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| **Exploration phase**  **Co-creation of the Cloud to Coast approach** |
| **A survey of our current understanding and practice** |
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|  |
| **April 2019 updated July 2019 and September 2019** |

# Report Information

**Interreg Project:** Cluster for Cloud to Coast Climate Change Adaptation (C5a)

**Report Title:** Exploration phase - Creation of a common understanding through a survey, needs analysis and collection of adaptation strategies

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**Drafting partners:** Sayers and Partners (UK), Rijkswaterstaat (NL), University of Twente (NL)

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# Summary

The North Sea Region (NSR) is facing a significant increase in the frequency and severity of floods, droughts and heatwaves in response to climate change. All countries in the region have to urgently adapt to this new reality to keep people safe, the environment healthy and our economies prosperous. To respond to this challenge, we, the partners of the project Cluster for Cloud to Coast Climate Change Adaptation (C5a), seek to co-create a new ‘Cloud to Coast’ (C2C) approach.

In doing so, we are building upon the outcomes of seven ongoing Interreg NSR projects and other national and international partnerships to help co-create the C2C approach. As a first step in this process, this questionnaire seeks to explore our current understanding of issues of resilience and adaptation to climate change, with a focus on floods.

This document is provided under work packages (WP) 3 and 4 and sets out a questionnaire to be completed by the C5a project partners with an interest in contributing to the development of the C2C approach. The WP3 and WP4 teams will then summarise the findings and incorporate elements into subsequent development of the C2C approach.

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# 1. Guidelines to Fill in the Questionnaire

This template includes the questions to be completed (and reviewed before) by all C5a partners. The responses will form the basis of a comparison of understanding of, and importantly, common perceived challenges and opportunities in developing the C2C approach. The results from the questionnaire will be taken forward in WP3, WP4 and WP5.

The questionnaire consists of two main parts:

1. This first part explores the case studies and the specific challenges and approaches that relate to the development of the C2C approach. The aim is to develop an understanding of what 'constituent systems’, ‘climate change resilience’ and ‘adaptation’ mean in the local context. It also aims to inventory the existing approaches in each partner country that forms the background to the current management paradigm and the seven C5a case studies.
2. The second part focuses on the regional (e.g. European, national or federal) context within which adaptation policy is made, strategies developed, and plans delivered. The aim is to provide a comprehensive overview of the major policy sectors that are related to climate change adaptation, such as water, urban planning, land use, agriculture, and associated extremes, including floods, droughts, and heatwaves, but with a focus on floods.

By including these two strands, an in-depth understanding is obtained of the different perspectives on climate change resilience and adaptation. These form the basis for the development of a common language and therewith co-creation of the C2C approach.

***Notes:***

1. *The responses to the questionnaire should be provided within this template according to question headings and table formats given here. The questionnaire is a ‘deep dive’ questionnaire and will require significant effort to complete fully. We recognize and encourage that you may need to ask colleagues to help ensure a full response.*
2. *If you are unable to response to a particular question, please note this.*
3. *If a question is unclear, please note which terms you feel are not clear and why.*
4. *If you feel a question is not important or irrelevant, please note this and why you believe.*

# 2. Part A - Case Study: Local Context and Understanding of C2C

***This section is applicable to the seven case study leads.***

*The following questions focus on the approaches, local context and understanding of resilience at the case study sites. By starting with the local context, we aim to start building up the C2C approach from the case study (that is, bottom-up) perspective.*

## Question A1: Setting the scene of your case study

*Please describe your case study in no more than three pages, including figures. Your response should be structured as below.*

### A1.1 Name and location of the case study

*Please also include a map showing the location of the case study. Rights to use should be ensured for the image file of the map and the resolution should be high enough for pdf reporting.*

Response: Add

### A1.2 Focus of the case study

*What is the decision focus of the case study? For instance, to determine how to invest in river flood management in the long term, or response to groundwater flooding in the short term etc.*

Response: Add

### A1.3 Objectives of the case study

*Which objectives do you want to meet? What priority outcomes of the system are sought (e.g. water safety, land protection, or housing)? Are there any compulsory objectives or targets that have to be met according to regulations?*

Response: Add

### A1.4 The physical setting

*What is the relationship of the case study to the four constituent systems (Catchment, City, Coast, Infrastructure networks)?*

Response: Add

### A1.5 The socio-economic setting and issues to be addressed

*What is the nature of the communities to be protected, residential and non-residential activities, and important infrastructure services (hospitals, transport hubs etc) identified in A1.4? How might these communities, activities and services be impacted by a flood?*

Response: Add

### A1.6 The environment setting and issues to be addressed

*What* *are the main functions or services provided by the constituent systems identified in A1.4? How do these functions/services provide benefits to the stakeholders and support the environment?*

Response: Add

## Question A2: Specific challenges of your case study

*Consider the following from the perspective of your case study, and if relevant, of the founding and supporting projects that you may be involved in (FAIR, BWN, etc.) to ensure that we capture these thoughts. Include other insights too.*

### A2.1 Key challenges addressed in the case study

*What are the key challenges that need to be addressed in your case study? There may be one key challenge, or there may be a set of related challenges. Elaborate on the problems and opportunities that are there and may coincide.*

Response: Add

### A2.2 The ‘whole system’ of the case study

#### Physical understanding

*What do you understand as the boundaries of the physical system that represents the cloud-to-coast system of your case study?*

Response: Add

*Which (infrastructure) solutions are now present (e.g. levees or retention areas)?*

Response: Add

*Which functions are currently being provided by the (infrastructure) solutions?*

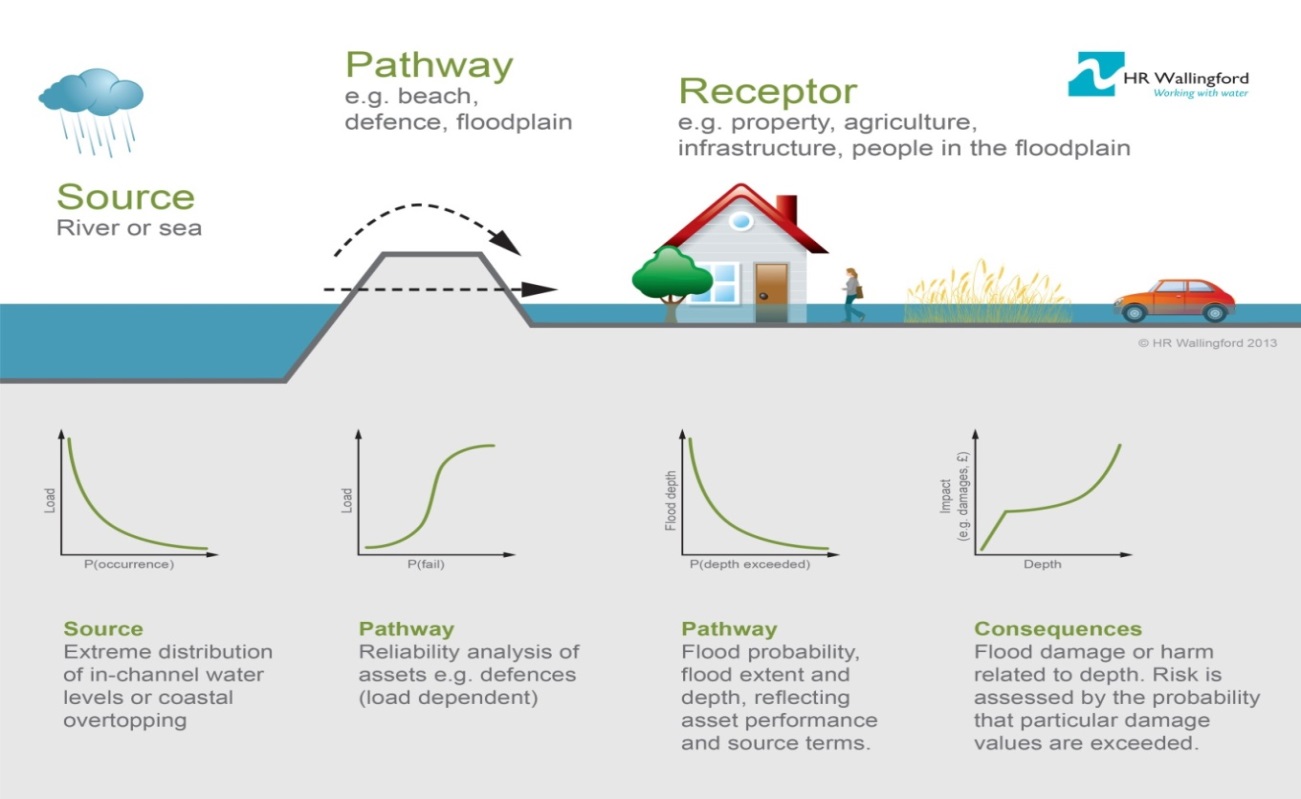
Response: Add

*Which other/new functions do you want to explore in the C5a project?*

Response: Add

#### Risk system understanding

*Using the Source-Pathway-Receptor framework (Sayers et al, 2002 below for illustration) discuss what are considered as part of risk assessment. What is relevant for your case study?*



***Sources***

*What are sources of the flood risks, i.e., from outside of the system to be managed (rainfall, storm surge etc.)?*

Response: Add

***Pathways***

*What are the physical features that you are seeking to manage? (e.g. the beach, seawall, river channel vegetation, floodplain topography?))*

Response: Add

***Receptors***

*What do you consider as the ‘things’ can potentially be harmed – the receptors such as residential properties, people, businesses etc.*

Response: Add

***Consequences***

*How do you consider the degree of harm caused? Monetary or other units? How are ‘apples and pears’ compared?*

Response: Add

### A2.3 Aspects of future change considered in plans

*We would like to understand how future change is accounted for in the plans you make.*

#### Climate change

*What aspects of climate change do you typically consider? Where possible, provide the quantified descriptions, associated uncertain ranges and what source of evidence is used, including:*

**Sea level rise**

Response: Add

**River flows**

Response: Add

**Rainfall**

Response: Add

**Groundwater**

Response: Add

**Drought**

Response: Add

**Temperature**

Response: Add

**Storm sequencing**

Response: Add

**Spatial coherence**

Response: Add

**Spatial quality**

Response: Add

**Invasive species**

Response: Add

#### Socio-economic change

**Population growth**

Response: Add

**Economic development**

Response: Add

**Demographic change**

Response: Add

#### Changes in the physical setting

**Settlement** (Regional soil subsidence)

Response: Add

**Isostatic rebound** (land levels increasing)

Response: Add

**Deterioration and degradation** (of infrastructure, of the water quality, of biodiversity etc)

Response: Add

### A2.4 Current strategy to adapt to future change

*Which measures (infrastructure and non-structural solutions) are available and constitute your current strategy to adapt to future change?*

Response: Add

### A2.5 Likelihood of the current strategy to become ineffective

*Is the current strategy likely to become ineffective into the future? The answer to this question helps to identify the conditions under which the current adaptation strategy and measures would no longer reach the main objectives (defined under A1.3). These can be expressed as adaptation thresholds. If possible, can you estimate the approximate location (e.g. how much sea level rise or increase/decrease of river flow) of any of these adaptation thresholds?*

Response: Add

### A2.6 The possibilities to adapt your strategy into the future

*What are the possibilities to adapt your strategy into the future? If yes, can you elaborate on that? The answer helps to make an inventory of the available adaptation strategies, measures and pathways of each case study.*

Response: Add

### A2.7 Effect of future change on the functions/services

*How will future change affect the functions/services provided by the constituent systems (other than the main objectives)? Refer to your answer to question A1.6 (The environment setting and issues to be addressed)*

Response: Add

### A2.8 Consequences to the socio-economic system

*Associated with the changes in the functions / services provided are the effects on the stakeholders that benefit from these functions / services. What are the likely effects on the socio-economic system? Are there any effects that stakeholders perceive as particularly concerning?*

Response: Add

### A2.9 Effects on the socioeconomic system

*Is it likely that the effects on the socioeconomic system will cause it to function fundamentally different? This answer helps to identify whether the stakeholders may conceive a certain threshold as a point beyond which they can no longer successfully carry out some socioeconomic activities (e.g. energy production). These can be expressed as socio-economic thresholds, which are defined as ‘disruptive social and economic situations which seem to evolve from future change’.*

Response: Add

## Question A3: Success, barriers and opportunities for your case study

### A3.1 Success of current adaptation efforts

*Do you know whether your current efforts deliver a successful climate change adaptation?*

Yes, No, partially?

*How do you measure the success of your efforts? (e.g. using performance criteria)*

Response: Add

*How successful are your current efforts to deliver climate change adaptation?*

Response: Add

### A3.2 Barriers and opportunities in adopting a whole system approach

*What are the barriers (e.g. policy, knowledge, data sharing barriers) to addressing resilience and adaptation within the context of a whole system approach to flood risk management that takes account of cross-sectoral interdependencies?*

Response: Add

*What are the opportunities you see from a whole system approach? For example, with reference to the barriers to addressing flood resilience and adaptation*

Response: Add

*Are there any illustrative examples in which the barriers to addressing flood resilience and adaptation have been addressed or overcome? Please explain using 200-300 words and provide a reference (e.g. link to a website or publication).*

Response: *Add*

### A3.3 Funding barriers

*What are the funding barriers?**Everyone has a finite pot of money – but is the structure of funding or payment a barrier to developing resilience and adaptive planning (compensation or paying for future flexibility for example).*

Response: Add

### A3.4 Existing outcomes of benefits and cost ratios

This set of questions will be used to form the baseline of our Project Indicator #2 that is about C5A’s contribution to improving long-term risk reduction for less whole life investment. We will then ask the questions again at the end about what they actually did for their case studies.

To set the baseline please

*State in years the length of time into the future the stream of costs and benefits that would be typically calculated (10, 50 or 100 years for example) in the context your pilot (before C5a)*

Response: Add

*State type of costs typically considered at the moment, capital, operational and removal (demolition) costs are considered as well as any other categories of costs in the context your pilot (before C5a)*

Response: Add

*State the type of benefits typically considered at the moment, damage to residential properties etc in the context your pilot (before C5a)*

Response: Add

*State the anticipated Benefit cost ratio (BCR) that would be achieved through a conventional approach within your case study area. Base your answer on available analysis of the conventional strategies or typical BCR achieved by current approaches within similar setting. For example, in the UK flood defence schemes typically achieve around a 1:5-1:8 BCR.*

Response: Add

## Question A4: Thoughts on flood resilience and adaptation for your case

*Consider the following from the perspective of the case study, and if relevant, of the founding and supporting projects that you may be involved in (FAIR, BWN etc.) to ensure that we capture these thoughts. Include other insights too.*

### A4.1 Your definition of concepts

*In the context of your case study, how do you define the following concepts? If your understanding is based on a specific reference, please include where possible.*

Response: Add

**Adaptation**

Response: *Add*

**Adaptive plan**

Response: Add

**Adaptive capacity**

Response: Add

**Adaptation thresholds (i.e., tipping points)**

Response: Add

**Resilience**

Response: Add

**Whole system**

Response: Add

**System interdependencies**

Response: Add

### A4.2 Desired characteristics of a resilient system

*In the context of your case study, what are the desired characteristics of a resilient system?*

***Reflective***

Response: Add

***Robustness***

Response: Add

***Preparedness***

Response: Add

***Redundancy***

Response: Add

***Transformability***

Response: Add

***Any other characteristic: (define)***

**Response:** Add

### A4.2 Measurement of resilience

*How do you perceive resilience should be ‘measured’? Consider the following:*

**How is resilience measured…**

*By a technical expert?*

Response: Add

*By a member of the public?*

Response: Add

**How is adaptive capacity measured and valued…**

*By a technical expert?*

Response: Add

*By a member of the public?*

Response: Add

### A4.3 Approaches to understand resilience and adaptive capacity

*Do you use any conceptual and analytical approaches in your area to understand resilience and adaptive capacity? Respond in the context of flooding, if possible, or more generically, if not.*

**Resilience of socio-economic systems**

Response: Add

**Resilience of ecosystems**

Response: Add

**Resilience of infrastructure services**

Response: Add

**Resilience of individuals and communities**

Response: Add

**Adaptive capacity and its value**

Response: Add

**Uncertainty**

*How are the uncertainties associated with future change factored into the decision process? Think of climate, development, funding.*

Response: Add

### A4.4 Monitoring and evaluation of resilience and adaptive management

*How do you monitor and evaluate the delivery of resilience and adaptive management? How do you use the monitoring results to identify actions to improve the resilience or adaptive capacity, and to inform future investment decisions?*

Response: Add

## **Question A5: Practical matters to take into account for your case study**

### A5.1 Tools and data available and/or to be used

What tools and data are available for your case study? *Give an overview of tools and data to be used (where this is known)*

Response: Add

### A5.2 Overview of the local planning process

*How is the relationship to boarder planning (spatial planning, road and rail networks, agricultural etc.) issues ensured?*

Response: Add

### A5.3 Overview of the local funding process

What funding constraints exist at the pilot site? *How is long term funding secured? Is additional funding for multi-benefits being sought? If so, where from and is this likely to be successful?*

Response: Add

# 3. Part B - Regional Context

## Question B1: The broader context of climate change adaptation

### B1.1 Relevant policies and codes of practice

*What are the policies and codes of practice/guidance that specifically influence climate change adaptation? Policies and guidance have a direct impact on the type of solutions that are developed. We are interested in identifying good practices and/or policy gaps and understanding how well current policies and guidance promote adaptation and could be used to shape the C2C approach. These should include both flood-related and non-flood related (for example, broader development plans or plans regarding droughts). This information should be provided as a table with supporting text below.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Policy or plan** | **Level** | **Description** | **Influence on adaptation** |
| **Regional (e.g. international/European/National/Federal)** | | | |
|  |  |  |  |
|  |  |  |  |
| **Local (city, catchment, coastal cell)** | | | |
|  |  |  |  |
|  |  |  |  |
| **Sectoral (infrastructure, agriculture, etc.)** | | | |
|  |  |  |  |

Response: *Please feel free to expand on the table here.*

### B1.2 Stakeholders

*Who are the stakeholders that have an interest and influence in climate change adaptation through funding, programming, setting the agenda, etc.? Stakeholders include both private and public sector organizations, as well as the local communities and non-governmental organizations (NGOs). This information should be provided as a table with supporting text below.*

|  |  |  |
| --- | --- | --- |
| **Organization** | **Interest (low or high)** | **Influence (low or high)** |
| **National government** |  |  |
|  |  |  |
| **Reginal government** |  |  |
|  |  |  |
| **Local government** |  |  |
|  |  |  |
| **Local community and action groups** |  |  |
|  |  |  |
| **Infrastructure providers (rail, water, etc.)** |  |  |
|  |  |  |
| **Agricultural sector (farming and forestry)** |  |  |
|  |  |  |
| **Private businesses** |  |  |
|  |  |  |
| **NGOs** |  |  |
|  |  |  |
| **Others? Name** |  |  |

Response: *Please feel free to expand on the table here.*

### B1.3 Planning timescales of interest

*Adaptation is a long-term process. Discuss the timescales of interest, and adaptation decisions that are typically assessed. Consider how activities over multiple timescales come together within the policies and plans. What timescales are most relevant to flood risk management? How are these linked (if at all) to ensure short term goals are delivered within the context of a long-term plan? This information should be provided as a table with supporting text below.*

|  |  |  |  |
| --- | --- | --- | --- |
| **Time scale** | **Time horizon**  **(in years)** | **What adaptation decisions take place over this timescale?** | **Who leads these decisions?**  **(from B1.2)** |
| **Long-term plans** |  |  |  |
|  |  |  |  |
| **Medium-term plans** |  |  |  |
|  |  |  |  |
| **Short-term plans** |  |  |  |
|  |  |  |  |

Response: *Please feel free to expand on the table here.*

### B1.4 Priority recommendations

*From your perspective, as currently seen, what recommendations would you make to enable a whole system C2C approach aimed at delivering climate resilience and adaptation?*

**European directive level**

Response: Add

**National policy level**

Response: Add

**Regional planning level**

Response: Add

**Local planning level**

Response: Add

**Sectoral infrastructure provision (e.g. railways**)

Response: Add

**Community level**

Response: Add

**What is needed to share good practices?**

Response: Add

**What data or tools are you missing?**

Response: Add

## Question B2: General requirements for resilience

*What kind of ‘resilience’ requirements (i.e. the end outcomes sought) are set? Who defines these and how these are determined in relation to climate risk issues (within a broader context of floods and droughts, but please highlight wider requirements)? Note: At this stage, please use the term ‘resilience’ in the context of your understanding. These questions also go beyond each specific case study.*

**B2.1 Requirements for resilience**

#### Required vs. desired criteria

*What criteria must or might be met to increase resilience regardless of costs and funding? For example, a required criterion may be to protect the integrity of a RAMSAR site, a desired one may be to increase environmental flows, to provide protection to people.*

|  |  |  |
| --- | --- | --- |
| **Time scale** | **Required criteria** | **Desired criteria** |
| **Environmental safeguards** |  |  |
|  |  |  |
| **People protection standards** |  |  |
|  |  |  |
| **Service infrastructure** |  |  |
|  |  |  |
| **Economic standards** |  |  |
|  |  |  |
| **Delivery of multi-benefits** |  |  |
|  |  |  |
| **Future flexibility** |  |  |

### B2.2 Other aspects: funding, investment and prioritization

#### Funding

*Who pays for flood resilience and adaptation: operational and maintenance, capital investment? How secure is this funding stream into the future? The actors mentioned here should be included in B1.2.*

Response: Add

#### Investment planning and prioritisation

**Expenditure type**

*What type of expenditures do you include in your investment assessments? - Total expenditure (whole life cycle costs) – or just capital or revenue?*

Response: Add

**Priorities**

*How are priorities set? What criteria are used to order projects that receive funding*

Response: Add

#### How is investment optimised across the portfolio of actions that exist?

*Do you make the case for the whole portfolio, or do you make the case for individual actions with it?*

Response: Add

#### How do you take opportunities for enhancing the return on investment?

*Payment for non-flood management benefits/functions? i.e., broader benefits – is this possible and do they change the investment ranking? Private contributions – does this change the ranking;*

Response: Add

### B2.3 Social justice

*How are the principles of social justice considered?*

**Equality**

*Are all citizens treated equally in the decision processes about climate change adaptation? If no, why not? If so, how is this ensured? This could include, but not limited to, participation (sharing information, consultation, active involvement) in decision making and the distribution of resources.*

Response: Add

**Prioritization of vulnerable groups**

*Are the most vulnerable members of society prioritized in terms of their needs regarding climate change adaptation? If no, why not? If so, how is this ensured?*

Response: Add

**Utility / return on investment**

*Is it required to ensure the best return for each euro of public funding spent? If no, why not? If so, how is this ensured?*

Response: Add