friendly' as possible. Participants said that this should start from a robust strategic planning process, which allocates resources and physical space to incrementally developing this network. This includes regulation for ensuring these ways are of high quality, while ensuring that "perfect is not the enemy of good enough". One group discussed that many of the standards put forward for cycle- and walk-ways (standard width for example) are barriers to extending the network, because there are often physical barriers like topography, narrow streets or cultural sites. With a strong network in place, participants saw opportunities for using bicycles as a way of delivering goods around the city (as opposed to delivery vans and trucks), and even discussed goods delivery by drones.

Fifth, there was a lively discussion about boats and the port as a transport hub. In general, participants saw the port and shipping traffic as positive, because it reduces the number of trucks on the road, it has overall reduced emissions, it is positive for Bergen's economy, and because shipping has a long and historic tradition in Bergen. But participants did suggest some changes. They argued for regulating, and reducing, the number of cruise-ships that visit Bergen each year, while simultaneously exploring options for emission-free cruise-ships. They argued for the port to endorse standards for ethical maritime trade, which may mean taxing some port-related financial transactions, and for example, highly taxing ships if they are not switching to land power. Finally, participant saw important opportunities for expanding the fleet of boats providing public transport around Bergen, and between the centre and the outlying islands.



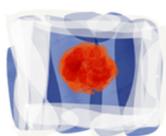
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5.3.7. Theme 6: Safe and smart buildings

A sixth theme that was particularly important in groups' scenario work, though featured less in the other activities, was about how we can improve the quality of Bergen's buildings relative to climatic change. One group chose the 'Safe from climate impacts' card, and wrote 'weatherproof buildings, including cultural monuments'. A second group wrote 'safe and smart buildings (weatherproof and energy efficient)' on the 'climate science city' card. A third group created their own card titled 'Reduced emissions related to buildings and construction activities'. Buildings' 'safety' and 'weatherproof-ness' generally referred to their resilience to climate-related impacts - particularly extreme events like storms or floods, but also very warm weather - related to where they are situated, how they are built and how they are used. 'Smart' buildings generally referred to buildings' energy efficiency, their actual emissions over their lifetime, and the emissions and environmental impact associated with their construction. One group in particular argued for building to be in environmentally-friendly materials and to have a 'circular economy' for construction, such that buildings are maintained, reused, and any waste recycled. Another group argued for incentives to insulate buildings, because they felt that electricity prices are currently too cheap, and as such that there is no incentive to be more energy efficient.

5.3.8. Hinge points or key moments towards affecting future scenarios

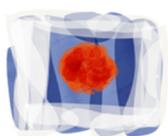
One year after the workshop, the Bergen CoCliServ team conducted an ex-post analysis of the 'hinge points' in groups' planned routes to their preferred scenarios in the back-casting exercise. These are key moments, when certain decisions or developments can see Bergen diverge from the planned route, and progress along a different trajectory, to a different future scenario. Of course, given the extreme uncertainties associated with the development of Bergen, this is more of a heuristic exercise to help think about important points of action,



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rather than seriously 'map' a limited set of possible futures; there is an unlimited range of possibilities at each juncture. A detailed list of these hinge points is included in the appendix.

Looking across the hinge points from all three groups, there are five noteworthy points of analysis. First, the groups did not consider at all any particular moments of natural change that were necessary to transition towards the identified scenarios. For instance, there were no climatic tipping points mentioned. Groups limited their discussion to the transformation of society (in nature). Second, most discussion focused on changes that would happen, or should happen, locally in Bergen. There were almost no explicit steps or hinge points relating to changes that would need to occur globally (i.e. related to global climate governance), or even nationally in Norway. This could be explained by the fact that the previous discussions were focussing on Bergen. Third, with some notable exceptions (about promoting new 'social spaces' for instance), most groups looked at how change could be affected within the existing institutions, organisations, networks and decision-making processes that exist now. Change was, in this way, more about incremental change within existing structures rather than a total restructuring of society in Bergen. Fourth, and related, groups tended to focus on things that are ostensibly within our 'control'; that we can plan and strategise for. Some changes were more controllable than others. For example, some hinge points depended on certain behaviours in the market, or certain political decisions or election outcomes, which are predictable to some extent. Finally, the majority of steps toward referred scenarios were related to climate mitigation and adaptation, but not exclusively focused on climate change concerns. For example, efforts to increase the density of the city centre were not solely related to reducing emissions, but also for enlivening the city and improving its amenity.



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In sum, most hinge points related to non-climate concerns, that were locally controllable within existing structures. This may indicate that it is difficult for people to imagine alternative futures at abstract scales (such as the global scale). Or indeed to imagine natural regimes or rhythms that are markedly different to those we experience now. On a more philosophical level, we should be aware of the impacts of running such exercises. Imagining alternative futures and possible hinge points is not only about making explicit some anticipatory (and sometimes wishful) thinking; it is also a way to co-construct socio-technical imaginaries.

5.3.9. Identifying Bergen's needs for climate services

One central goal of this workshop was to elicit from participants their perspectives on which particular climate information (or climate services) is needed to plan for Bergen in 2050, under climatic change. To this end, the back-casting work was designed to elicit information needs at each step toward groups' scenarios, distilled into a prioritised 'wish list' of resources. The intention was that, by identifying knowledge gaps, we could help steer the climate-related scientific research conducted on Bergen and its surrounds. Our actual experience can be reduced to three reflections, none of which are totally original, but all three are important for thinking about climate services in Bergen and elsewhere.

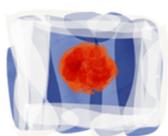
One key reflection is that climate information needs are rarely packaged as carefully-defined scientific questions. The workshop did distil some explicit and concrete calls for more scientific research in key areas. Some of this research is in the domain of the traditional sciences of climate and its impacts, like research on rainfall, runoff, flooding, and ecosystems. Other science needs belonged to the social sciences, for calculating current energy needs and emissions, or assessing how best to communicate climate information. However, in a debrief immediately following the workshop some project researchers were quite



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surprised that, despite the obvious importance placed on climate science (see Theme 1) there was relatively little explicit mention of new science needs.

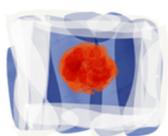
For us, this observation invited three explanations. It could be that participants felt they already have sufficient science about Bergen to act, and that we should direct attention to how science is organised, communicated and used. Some participants were commenting that we have a lot of research and knowledge, but it is how to communicate this and inform the public, that is the challenge. It could be, methodologically, that the relatively broad discussion among diverse generalists in each group was a barrier to discussing specific science needs. There is reason to think that getting to detailed lists of scientific information is first dependent on detailed technical and scientific discussions among experts. That scientific needs arise in scientific discussions. For example, a technical discussion about design-dimensions for Bergen's blue/green corridors to accommodate future flooding, with which flood-resistant local species, may have elicited more concrete science needs. A third explanation, related to the second, is that the most important steps for Bergen to become more resilient to climatic change cannot be communicated in scientific terms. The things that really mattered to participants, like being part of a caring and inclusive local community for instance, are less easily defined as scientific needs; they are a different category of concern. This does not mean that we cannot infer from their discussions where science can help – there is an extensive body of science on social spaces for participatory democracy – but by inferring these scientific questions we abstract from and reformulate the original social concerns. The scientific questions will rarely perfectly match with peoples' actual needs, because they belong to two different categories; two different worlds. This emphasises the importance of interdisciplinary research and collaboration between researchers, planners, public actors and decision-makers.



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A second key reflection is about the need for diverse knowledge systems. Though the groups' discussions remained quite general, they did bring up an extremely rich and wide set of measures for making Bergen more resilient. These were social and procedural measures, by changing the way science is organised and used for decision-making, by creating social spaces for participatory democracy, and maintaining Bergensers positive culture towards being out in all weather. These are also physical outcomes, to enhance and extend the areas of green space and transport corridors for public transport and cycling or walking, and build smarter and safer buildings. It is quickly apparent that these diverse measures need to be supported by diverse knowledge systems, going beyond the climate sciences to include a wide range of natural, social and humanities science disciplines, professional knowledges, local and traditional knowledges. For example, participants argued for more professional experience in Bergen, from engineering or planning, to build urban spaces for flooding or social interaction. Climate services as climate science is a narrow framing and either it needs to be broadened, or an alternative label used to describe the broad set of climate-related knowledges that should be tailored to communities' needs.

A third key reflection is that climate services should be more broadly construed than as a scientific knowledge product, advice or tool. In Bergen at least, we see some people talking about climate services (even if not in those words) as social processes of discussing what climate change means for places where people live. This is not to dismiss the science, but to change its role from that of providing a data-based projection or simulation, to being a source of evidence to be weighed in public and often highly political debates. This will demand the transformation and tailoring of science to be effective in these social spaces; integrating science into interdisciplinary platforms that 'talk' across disparate studies, and are able to be made meaningful for the topic at hand. While there is undoubtedly a need

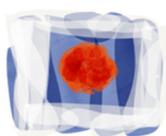


for climate service products for private actors, where these products enter the public sphere, they will need to be transformed again.

5.4. Summary

The participants reported that the workshop made interesting contributions to their on-going discussions in Bergen, emphasising six key themes for a more resilient Bergen. First, that Bergen's **strong climate science capacity** should have an important role in building the city's climate resilience. Second, that a resilient city will be one with strongly engaged citizens in a **healthy participatory democracy**, emphasising the importance of climate justice and social spaces for discussing what climate means for Bergen. Third, that Bergen's resilience will build on the **inherent resilience of inhabitants** and their attitudes – even identity – of being outdoors in all weather, though creative measures like rain festivals for instance. Fourth, that Bergen's **close link to surrounding natural areas** – the mountains and fjord – are key to building resilience; building green and blue corridors and other green spaces for inhabitants, and encouraging urban food gardens for instance. Fifth, resilience is linked to the city's **mitigation of emissions from transport**, by improving public transport systems, and networks of walk- and cycle-ways. Sixth, that the city should encourage **safer and smarter buildings**; resilient to weather events, and energy efficient to mitigate emissions.

The workshop offers three broad insights for re-thinking climate services, that: (i) climate information needs are rarely packaged as carefully-defined scientific questions; (ii) there is a need to mobilise diverse knowledge systems; and (iii) climate services should be more broadly construed than as a scientific knowledge product, including as a social process or arena.



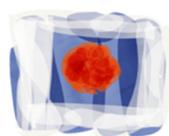
6. Case study: Golfe du Morbihan, France

6.1. Case Introduction

6.1.1. Case study situation

Located within the southern fringe of Brittany (at 47° 36' North, 2° 48' West), the Gulf of Morbihan is an attractive location for many aspects: geography and geology, history (and prehistory), environment and biodiversity, economy and tourism, and climate. The Gulf's coastline is a dynamic setting. Around 15 000 years ago, sea level was 120 meters lower and the coastline was located more than a hundred kilometres away from the current shore. Although sea level has been virtually stable for the past 3 000 years, the expected rise for the period 2081–2100 relative to 1986–2005, could exceed one meter from the beginning of the 22nd century and reach 3 m in 2300 (medium confidence - IPCC AR5 - RCP8.5). Coastal erosion in the region is provoked by natural drivers (such as currents, wind, etc.) and aggravated by human activities, such as hydrodynamic barriers formed by oyster farming, soil impermeabilization deriving from the development of urban infrastructure and soil compaction resulting from continuous circulation on the coastal footpath (Office National de la Chasse et de la Faune Sauvage, s.d.-a).

The multiple megalithic sites that can be found in the Gulf are a heritage of human presence during the Neolithic and represent areas of international scientific interest. Many of these sites are partially or completely submerged, thus working as chronotopes that materialise changes over time in the region and allowing reflection on future markers of current changes. The modern history of the Gulf is shaped by a fast transition from a primary activities-based to a tourism-centred economy, which started in the 1960s. The tourism sector currently represents over 1.5 billion euros in annual revenue generated by almost 5 million tourists (Morbihan Tourisme, 2018) mostly interested in the



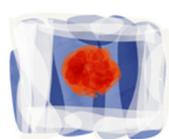
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region's coastal landscapes, biodiversity, historical heritage and ornithological interest. Infrastructure has grown accordingly, as many second homes have appeared on the outskirts of coastal villages with prices twice as high as those observed in the countryside (Observatoire Départemental de l'Environnement du Morbihan, 2010c). They are mostly near the sea and some are already in areas at risk of flooding, protected only by dikes and dunes, while others will become endangered as the sea level rises.

Risk perception regarding coastal occupation and the future of primary activities in the Gulf are concerns for the local community, as well as socioeconomic and intergenerational balance in a territory that is highly dependent on peak season. For instance, 79.7% of houses in Arzon are second homes (INSEE Bretagne, 2016) and 57.6% of residents in Arzon are retired (INSEE Bretagne, 2018), phenomena that are coupled with soaring land prices and a struggle from young people to find work outside the holidays season.

In varying degrees, climate change is perceived by locals through a shift in the timing of seasons, weather disturbances, and progressively hotter summers. These changes may impact the natural cycles of primary activities, biodiversity conservation, the peak- and off-seasons dynamics of tourism and local demography, the latter due to an expected future inflow of population seeking to escape temperature rise in other areas of the country.

The CoCliServ team has worked with local stakeholders in long-term scenarisation coupled with short-time planning of actions in order to identify matters of concern to the community, identify climatic information needs and to codevelop potential adaptation paths. The adopted methodology and the result of these activities are described in the following sections.



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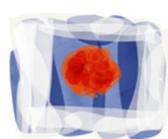
6.1.2. Setup of the scenariowork

We led two fieldwork in February 2018 and March 2019, mobilising 34 local stakeholders who participated in preliminary semi-structured interviews and/or the prospective workshop. This work started with a cartography of socio-professional categories which actively shape the socioeconomic structure of the Gulf. Then, through internet research and insight from local partners, representatives of these categories were identified amongst employees of different types of organisations, environmental volunteers, political figures, public officers and self-employed workers.

The final cartography is composed of thirty-four people representing six socio-professional categories: elected officials and administrative staff, public officers, NGOs and associations, primary activities, business and services, and academia (Table 1). The group is composed of 17 men and 17 women, reflecting the importance attached to gender equality when reflecting on the desirable future of the territory.

Table 6.1: Cartography of CoCliServ stakeholders in the Gulf of Morbihan

Socio-professional category	Stakeholders
Elected officials and administrative staff	<ol style="list-style-type: none"> 1. Mayor of Sarzeau 2. Culture and Economy deputy at Sarzeau 3. Member of municipal council at Sarzeau 4. Vice-president of environment, water and sanitation at the regional level (Gulf of Morbihan - Vannes metropolitan area) 5. Responsible for urban planning and development projects at Sarzeau
Public officers	<ol style="list-style-type: none"> 1. Responsible for scientific initiatives at the local Fishing and Aquaculture Departmental Committee (CDPMEM 56) 2. Project manager at regional/departmental sustainable development governmental agency (DREAL) 3. Project manager at the Gulf of Morbihan Regional Natural Park (PNRGM) 4. Local level facilitator at the Chamber of Agriculture 5. Responsible for organic agriculture practices at the Chamber of Agriculture 6. Responsible for Sustainable Development at the Departmental Committee of Tourism 7. Director of the Tourism Office of the Gulf of Morbihan – Vannes metropolitan area 8. Responsible for Territorial Development at the Gulf of Morbihan Regional Natural Park (PNRGM) 9. Responsible for communication and pedagogic activities at the Gulf of Morbihan Regional Natural Park (PNRGM) 10. Director of the Gulf of Morbihan Regional Natural Park (PNRGM)



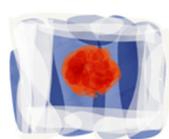
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NGO and Associations	<ol style="list-style-type: none"> 1. Member of Clim'actions 2. Member of Clim'actions 3. Project manager at local environmental association (Eau et Rivières de Bretagne) 4. Social and Solidarity Economy entrepreneur 5. Member of a local associative shop selling organic products (Court Circuit)
Primary activities	<ol style="list-style-type: none"> 1. Oyster farmer 2. Oyster farmer and entrepreneur 3. Farmer (traditional farming) 4. Farmer (organic farming) 5. Salt mine worker
Business and services	<ol style="list-style-type: none"> 1. Professional guide – fishing 2. Professional guide – aquatic sports 3. Administrator of an ecotourism facility 4. Naval architect and businessman 5. Architect
Academia	<ol style="list-style-type: none"> 1. Student (high school level) 2. Student (university level) 3. University associated professor 4. University professor

In the first stage of the project (WP1) between February 2018 and May 2019, twenty-eight semi-structure interviews were carried out with local stakeholders, aiming to set the basis to understand the impact of past, present and future changes in the territory, focusing on experiences related but not limited to climatic issues. Desirable long-term visions for the territory were also explored, as a preliminary step for the prospective workshop.

As a result, four narratives were conceived in an attempt to describe and to make sense of past, present and future changes in the territory as perceived by local stakeholders. These narratives of change are:

- Geo-social (from estuary to expanding little sea): the coast is not static line, but evolves in terms of its geographic/geological configuration, which also influences human presence in the region. Impacts of current infrastructure and economic activities intensify environmental impacts on coastal erosion and halieutic resources. Climate change is likely to intensify such impacts and to introduce new challenges (increasing risks of storms, flooding, submersion, etc), driving the reflection about possible strategies to face this everchanging dynamic.
- Historical (from primary activities to tourism): Since the 1960s, the development of the tourism sector has been transforming the economy, the landscapes and the resources on which traditional activities such as salt marshes, oyster farming, fishing and agriculture are based. Climate

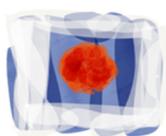


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change impacts both sectors and reflections on how to improve the resilience of each is an opportunity to explore models of a harmonic coevolution of both.

- Seasonal (winter time and peak season): there is an important gap between local life during peak season (summer) and winter time. When the latter comes, population decreases substantially in certain villages, since extensive zones of second homes residences are virtually empty. Local population, especially young people, struggle to live year-round in the territory, especially in terms of job availability and housing affordability. As they seek larger urban areas to escape these issues, finding socioeconomic and generational balance in the Gulf becomes progressively challenging.
- Climatic effects narratives (impacts on economic activities and socioeconomic profile): Climate change will impact seasonal dynamics in the region, as for instance longer summers are expected. Adaptive strategies to rethink economic activities in this future context may consider current socioeconomic challenges described in the Seasonal narrative. Additionally, the future climatic conditions of the Gulf are expected to resemble those of current Mediterranean regions, such as Southern France. This projection leads stakeholders to imagine an increase in the Gulf's population, both seasonal and permanent, as people seek alternatives to rising temperatures in other regions of the country.

These narratives are intertwined, they contribute to each other and coexist in time and space. A network of narratives was elaborated to reflect these interactions, based on a sample of quotes from stakeholders' interviews (Figure 1).



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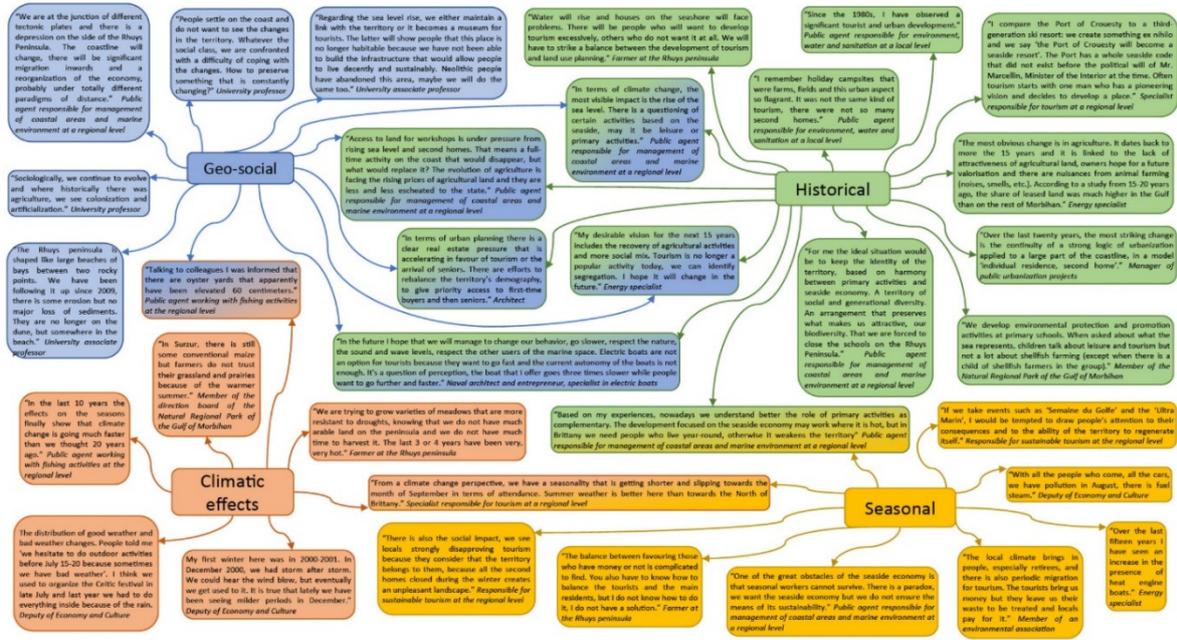
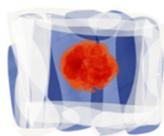


Figure 6.1: Network of narratives

The next step of the incremental scenario design was a prospective workshop, organized in March 7th, 2019, which gathered twenty local stakeholders to collectively reflect on a long-term vision for the Gulf of Morbihan during a three-hour workshop. To facilitate this exercise, we devised specific tools to encourage participants to consider multiple possibilities for the territory. Adopting 2200 as a time horizon, a physical scenario was presented considering 1 mm per year of local subsidence, a mean temperature increase of 6.5°C and a conservative (yet realistic) simulation of a 2.5 m rise in sea levels (based on the mean value of the Kopp-2017 model K14 – RCP 8.5). The “Climate Central’s Surging Seas” simulator was used to represent the sea level rise in comparison to current local infrastructure and a map of the territory was designed by local designer Marianne Cardon using Illustrator®, allowing the stakeholders to think about the future of the territory (Figure 2).



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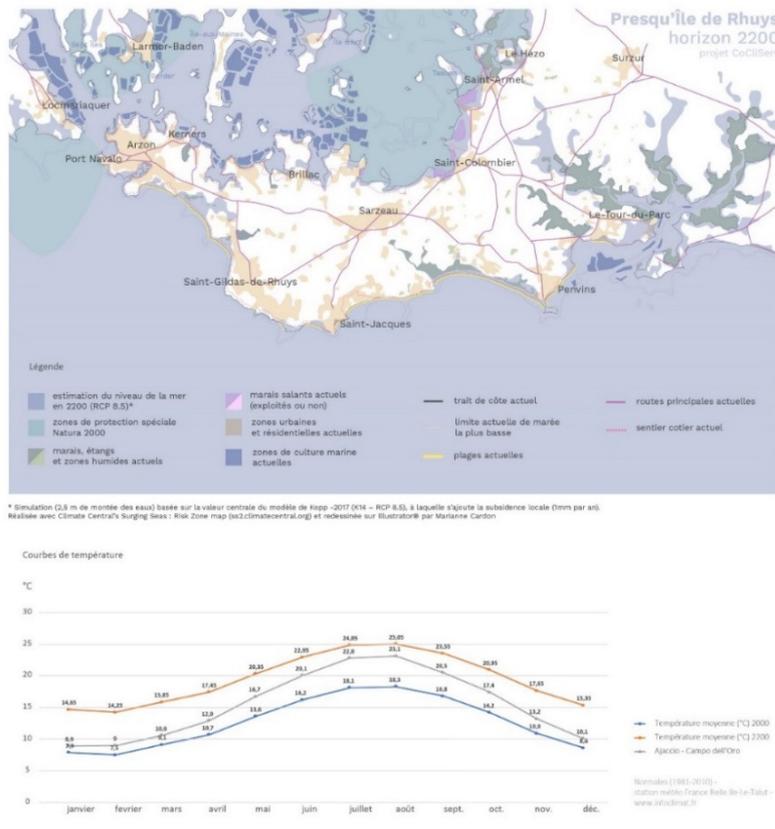
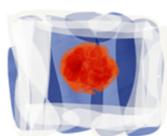


Figure 6.2. 2200 physical scenario map of the Rhuy peninsula (Elaborated by Marianne Cardon)

Additionally, a small series of factsheets summarizing current and future societal, environmental, economic and demographic trends complemented the context under consideration (Figure 3). The categories were urbanisation, societal tendencies, housing and real estate, natural resources, demography, tourism, employment and energy.



Figure 6.3. 2200 socioeconomic scenario elements for demography and tourism (Elaborated by Marianne Cardon)



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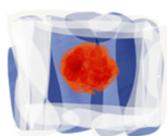
To support the activity, a creative exercise named poker design was devised. This type of ideation exercise, so-called “design thinking”, prioritizes stakeholders’ needs when elaborating a product or a concept and finds its origins in the work of Robert Mckim (1972) and Rolf Faste (1995). It has been widely publicized by Tim Brown (2008), founder of IDEO (American Design Studio). The local designer involved in the project, Marianne Cardon, and the University of Versailles Saint-Quentin-en-Yvelines team jointly conceived the poker design exercise. It consisted on a series of cards, combined in three categories, that visually represented key-elements of the narratives and the local context, as shown in Table 2 and Figure 4. By randomly combining cards from each category, groups of four participants were encouraged to imagine how these unlikely combinations could go together to describe future situations.

Table 6.2. Examples of poker design cards, relating the four narratives of change and the three poker design categories

Poker design categories	Categories of narratives			
	Geo-social	Historical	Seasonal	Climatic effects
Climatic changes and hazards	<ul style="list-style-type: none"> – Submersion – Flooding – Erosion 	<ul style="list-style-type: none"> – Drying soils – Sea level rise – Ocean acidification 	<ul style="list-style-type: none"> – Warmer summer and spring periods – Colder winters 	<ul style="list-style-type: none"> – Storms – Heat waves – Droughts
Infrastructure and territory	<ul style="list-style-type: none"> – First nautical mile – Subsidence – Beaches 	<ul style="list-style-type: none"> – Oyster farms – Coastal pathway – Salt mines 	<ul style="list-style-type: none"> – Second homes – Ports – Water treatment systems 	<ul style="list-style-type: none"> – Historical sites – Urban areas – Routes
Resources and actors	<ul style="list-style-type: none"> – Island owner – Intra-gulf nautical transport network 	<ul style="list-style-type: none"> – Oyster farmers and farmers – Direct selling – Tourists 	<ul style="list-style-type: none"> – Office of Tourism – Retired population – Seasonal workers 	<ul style="list-style-type: none"> – Measuring instruments – Scientific community



Figure 6.4. Prospective workshop participant utilizing poker design cards



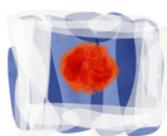
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Taking 2200 as a time horizon, so that present restrictions would be overcome, the abovementioned tools were fundamental in allowing participants to reflect on living conditions and on changes regarding housing, mobility and transportation, work and the future of certain economic sectors, as well as possible development paths for the territory, the evolution of their relationship with nature, among other issues. Finally, an innovative means of synthesizing and presenting the ideas was conceived: a note-taking support (Figure 5) allowed the participants to synthetically represent the scenarios created on a map of the territory and to imagine their insertion in their social, economic and environmental context. Then, they evaluated the innovative and desirable characters of the propositions. During these discussions, stakeholders also debated initial proposals of short-term actions (2030 horizon) and mentioned hinge points.

The figure shows a digital note-taking interface for a workshop. At the top, there are two input fields: 'Titre de la projection' and 'nom des participants :'. To the right of the map are two sliders: 'novateur' and 'souhaitable', each with a minus sign on the left and a plus sign on the right. Below the map is a section titled 'Cartes tirées' with three lines for notes. The map itself shows a coastal region with a legend for 'communes' (2016 and 2200) and a scale bar. Below the map are two large text areas. The left one is titled 'Quelle projection pour la presqu'île en 2200 ?' and contains three bullet points: '► Quelle économie locale ?', '► Quelle relation à l'environnement ? Quelle qualité de vie ?', and '► Quel usage du territoire ?'. The right one is titled 'Représentez la projection sur la carte Dessinez ou schématisez la projection'.

Figure 6.5. Note-taking support used during prospective workshop (Elaborated by Marianne Cardon)

Using these tools, the narratives' elements could be linked to the prospective exercise, encouraging deeper reflections about the territory and enhancing the participants' creativity while proposing their visions for the future.



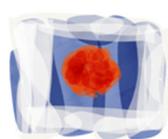
6.2. Results

6.2.1. Long-term incremental scenarios (2200 horizon)

The co-development process carried out in the Gulf of Morbihan resulted in two scenarios, named “Shore-centred adaptation” and “Countryside-based adaptation”. Each scenario is composed ten local issues for which participants conceived a desirable vision. For the two resulting scenarios, visions of nine local issues were consensual, while there are two desired 2200 visions regarding “Urbanisation and spatial planning”. Both scenarios are equally relevant and this display does not intend to prioritize the versions of desired futures proposed by the stakeholders. Table 3 describes the two co-developed scenarios.

Table 6.3. Incremental scenarios co-developed in the Gulf of Morbihan

Local issues	Shore-centred adaptation scenario	Countryside-based adaptation scenario
Primary activities	Implementation of sustainable practices in the primary sector. Short circuits bring together producers and consumers. Harmonious co-evolution of primary activities and the landscape.	Implementation of sustainable practices in the primary sector. Short circuits bring together producers and consumers. Harmonious co-evolution of primary activities and the landscape.
Soft and low carbon mobility	A territory that favours soft and shared mobility, through development of infrastructure for already existing technologies (bicycles, buses, boat buses) and investment in the sectors of the future (shared, electric, autonomous means of transport).	A territory that favours soft and shared mobility, through development of infrastructure for already existing technologies (bicycles, buses, boat buses) and investment in the sectors of the future (shared, electric, autonomous means of transport).
Housing	Adapting local habitat in terms of construction (techniques, materials, etc.) and usage (seasonality, sharing, etc.).	Adapting local habitat in terms of construction (techniques, materials, etc.) and usage (seasonality, sharing, etc.).
Innovative economic models	Development of an active economy all seasons, evolution towards economic models of sharing and service. Short circuits between producers and consumers.	Development of an active economy all seasons, evolution towards economic models of sharing and service. Short circuits between producers and consumers.
Demographic balancing	A territory accessible to permanent residents as well as tourists, rich in generational, social and demographic diversity.	A territory accessible to permanent residents as well as tourists, rich in generational, social and demographic diversity.
Energy and food autonomy	Incentivizing food autonomy by promoting primary activities and short circuit in the territory, as well as a model of energy autonomy based on renewable energies.	Incentivizing food autonomy by promoting primary activities and short circuit in the territory, as well as a model of energy autonomy based on renewable energies.
Cleaner environment	Reducing production and improving waste treatment. Improving water quality and focusing air quality, especially during the summer months due to boats and cars with thermal engines.	Reducing production and improving waste treatment. Improving water quality and focusing air quality, especially during the summer months due to boats and cars with thermal engines.



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Biodiversity conservation and environmental protection	Preservation of fragile ecosystems and endangered species.	Preservation of fragile ecosystems and endangered species.
Regional planning/ Urbanization	Population continues to occupy coastal areas, leading to intense adaptation efforts against climate change hazards.	Population retreat and densification of inland urban areas. Recovery of the natural coastal landscape.

6.2.2. Backcasting potential actions

The following step of the analysis was compiling the potential actions proposed by the participants as components of the trajectory between present and future. Twenty-five actions were identified as part of this backcasting process, which can be linked to one or multiple local issues, as shown in Table 4.

Table 6.4. Actions composing the backcasting trajectory and their relation to local issues

Reference	Action	Description	Local issues
1	Develop infrastructure for irrigation in agriculture	Invest on polders and dykes to control water flow for the irrigation of lands and crops.	- Urbanisation and spatial planning - Primary activities
2	Protect oyster farming infrastructure from the effects of real estate market and touristic pressures.	Develop regulatory tools reinforcing the preemption rights of Safer (land development and rural establishment public societies) aiming to prevent oyster farming infrastructure from being reconverted for non-agriculture related purposes.	- Urbanisation and spatial planning - Primary activities
3	Build vertical villages	Conceive vertical villages based on aggregated multi-purpose spaces (schools, offices, housing, etc).	- Urbanisation and spatial planning - Demographic balance
4	Remedy coastline retreat	Develop technical solutions to coastline retreat, such as artificialisation, elevation of beaches, etc.	- Urbanisation and spatial planning
5	Regulate circulation during peak season	Set up rules regarding the circulation of boats and vehicles powered by combustion engines during summer.	- Cleaner environment - Tourism - Primary activities
6	Define a chart for the different navigation modes	Make a chart concerning the different users of the maritime space (motorboats, sailing boats, paddles, swimmers, etc). Identify their constraints and needs to incentivize their harmonic coexistence.	- Soft and low carbon mobility - Tourism - Primary activities
7	Invest in a boatbus network	Invest in a boatbus network, favouring electric boats, aiming to utilize the inland sea as an alternative for roads for passenger transport.	- Soft and low carbon mobility - Demographic balance
8	Sensitize the local community about nuisances related to sustainable agriculture	Sensitize farmers and habitants of areas around farms about nuisances related to sustainable agriculture. For instance, farmyard manure might produce odours but they replace chemical fertilizers effectively.	- Cleaner environment - Primary activities



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9	Develop short circuits for agricultural products	Favour short circuits and direct sale for products from farming, fishing and oyster farming.	- Innovative economic models - Primary activities
10	Decrease the use of chemical fertilizers	Reduce the use of chemical fertilizers in agricultural lands to reduce nitrate and phosphate levels in local water bodies, thus preventing eutrophication and algae bloom.	- Cleaner environment - Primary activities
11	Technical innovation in favour of primary activities	Develop technical solutions and implement sustainable practices in the primary sector (permaculture, agroforestry, oyster culture in open sea, climate-resilient species, algae as a substitute for meat, etc).	- Biodiversity conservation and environmental protection - Primary activities
12	Protection of agricultural lands	Assure sufficient agricultural land is available by means of spatial planning regulation.	- Urbanisation and spatial planning - Primary activities
13	Develop renewable energy in the territory	Invest on renewable energy systems (solar, wind, marine, hydrogen from algae, etc), as well as in desalination and valorisation of by-products.	- Food and energy autonomy
14	Implement the energy transition	Implement and accelerate the energy transition, notably in the housing sector. Reduce residential energy consumption and improve thermal insulation.	- Housing - Food and energy autonomy
15	Reflect on seasonal and mixed use of spaces and infrastructures	Develop voluntary schemes of house sharing, notably during off-season (winter). Develop sensitizing tools concerning rational and multipurpose use of spaces and infrastructures for primary and tertiary activities.	- Tourism - Housing - Innovative economic models
16	Promote innovative and low carbon construction	Favour low carbon, innovative, climate-resilient construction, which values local resources.	- Housing
17	Incentivize the use of a local currency	Develop awareness raising actions and incentives to the use a complementary local currency, such as the Bizh, aiming to promote the local economy and strengthen ties between local stakeholders.	- Innovative economic models
18	Create Social and Solidarity Economy Investors Clubs	Create "Investors Clubs" to finance and support projects developed in the Social and Solidarity Economy model, especially initiatives concerning sustainable development and the fight against climate change.	- Innovative economic models
19	Develop service and functional economy	Imagine new professions and work possibilities linked to service and functional economy, aiming to create local, long-term employment. Some possibilities are barter exchange platforms, objects and material sharing, rental of boats and mooring points, as well as reuse and recycling initiatives.	- Innovative economic models - Tourism - Demographic balancing
20	Reinforce housing policy and programmes	Develop more housing programmes regarding buying and renting options, favoring social, generational and demographic balance in the territory.	- Demographic balancing
21	Increase young people's interest in the territory	Invest in public infrastructure (such as public spaces for collective activities, transport networks, etc.) in order to create an attractive territory for younger generations	- Urbanisation and spatial planning - Demographic balancing



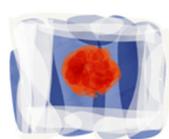
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22	Increase the capacity of wastewater treatment stations	Increase the capacity of the wastewater treatment stations located in the Rhuys peninsula, aiming to manage seasonal peaks and to efficiently treat pollutants such as heavy metals, medicines, phosphate and nitrate.	- Cleaner environment
23	Develop programs of environmental education	Create programs of environmental education and awareness raising for publics of all age, including kids.	- Cleaner environment
24	Increase coastal reserve areas	Increase the coastal reserves registered in spatial planning documents, in order to protect a larger area of the coastline. This could possibly be conceived to set the basis for a future governmental buyback program.	- Urbanisation and spatial planning
25	Set limits to urban sprawl	"Redensify" and vegetate cities, especially by favoring the construction of higher buildings in downtown areas.	- Urbanisation and spatial planning

In terms of actions, the focus of the prospective workshop was to brainstorm possibilities and collect ideas, so details on their implementation and specific timeframes have not been developed other than setting 2030 as time horizon. An online participatory process is ongoing during which stakeholders will select which actions should be further detailed during a second prospective workshop, to be carried out in March 2020.

6.2.3. Hinge points

Data analysis registered 23 mentions of hinge points during the prospective workshop and semi-structured interviews which, after excluding reoccurrences, resulted in a total of 11 unique hinge points (Table 5). Eight of them described past situations, but are nonetheless worth mentioning due to their role in allowing participants to imagine similar (or opposing) possibilities in the future and to identify potential actions. Three future hinge points were mentioned, linked to the local issues "Urbanisation and spatial planning", "Food and energy autonomy" and "Demographic balance".



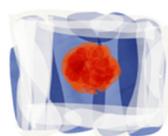
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Table 6.5. Hinge points and associated local issues

Description	Chronology	Origin	Local issues
Creation of the Natural Regional Park of the Gulf of Morbihan	Past	Institutional	Urbanisation and spatial planning Biodiversity conservation and environmental protection Primary activities
Decision by the PNR to prohibit changes in land-use in agricultural areas	Past	Institutional	Urbanisation and spatial planning Primary activities
Enforcement of the Coastal Act	Past	Institutional	Urbanisation and spatial planning Demographic balance Primary Activities
Decision to plant exogenic trees on cliffsides, which lead to an acceleration of erosion processes	Past	Urbanisation and spatial planning	Urbanisation and spatial planning Biodiversity conservation and environmental protection
Development of tourism and construction of the Crouesty Port	Past	Urbanisation and spatial planning	Urbanisation and spatial planning Tourism
Regulatory changes following the Xynthia storm	Past	Climatic effects (storm)	Urbanisation and spatial planning
Parking interdiction in fragile areas of the coastline (e.g.: dunes, bird nesting sites)	Past	Institutional	Urbanisation and spatial planning Biodiversity conservation and environmental protection
Restructuring of main roads and creation of bicycle lanes	Past	Institutional	Urbanisation and spatial planning Soft mobility
Hardening of the Coastal Act following changes in the coastline	Future	Climatic effects (changes to the coastline)	Urbanisation and spatial planning
Amendment to the Coastal Law allowing installation of renewable energy infrastructure where construction is currently forbidden	Future	Institutional	Food and energy autonomy
Increase in migration flow to the Gulf of Morbihan as a consequence of temperature rise in other regions	Future	Temperature rise	Demographic balance

6.2.4. Integrated diagram of scenarios

In Figure 6, all elements that compose the incremental scenarios are organised in a single diagram. Moving from left to right is the equivalent of advancing in time, although proportions do not represent any particular scale. Starting from the left, the identified local issues are displayed in the present time, as frameworks of stakeholders' reflection on the desired future. For each issue, there is a horizontal line indicating the progression from 2019 to 2200 and the numbers in the rectangles represent the actions proposed by stakeholders (Table 4). These actions are not displayed according to any particular



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prioritization nor is any implementation order meant but the attribution of numbers, since this level of detail will be discussed in the next prospective workshop.

If an action can be linked to more than one local issue, it will be represented in all of their respective horizontal lines (in rectangles of the same colours) and connected through dotted vertical lines. Hinge points are represented as rhombuses and roman numerals and their relation to scenario formation is detailed in Table 5. On the right side of the image, the “Common 2200 desired vision” is represents all nine consensual visions (Table 3). Finally, combining this common vision with each of the outcomes from hinge point III results in the two incremental scenarios.

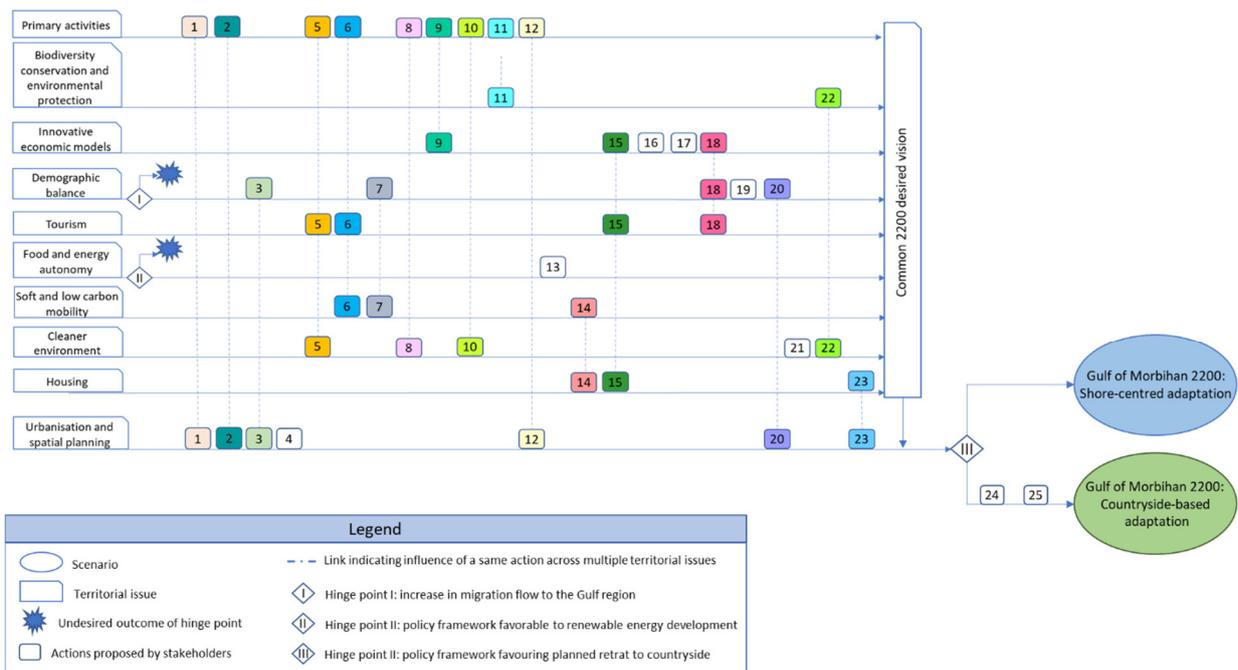
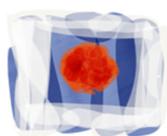


Figure 6.6. Co-developed incremental scenarios – 2200 horizon

6.3. Reflection

6.3.1. Methodological reflection

The two incremental scenarios are a result of a methodology that includes local narratives of change as a starting point to a long-term scenarisation process

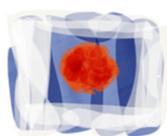


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focusing on desirable futures. This work started out with semi-structured interviews, during which stakeholders evoked climatic changes mostly spontaneously, encouraged only by broad questions. Interviews would end with a question about their desirable vision for the Gulf of Morbihan in 2200, regardless of any current constraints. Reactions to this proposal were mostly positive, although some of the interviewees considered this exercise as “too abstract” and the long-term nature of this reflection to be anxiety-inducing when presented individually since it moves beyond the timeframe of individual human-life. This perception seems to have changed during the prospective workshop, which is likely linked to the collective dimension of the activity and to the elements offered as creative supports (poker design cards, socioeconomic and climatic trends, etc). This hypothesis may be verified after the second workshop, by means of specific questions at the post-workshop evaluation grid.

At first glance, the “human- or nature-priority” of the two scenarios seems to be the main difference between the scenarios (either humans make space for nature to take back the coast by moving back to inland or humans decide to stay and overcome the challenges of the rising waters). However, concerns about public access to the coastal pathway were an additional element to the “Countryside-based adaptation”, in opposition to the private nature of the second homes and the socioeconomic imbalance they represent. This was not evoked by those proposing “Shore-centred adaptation”, although there was consensus amongst all participants regarding the desired vision for the “Demographic balance” local issue, which included assessing the issue of beach houses and second homes in the Gulf as a problematic one.

This shows climatic aspects of the projections and current socioeconomic issues being analysed simultaneously, which was indeed an objective of the methodology being tested. Furthermore, this apparent contradiction reflects the narratives’ capacity to make room for nuance and multiple human experiences.



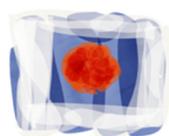
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Scientific data is often presented as precise, although biases are ubiquitous, which is one of the reasons why it remains the dominant discourse when debating long-term, complex issues such as climate change. However, there is a certain indisputability to “science as unbiased” approach, making it less efficient when social changes are required and dialogue is fundamental. On the other hand, adding narratives as a way to portray scientific and non-scientific elements (values, fears, desires, etc.) of the discussion has facilitated the dialogue between stakeholders. Idea exchange and, ultimately, the scenarisation process, was facilitated because stakeholders were able to resort to shared references regarding the local narratives of change regardless of disagreements about their versions of the desired future.

Narratives have also facilitated researchers’ understanding of the local context, by making sense of a great deal of data, issues, history and stories, allowing them to better grasp people’s experience in the Gulf of Morbihan. They have also informed the organisation of prospective workshop, especially the elaboration of the poker design methodology, which was all the more able to enhance creativity because the issues being explored were relevant to the participants.

Discussions about long-term visions were carried out simultaneously with initial reflections on hinge points and potential actions, since the entire exercise was based on combinations of poker design cards. That means it was a methodological choice to not have separate discussion for each aspect, in order to profit from the creative dimension of the poker design and to optimize the work during a session limited to three hours. This choice presented satisfactory results, reflected on the quality of the discussions and the relevance of the scenarios, actions and hinge points proposed.

Finally, advantages of the interdisciplinary nature of this methodology were observed. The artistic dimension of the poker design mobilised the participants’ creativity and undoubtedly contributed to the quality of the final result. The



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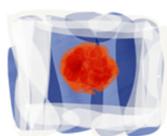
collaboration between social and climate scientists allowed researchers to communicate to the participants a coherent vision of the issues at hand, composed of climatic and socioeconomic dimensions. This set the tone of the collective discussions during the workshop and, as a result, climatic information needs start to emerge from the joint narratives/incremental scenarisation approach, as desirable visions and adaptative actions to get there are co-developed. These results contribute to the development of action-oriented, demand-driven and science-informed climate services, which is the goal of the CoCliServ project.

6.3.2. Preliminary assessment of climatic information needs

A preliminary evaluation was carried out to identify the climatic information needs expressed by local stakeholders during the semi-structured interviews and the prospective workshop. The results were:

- Impact of storms, sea level rise and marine submersion for coastal risk management;
- Occurrence of extreme events for agriculture, tourism and territory planning
- Seasonal changes for primary activities and tourism
- Temperature rise (air and water) for primary activities, tourism and, to some extent, territorial planning
- Pluviometry changes for agriculture

A collaborative analysis between climate and social scientist continues to detail this information (format, timeframes, etc.) and is working on the identification of their potential sources. Climatic information needs that are even more precise are expected to rise after the second prospective workshop (March 2020), during which specific adaptative actions will be prioritized and detailed.



7. Case study: Kerourien, Brest, France

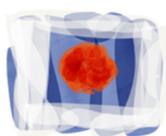
As described in D1.1 the scenario exercise in Kerourien follows “The beautiful stories of Kerourien”, bringing together local stakeholders, other neighborhood residents and project participants through a multi-day festival that included three art forms synthesizing and embedding the efforts of WP1 in narratives as described in D1.3 and 2, two public meetings that created the conditions allowing for the emergence of the main scenario plot lines. The two debates, 2h each, are entitled “Power” and “What to do today to love our neighborhood tomorrow”.

Completing the public debates and art forms allowed us to identify preliminary questions from the five main narratives :

- i. How are community priorities such as housing and physical safety connected with climate narratives in representations of daily life and world views;
- ii. How do 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 these political choices and residents’ dynamics.

From these, we arrived at the three main narrative lines that will be explored in the next steps of the scenario exercise, with special emphasis on how gender weaves into them:

- Sc_K_1: Social justice related with climate change and local weather.
- Sc_K_2: Migrations and their associated consequences at each unbalanced step.
- Sc_K_3: Housing and urbanization in a changing climate context.

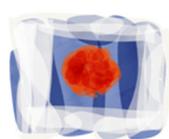


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Table 7.1. Main narrative lines from the locally controllable and not locally controllable perspectives.

Trends, challenges and desires	Controllable locally	Not controllable locally
Social justice	<ul style="list-style-type: none"> • Employment. • Local funding & distribution. • School dynamics. • Local NGO dynamics. • Trust conditions. • Empowerment. 	<ul style="list-style-type: none"> • Criteria for residents' acceptance. • Rules for balancing the public and private sectors. • Regional and national funding.
Migration	<ul style="list-style-type: none"> • Inform immigrants about climatic conditions in the places they come from or they want to go next. 	<ul style="list-style-type: none"> • Immigration flow. • Trigger/s for migration.
Housing and Urbanization	<ul style="list-style-type: none"> • Union for H/U rights. • Political pressure. 	<ul style="list-style-type: none"> • Climate planning. • Water scarcity planning. • Energy planing. • Municipal urbanization planning. • Investments for housing rehabilitation.

With this starting point it has been hard to find the right timing to do the scenario workshops for several reasons impacting local daily life: **21 and 22 April 2019**, Shooting by a gang of young adults reported to the police. The police inspected the scene and discovered a shell casing from a 9 mm, confirming the story of the victim. Monday evening, new shots rang out in early evening. The case would be linked to that of Sunday, with a backdrop of rivalry between two neighborhood gangs. Kerourien, Pontanezen, Kerbernard? We still do not know which are incriminated. **27 August 2019**, Another shooting by a gang of young adults reported to the police. The event took place around 11pm Tuesday. Many gray areas cloud how the event unfolded, its potential perpetrators, and the

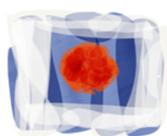


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victims. Four people are still in custody, the two victims still hospitalized. **21 September 2019:** Another shooting Saturday night. At least four shots fired in Kerourien. Three people were injured. **And 22 September 2019, too:** Three people were injured after gunfire on Sunday night. Inhabitants are tired. A neighbor who has lived in the Kerourien district of Brest since 1971 says on Sunday night, at the foot of her building, at least four shots were fired. "I heard at least four shots, even my cat jumped ... After, I saw an ambulance arrive but I do not know".

The work plan has been delayed and we will merge D2.2 and D2.3, with the intention to recover trust conditions during the process of doing the scenario exercise in face-to-face meetings to explore the environmental, social and policy scenarios related with the questions above. The plan is to work with three groups of high trust: social action stakeholders, local politicians and residents, launched during the "belles histoires" and working locally as "comme un chantier".

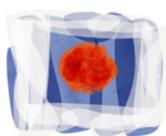
The main challenge for us is to connect the identified desired futures expressed through the inhabitants' and stakeholders' narratives with available scientific knowledge about climate change in order to develop the scenario-based narratives that capture the complexity and empower the inhabitants through the process. This will feed the Kerourien scenario and hinge points report (D2.2) and the ground-tested scenario development protocol (D2.3) that will be merged in the same document as part of D2.3.



8. Reflection

The CoCliServ project conducted scenario case studies in five case study locations in the Netherlands, Germany, Norway, and France. Building on the narratives of change developed in Work Package 1, we developed visions of desirable futures, scenarios and options, and potential hinge points that might steer developments in alternative directions along the way.

In general, we managed to work successfully with all parts of the process described in the CoCliServ Draft Scenario Protocol (Wardekker et al., 2018). The early stages of the process, such as visioning and early brainstorming on options seemed relatively easy for participants (they often led this independently), whereas the later stages such as detailed backcasting, placing options on a timeline, and hinge point development were more difficult (the moderators needed to do more prompting or lead the process). Most case studies did find that the process takes considerable time to work through. This is similar to backcasting studies in the literature, which often take multiple full days of work to develop detailed scenarios and plans. There's also a clear trade-off between in-depth discussion with small groups, ca. 6 persons worked very well (more detail, but less representative) and larger gatherings with many actors and residents (more representative, but less time for detailed discussion). The CoCliServ cases generally used workshops of 4-6 hours, but were not always able to fit the entire process in a single workshop. Consequently, we had to focus on specific aspects. For instance, Bergen, Jade Bay and Morbihan focused relatively heavily on the visioning and option design & backcasting, leaving little time for the hinge points. We would advise to use dedicated note-takers (or Jade Bay's 1-2-4 method) in addition to reporting by the moderators. Dordrecht conducted the entire process in a single workshop, by intentionally not going into too much detail for the option design. We would advise to use either multiple workshops or supplement a workshop with pre- or post-workshop analysis.



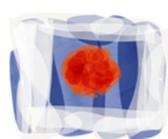
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Each case study independently developed two or three core storylines based on the narratives collected in each case study site (Table 8.1). Most of these storylines are highly integrative. They contain elements strongly related to climate change and adaptation, but also focus on broader challenges, transitions and themes, such as community, social justice, migration, innovation & technology, urbanisation, and climate change mitigation. We found that basing vision-development on local narratives of change helped build such integrated visions and scenarios, and that local collaborators found these more relevant to the local situation than purely climate-related scenarios.

Table 8.1. Scenario foci/storylines of the case study sites.

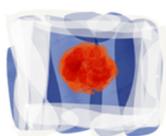
Dordrecht (NL)	Jade Bay (DE)	Bergen (NO)	Golfe du Morbihan (FR)	Kerourien, Brest (FR)
Close-knit island community	Oldenburger Land & climate change	A 1.5 degree city	Shore-centred adaptation	Social justice
Innovative connections	Jade Bay 50% carbon emission reduction	Let it rain	Countryside-based adaptation	Migration
Water safe & water wise (left undeveloped)	Ammerland & climate change (climate democracy)	High-tech haven		Housing & urbanisation

Our visions and scenarios dealt with timelines of 2030, 2050, and 2200. The shorter timelines were relatively easy to work with for local actors. In particular, 2030 is often used on local planning and visions and is easy to connect to near-term and medium-term local actions. The longer term was seen as more abstract. An advantage is that it may draw people out of their present situation and actions, and include large scale change and transformations, but it does require methods that help make it more concrete. We designed and applied several creative methods to facilitate this, such as card drawing / poker methods (Bergen, Morbihan), mapping (Morbihan), and collage creation (drawing, cutting and pasting assorted images, etc.) (Dordrecht). Participants appreciated these and could use them to move from abstract visions to concrete actions.



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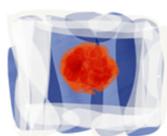
The work on hinge points was successful. The Dordrecht team in particular did a detailed participatory hinge point analysis, and the participants (policymakers, researchers and residents) could – with some prompts and examples – work very well with the hinge points matrix in Appendix A.1 and Table 2.1. Bergen gathered hinge points in a second workshop with the project team. We felt that this was less satisfactory. It resulted in many hinge points (Appendix A.3), but the team was constantly hesitant on whether the local actors might have had other ideas. The Jade Bay and Morbihan deduced hinge points from the discussion notes, which was relatively successful, but this is dependent on detailed notetaking and a lively discussion that does address these points (which may require some prompting from moderators). Interesting aspect in Morbihan was that it explicitly included major past hinge points, which can provide good examples of what a hinge point means and might be expected in the future. Interesting in Dordrecht was that it explicitly included positive hinge points – developments that local actors could use as a window of opportunity to move to an even better situation. This aspect was highly appreciated by local actors, as it allowed for a more positive discussion of the future. While the individual hinge points are case dependent, we can observe some similarities. Particularly, while there are many climate-related hinge points, many more locally relevant ones are related to events and trends in politics, decision-making and legal aspects (at local, regional, national and EU levels), social dynamics, public imagination and concerns, and to technology. This was a very prominent feature in all case studies. One relevant point of discussion in the Jade Bay case was the difference between ‘directly climate-related’ and ‘not directly climate-related’ hinge points. This distinction is often very murky in debates on local visions and scenarios. For instance, residents may have different (often broader) ideas of what is climate related than climate scientists (and other fields of science and policymakers may again have other ideas). There are also many aspects that are indirectly climate



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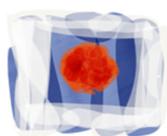
related. Similarly the axis of 'locally controllable' versus 'not locally controllable' may depend on which actors are at the table. Consequently, using the hinge points matrix as *analytical tool* results in somewhat forced or artificial divisions. Rather, it should be used as a *discussion tool*, with the explicit understanding that the intention is that it should open up the discussion for participants, to allow them to mention all aspects they deem relevant to their local situation, to go beyond the ones that may be climatic.

We were also able to elicit information needs, based on the scenarios or hinge points. The latter was particularly successful in Dordrecht, the other groups had insufficient time to do this exercise explicitly. This followed similar lines as the observations discussed for hinge points. While some specific and new climate science needs emerged from the discussions, three other points were very prominent across the case studies. Firstly, it is often not so much about what science is available. As participants in multiple cases noted: there is much available already. It is more about how climate knowledge is made available and presented (e.g. formats), communicated and used in decision-making. Secondly, there is a strong need for information services related to climate politics and decision-making (e.g. policy and legal developments). Thirdly, there seems to be a strong need for social spaces where different local actors can articulate and discuss their concerns and ambitions regarding climate change, local futures, and the way forward, involving a variety of actors and forms of knowledge.



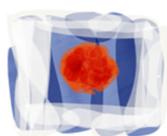
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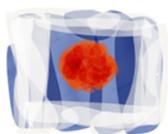
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Appendices

A.1. Hinge points flyer

Hinge points – critical moments where our plans might turn out differently

What are hinge points?

There are points in our plans where something really essential needs to be done (will we do this well or not?), or where our plans could run into trouble (there can always be surprises). We'll need to anticipate these, and respond in time.

In designing future visions, plans, or scenarios, we've developed ideas on how to reach our vision(s) of a desirable future. Behind these ideas, there's certain logic: they form a (sort of) step-by-step story of how we think we might achieve our vision. Some of these steps may be 'essential'¹. However, in practice, that story and the future in general might always take a different turn. The question in this exercise is: where could the story take an unexpected (good or bad) change?

Compare it to a route planner: we have the destination (our future vision), and a plan/route on how to get there (the scenario/options). However, during our trip, we might encounter red traffic lights, road works, or we remember that we also needed to do grocery shopping along the way. If we ever want to get to our destination, we'll need to keep that in mind: we'll need to take the right turn at the right moment, or find an alternative route.

Examples of hinge points.

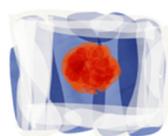
	Things we <i>can</i> influence locally ("are our plans resilient enough?")	Things we <i>can't</i> influence locally ("surprises from outside")
Things that <i>are</i> directly climate-related	<p>In X years, we'll have a new sewer system in our neighbourhood. It'll easily be there for dozens of years.</p> <ul style="list-style-type: none"> - We'll need to decide on how large the sewer will be. If it's too narrow, future heavy rain showers will flood the streets. - A little while before construction, we will need information on how much water the sewer should cope with in the (far) future. 	<p>What if sea level rises more quickly in the future and the dikes and other flood defences can't cope with it anymore.</p> <ul style="list-style-type: none"> - How quickly would this become a real problem for us? What are the consequences? - Could we think of something innovative to protect our neighbourhood? And what information would we need to make the right choices in this plan?
Things that <i>aren't</i> directly climate-related	<p>In our plans, we want to account for vulnerable groups. E.g., we need cooling, shade in/around retirement homes and spaces where elderly people could meet and stay involved in the community.</p> <ul style="list-style-type: none"> - How flexible are current plans for the neighbourhood? When should we pin these matters down, and make a final decision on how to implement them? - When do we need info on how many elderly will live in the neighbourhood in the future (therefore: how many homes and recreation are needed)? 	<p>What if there's another economic crisis in the future? How could that impact our plans?</p> <ul style="list-style-type: none"> - Which plans are most vulnerable to such a crisis? Are there groups in the neighbourhood that would be hit extra hard? - Are there alternatives to our current options, and how easy would it be to change our approach? What consequences might it have for the affordability of our plans and the cost of living in the neighbourhood?

Why are they important?

Just like the example of the route planner, you'll want to spot potential problems before it's too late. You'll want to account for it – steer the developments in the right direction – when we can still do something about it. Hinge points are important for two reasons:

- They show potential weaknesses (and 'windows of opportunity') in the plans.
- You can use them to think about what kind of information you'll need at what time.

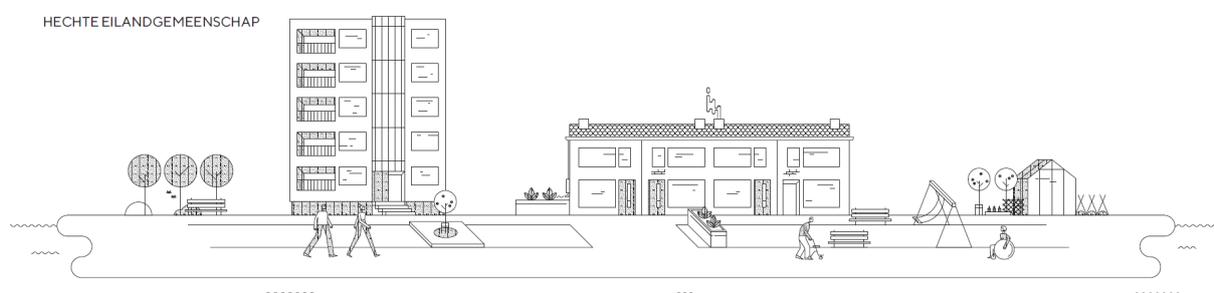
¹ Note: in the Dordrecht scenario workshop, we've included an exercise where we scored all options as 'essential' (need to have) versus 'non-essential' (nice to have) and short term versus long term.



A.2. Dordrecht themes/narratives

Close-knit Island Community

On an island, you're dependant on each other. Therefore, it is important that we collaborate. That people at the municipality and other governments and people in the neighbourhood start a conversation and collaborate. That we keep an eye on vulnerable groups such as elderly and the ill. This is important to keep in mind, especially now that the neighbourhood is changing quite a bit.

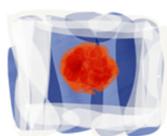


'If there's (a lot of) water in the street, such as during flooding, that has consequences... the entire social structure collapses for some time'

'A voluntary rescue brigade, I think we'll need something like that...'

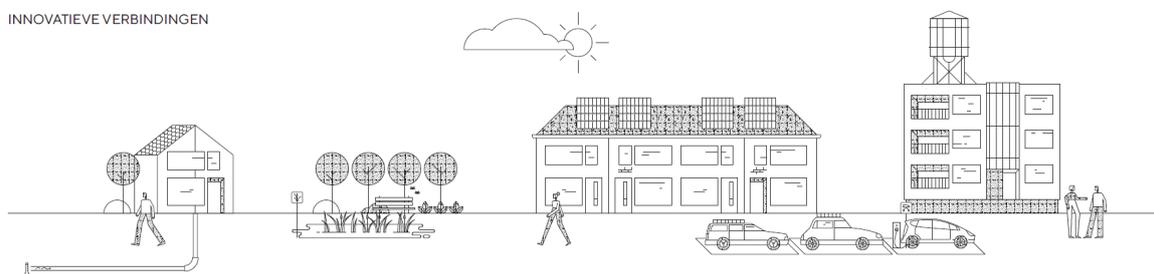
'For most future problems, such as climate change, it's impossible that one party solves everything. You'll always need collaboration between governments, citizens, and societal organisations.'

'If there are plans to change things, residents need to be involved. Not just sending a letter about what's going to happen. More like "OK, this is what we want to achieve, how do you think we should do this, and do you think we're on the right track?"'



Innovative Connections

An island sounds isolated, but in reality the connection with the wider world is of extra importance. Everything is interrelated. A broad view is therefore of great importance. You cannot separate water and adaptation to climate change from a broader view of sustainability and environmental care. But also not from the economy, housing, a good, healthy and safe living environment, and other things that are happening in the neighbourhood.

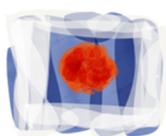


"We all have to make a contribution. Small things, the greenhouse gases, we have one small car. If everyone thinks so, it will grow. Always start with yourself."

"We are always surrounded by the rivers, but also have a connection with the Biesbosch. That was not only an area with rivers, but also with ebb and flow, with economic functions, fishing, polders and agriculture"

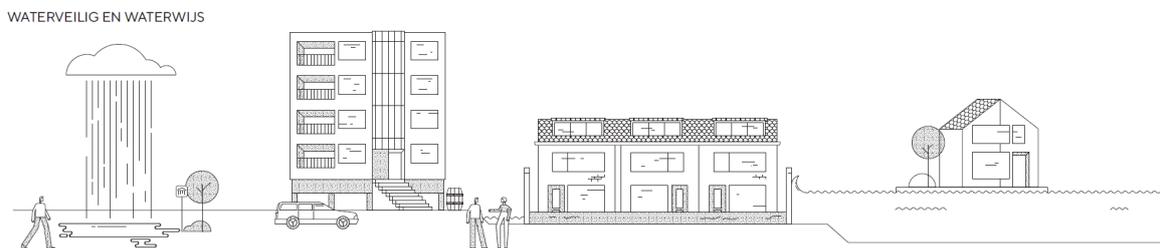
"We are going to build many new houses in the coming years. There is a lot of demand for that. And then you can do that better in a sustainable way and also in a way that makes the houses and neighbourhood more resilient to climate change. That is why we give construction projects an extra focus on that."

"One in three people is on social assistance, one in four has problem debts. Many divorces, single parents, and more such things. People have many other concerns."



Water Safe & Water Wise

An island is dependent on weather, wind and water. Dordrecht is surrounded by rivers, with low-lying areas and close to the sea - and therefore vulnerable. The city and the neighbourhood must remain safe, also in the future. But Dordrecht has also been used to dealing with water for years and centuries. That is something we can be proud of and perhaps take advantage of.

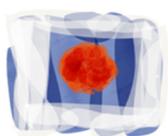


"I think that the awareness (around water) in Dordrecht is better than in the rest of the Netherlands. We are more aware of living with water - it is an island, an island between all rivers."

"It is a combination of wind from the west, spring tide and (high) water in the rivers. With that combination you get very high water levels. And we know that something can happen and that is why we can prepare with sandbags and other things."

"You put things in low-elevation spaces that you don't mind getting wet. So you put your bike in the basement, but not your books, and no wooden or parquet floors."

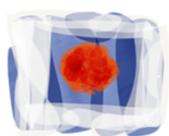
"The gardens are very low in elevation. This is a peat area and it continues to settle. When it was very wet, everything was covered in mud. My entire house sagged."



A.3. Bergen scenarios and hinge points

Attached are the English-translated results of the group work in all three groups. Producing a clearly legible digital version of this desktop work meant some re-organisation of the labels on the page, and some colour coding, but we have tried to re-produce the groups' work as faithfully as possible.

The final appendix contains the hinge points identified in an *ex post* analysis of the back casting exercise for each scenario, in December 2019 by Elisabeth Schøyen Jensen, Anne Bremer, Scott Bremer, Jeroen van der Sluijs and Arjan Wardekker.

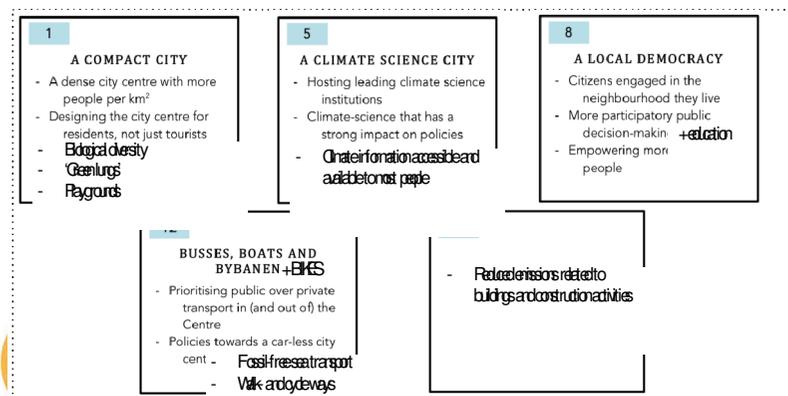


Scenario A: A 1.5 degree city



CONTROLLING CLIMATE CHANGE: BERGEN AS A LOW-EMITTING CITY

“The goal is for the people of Bergen to limit their climate footprint in line with the UN agreement on climate change. In 2050, we will have succeeded in ensuring that the people of Bergen do not contribute more GHG emissions than the Earth can handle.” (Grønn Strategi, 2016)



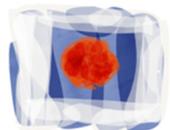
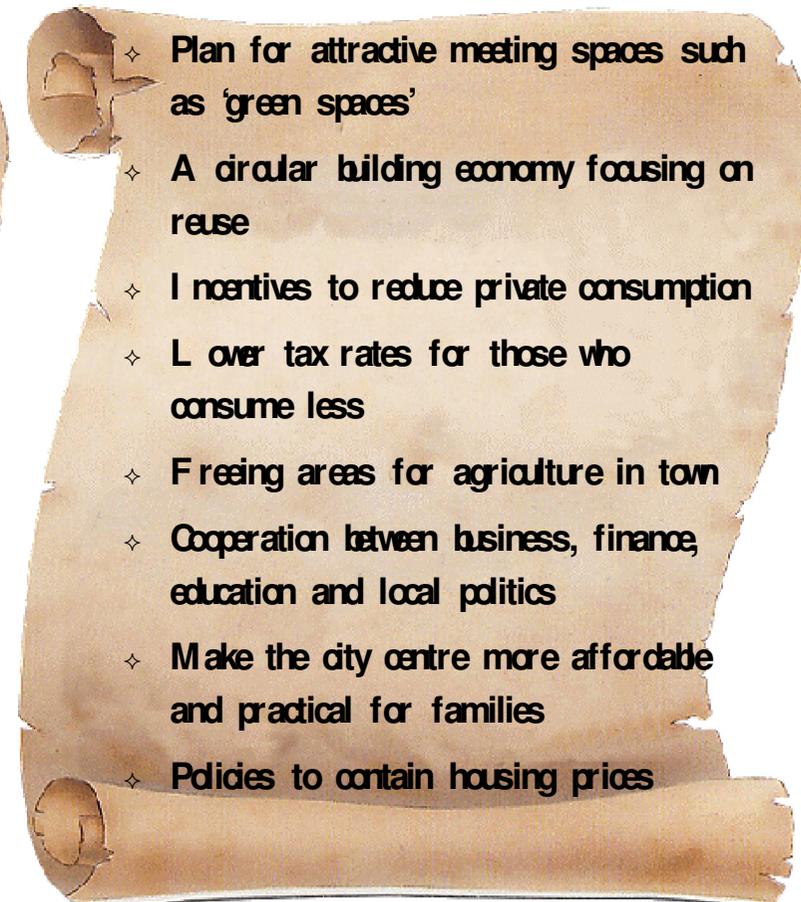
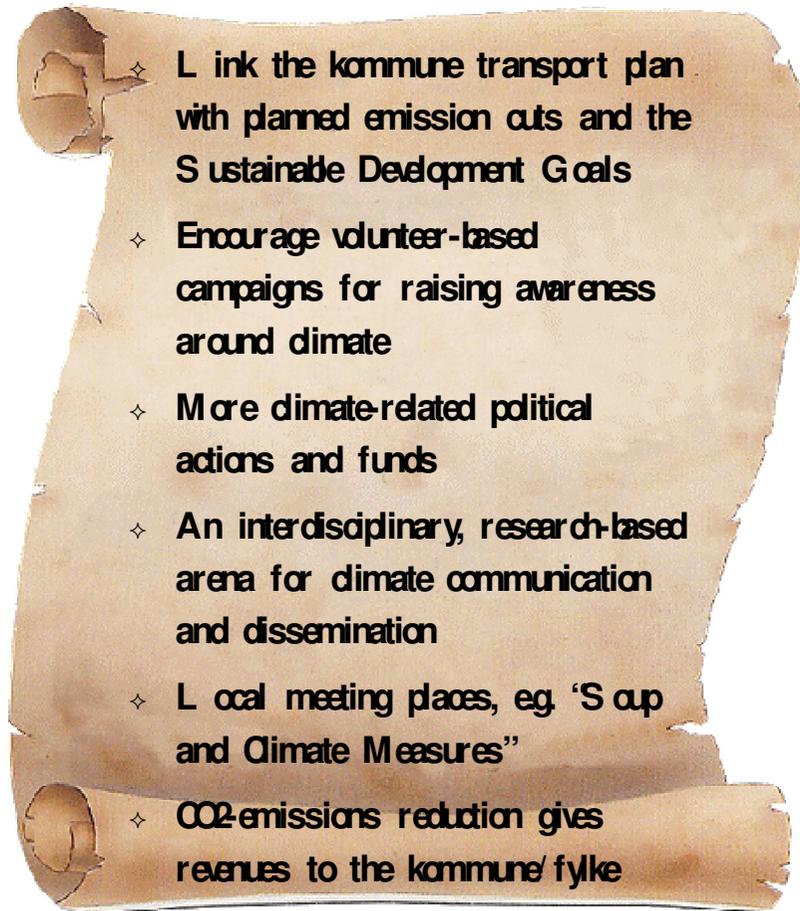
Bergen today

<p>CARD 1: A COMPACT CITY</p> <ul style="list-style-type: none"> • Few people living in the city centre, especially families • Many nice urban spaces • A focus on big shopping malls • Inadequate social infrastructure • Resistance against the idea of a 'compact city', which misses a positive image 	<p>CARD 5: A CLIMATE SCIENCE CITY</p> <ul style="list-style-type: none"> • The best climate science in Norway is in Bergen; but it is not available/accessible to citizens and decision-makers • Research organisations lack incentives and are not innovative enough to engage in international cooperation. 	<p>CARD 8: A LOCAL DEMOCRACY</p> <ul style="list-style-type: none"> • Some decisions are made with different local committees in the city; for example: the youth city council and seniors associations. • There are local cultural measures, such as cultural days, and the 'Sustainable Life' initiative at Landås • Schools sponsoring waterways • Need to tighten local dialogue with the Kommune, with public meetings for example.
<p>CARD 12: BUSSES, BOATS, BYBANEN AND BIKES</p> <ul style="list-style-type: none"> • Bybanen: highly used, and plans to extend the network • Bus: too few buses, and not frequent enough, too expensive, and low capacity • Bikes: lack of cycle-ways • Need to intensify urban areas along the bybanen • Boats: public boat transport is not emission-free. Need more boats to the islands – Askøy and Osterøy and Nord Hordland 	<p>CARD 16: FREE CARD</p> <ul style="list-style-type: none"> • Need to bring nature back into the city • There are a few green-roof projects, but little support and information • There is good water and sewage planning, with recommendations for opening waterways 	

Funding obtained through the ERA4CS Joint Call on Researching and Advancing Climate

CoCliServ is funded by the following national funding agencies: Agence Nationale de la Recherche (**ANR**), France; Service public fédéral de programmation politique scientifique (**BELSP0**), Belgium; Deutsches Zentrum für Luft- und Raumfahrt EV (**DLR**), Germany; Nederlandse organisatie voor wetenschappelijk onderzoek (**NWO**), the Netherlands; Norges forskningsrad (**RCN**), Norway.

Wish list

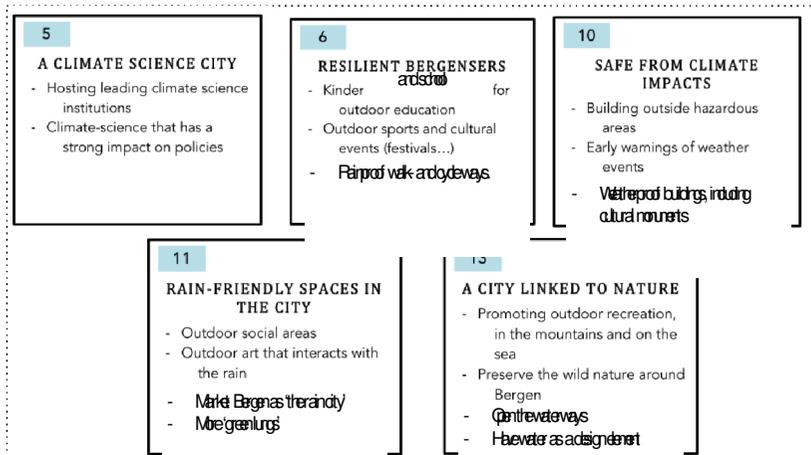


Scenario B: Let it rain!



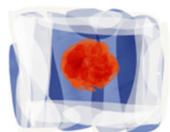
NURTURING RESILIENCE TO WEATHER AND CLIMATE IN BERGEN

“If it means you can have more rain festivals or go outside and do crazy things when it’s wet, maybe people can do that! [...] Rain isn’t good or bad, it’s just a fact of life.” (Interviewee 4)

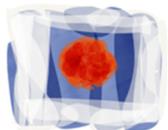
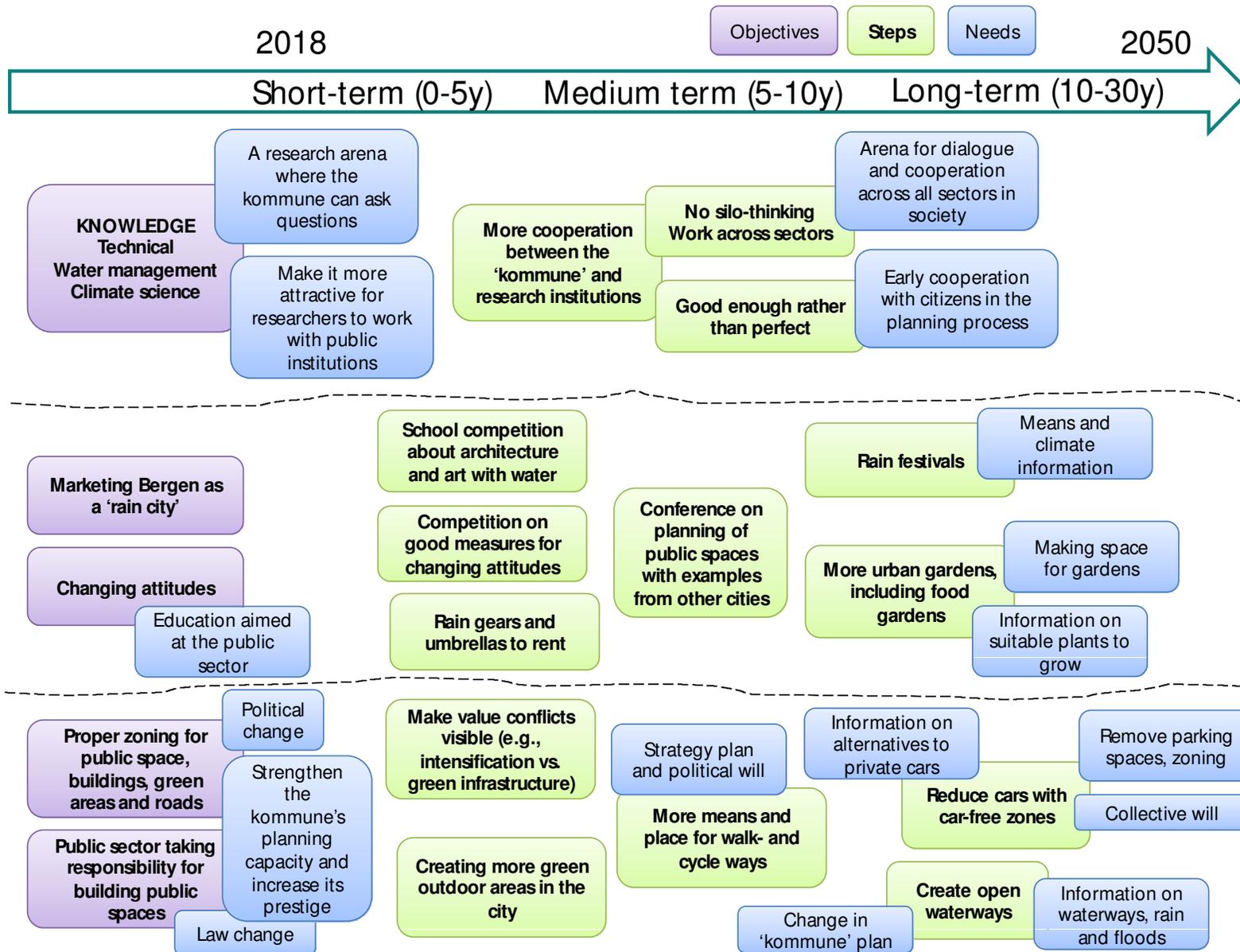


Bergen today

<p>CARD 5: A CLIMATE SCIENCE CITY</p> <ul style="list-style-type: none"> • Already good • Not enough academics in public discussions • Few who want to exert political influence • Conservative ‘fylkesmann’ • Cooperation between the political sphere and climate research could be better • ‘Kommune’ not set up for cooperation with climate research 	<p>CARD 6: RESILIENT BERGENSERS</p> <ul style="list-style-type: none"> • Bergensers are not less outdoors than others (e.g., in kindergartens and schools) • Less often using outdoor modes of transport (cycling, walking) • No well-adapted cycle and walkways • Many events organised, but not particularly about climate 	<p>CARD 10: SAFE FROM CLIMATE IMPACTS</p> <ul style="list-style-type: none"> • OK building safety as of today • OK for early warnings as of today • Much to be done relative to sizing sewage and storm water systems, especially for existing buildings and constructions.
<p>CARD 11: RAIN-FRIENDLY SPACES IN THE CITY</p> <ul style="list-style-type: none"> • Few green outdoor areas in the city • Few or no outdoor areas adapted to the weather • Not much architecture or art that is about water • Bergen not marketed as a ‘rain city’. All pictures and postcards show Bergen under the sun. 	<p>CARD 13: A CITY LINKED TO NATURE</p> <ul style="list-style-type: none"> • Great mountains and natural areas around the city • Water and rain not often used as an element in the city. 	



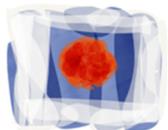
D2.2. Incremental Scenario Case Studies



Wish list

- ✧ A research arena where the 'kommune' can ask questions
- ✧ A competition on good measures for initiating a change in attitudes in the 'rain city' Bergen
- ✧ Political changes and changes in the legislation that ensure that the public sector is in charge of the public space, and that the kommune's capacity for planning is increased
- ✧ Education aimed at the public sector

- ✧ Arenas for dialogue and cooperation across a variety of sectors in society
- ✧ Financial means and climate information to organise 'rain festivals' in Bergen
- ✧ Regulation to reduce private car ownership, more car-free areas, open the waterways, walking and cycling ways, green corridors, urban food gardens
- ✧ Information on waterways, rain and floods

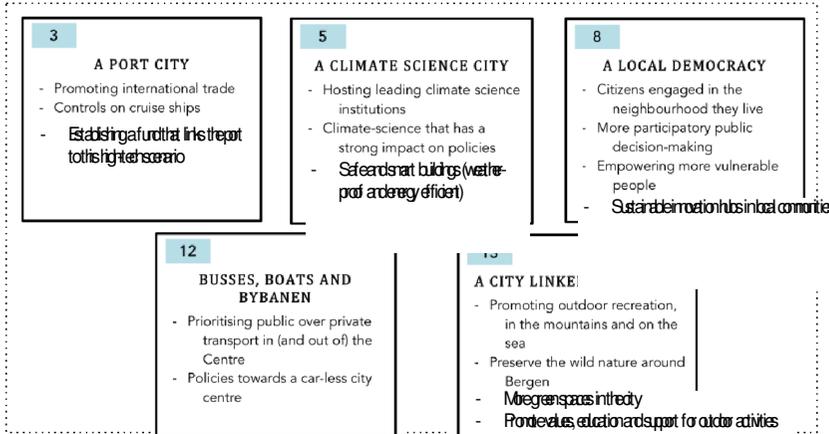


Scenario C: High-tech haven



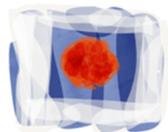
THE MOST OF CLIMATE CHANGE AS AN OPPORTUNITY FOR NEW SUSTAINABLE INDUSTRIES

“Bergen could become a high-tech haven, particularly for marine resources and technology like electrical power; being a battery for Europe through water, wind and waves.” (Interviewee 9)

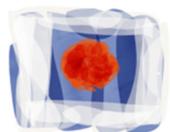
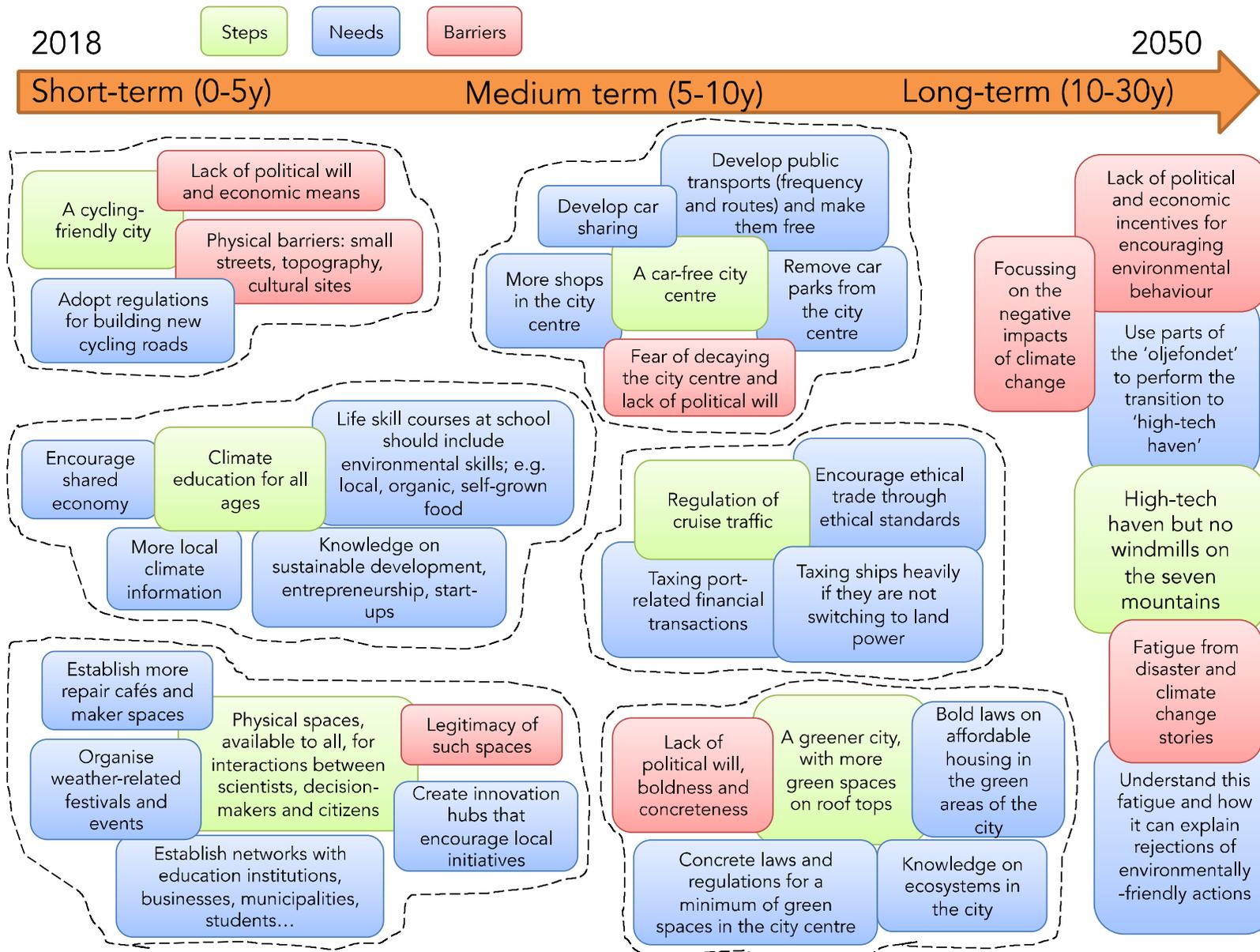


Bergen today

<p>CARD 3: A PORT CITY</p> <ul style="list-style-type: none"> • Need for more regulations on cruise ships (amount, emission levels...) • Bergen is a port city already today (uncertain as to how big?). It is vital to Bergen's economy and has always been • Polluted port areas (Dokken/ Jekteviken) • We don't know about any connections between taxes and future sustainable projects (does the population pay than corporations?) 	<p>CARD 5: A CLIMATE SCIENCE CITY</p> <ul style="list-style-type: none"> • Bergen already is a climate science city today (with leading institutions) • The challenge is to getting policy-makers and politicians to plan according to the available knowledge on climate change 	<p>CARD 8: A LOCAL DEMOCRACY</p> <ul style="list-style-type: none"> • We are not there yet: lack of local visions and engagement • Too little local democracy as of today
<p>CARD 12: BUSSES, BOATS AND BYBANEN</p> <ul style="list-style-type: none"> • There is currently 20% electric cars in Bergen • It is not a bike-friendly city (too dangerous for cyclists) • Not enough public transport options (both frequency and routes) • We are on the way towards a car-less city but not fast enough 	<p>CARD 13: A CITY LINKED TO NATURE</p> <ul style="list-style-type: none"> • It is important, and outdoor recreation is part of Bergen's identity • There are not enough green spaces in the city 	

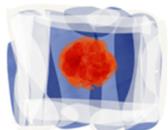


D2.2. Incremental Scenario Case Studies



Wish list

- 
- ✧ **Bold politicians with clear green visions**
 - ✧ **Engaged citizens and a healthy democracy**
 - ✧ **Positive framing of climate projects**
 - ✧ **Justice**



Bergen hinge points in back casting work

Hinge points are key steps identified in the groups' back casting exercises towards preferred future scenarios. At these junctures or 'moments', we looked at what could happen if the necessary resources or actions or decisions are not made available as planned; what alternative trajectories would this take Bergen on, to what alternative futures? Effectively the analysis looks at what could go wrong. This analysis was not conducted with participants in the workshop for lack of time, but was rather conducted ex-post by members of the CoCliServ project team, based on the back-casting diagrams. Some over-arching analysis is provided in Section 5.3.8.

Hinge points in scenario A

- Conflict of aims (e.g. compact vs green city) slow down decision-making processes and implementation of policy. Conflict of more fundamental values (e.g. one-child policy of car free city) might also slow-down decisions and in general contribute to polarization, which again makes efficient policy difficult. **Hinge point: working for a united and determined community allowing for efficient development and implementation of policy.**
- "Curriculum overload". Schools report to have too many good causes included in the basic curriculum all ready. This could lead to resistance towards climate education in schools. **Hinge point: integrate climate perspectives in basic subjects so as to avoid resistance to yet another subject in schools.**
- Irreducible uncertainty hampering knowledge based decision-making processes. **Hinge point: courses on dealing with uncertainty to all local decision-makers.**
- Lack of time and incentives for climate scientist to participate in public debate and media. **Hinge point: regulate research institutions so as to make time and incentives for researchers to participate in public debate.**
- Hostile debate climate scare climate scientist from entering public debate. **Hinge point: regulate media in order for them to work on reducing levels of personal attacks, threats and unfunded claims.**
- Conflicts with regard to car-free city might hamper this development. Hinge point: **development of public transport and compact city so as to make a car-free life a realistic option BEFORE implementing/suggesting car-free zones or tolls.**
- Extremely challenging urban city planning, integrating many different goals and perspectives (open waterways, car free zones, urban agricultural plots, cycle ways, compact, green spaces, green roofs etc). **Hinge point: look for win-win solutions and stress a long term and overall perspective.**
- Availability of technology and avoidance of "lock-ins". **Hinge point: thorough research on availability of and experience with technology + informed long-term planning.**
- Global and national legislation and regulation with regards to e.g. banning online shopping, building standards, incentives for solar panels, opportunity in EU regulation for favouring local providers etc. : **Hinge point: doing**



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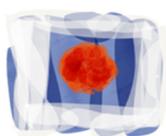
D2.2. Incremental Scenario Case Studies

things at the right level at the right time, for instance “lobbying” on national and international regulation developments first, thus preparing the ground for local initiatives.

- Need for wood (an environmental friendly material) as building material (also for bigger constructions). **(Positive) hinge point: win-win on developing national business opportunities as use of wood becomes more widespread.**
- Municipalities need to start regulating the kindergarten supply in new ways so that there are available spaces where people actually live. **Hinge point: political will and focus on distribution on kindergartens.**
- Municipality need to make available allocated areas for kindergartens, also for private providers, so as to allow for kindergartens in every neighbourhood. **Hinge point: integrate kindergartens better in city planning.**
- Make available information with regards to environmentally friendly consumption. **Hinge points:**
 - o **reach some level of agreement and clarity on what environmentally friendly consumption is, and allocate resources in order to communicate this efficiently to the public.**
 - o **Reduce poverty to make environmental consumption possible for everyone (e.g. buying local quality products)**
- Develop and encourage free and local activities. Develop/support culture for free and local activities (eg. Support initiatives like DNT, the Norwegian trekking association, local amateur sports teams, local culture). **Hinge point:**
 - o **allocate resources at local and national level to develop and to advertise free and local activities.**
 - o **Regulate the “frivilligsektor” (voluntary work) in smart ways to support their work.**
- Think long term and on integrating many levels so as to make possible new ways of delivering goods. **Hinge points:**
 - o **Cooperate with commerce and unions (truck drives, delivery firms etc) when planning new ways of delivering goods.**
 - o **Integrate local commerce, restaurants, delivery firms and unions in urban city planning so as make sure the logistics work out.**

Hinge points in scenario B

- Academic systems of incentives to work in support of decision-making in public institutions; locally, but especially internationally (e.g. shifting incentives from publishing to outreach)
- Integration or disintegration of climate science institutions in Bergen
- Institutional cultures and capacities shift toward or away from science-based decision-making. Toward or away from integrative governance of the city across sectors
- Development of integrative ‘boundary organisations’ in Bergen, linking activities across organisations and sectors, like Klimastiftelse
- Local policy amendments to include citizens early in the planning process, for more transparency (including of value conflicts)
- Climatic change alters rainfall regime in Bergen
- Change in tourism strategies for Bergen
- People and organisations with resources take leadership to implement creative local initiatives (eg competitions, festivals and conferences)
- Local businesses take risks in implementing new, creative services attached to the rain (eg umbrellas for rent)
- Moments/structural planning opportunities to create space for urban food gardens
- Climate change makes certain food species more or less difficult to grow
- Political and policy shifts that facilitate urban food gardens
- Political will and resources to build public spaces
- Public and political attitudes towards storm water management and opening the water ways, from a safety perspective.



D2.2. Incremental Scenario Case Studies

- Institutional culture changes towards risk, especially amongst engineers; based on good information

Hinge points in scenario C

- Sufficient political will to implement a cycle-way network, and its corollary of funding and regulations
- Renovating parts of the city are opportunities: Incremental development of cycle-ways as-and-when re- designing parts of the city/Flexible implementation of the regulations.
- Bergen public transport develops (frequency and coverage and cost) in such a way (according to many different influences) that there is widespread public transport use.
- Development of car sharing platforms and associated business models and legal/insurance frameworks, and parking places.
- Structural planning moments/city renovation moments/space becoming available, to structurally remove car parks from the city centre to the city periphery, and push for more intensive commercial premises in the city centre.
- Attractiveness of the city centre for commerce
- Climate education implemented in the curricula in different educational institutions, for all ages.
- Attendance in climate education courses, e.g. because of events that shift priorities/new fields or industries/or climate education highly politicised...
- Political will and regulatory possibility of locally implementing tax regimes for cruise ships
- International initiatives for more sustainable shipping
- Cruise ship companies reaction to taxing regimes
- Will social spaces remain the domain of a small, established group ('in-crowd'), or become used by a large spectrum of society (as a result of education/events/initiatives...)
- Demonstrated impact of social spaces on individuals' lives and the city; climate and socially
- Developments in green roof technology for Bergens climate and architecture
- Political boldness to implement regulations on zoning/creating green space in the city centre, based on recognised value of green spaces.
- Push for a denser city centre; policy and political.
- Competition over green space and what that does to the creation or use or development of green space; e.g. housing market in the city centre
- Issues arising from use of the park - crime, safety, drugs
- Non-governmental organisations become involved in developing green space.
- Public discourse of climate in Norway shifts to negative or positive, emphasises the positive or negative aspects
- Influx of environmentally friendly high tech private sector companies to Bergen; dependent on political debates, use of oil fund as economic incentive, regulatory approach as to which companies are rewarded with incentives ('how environmental are they)?

