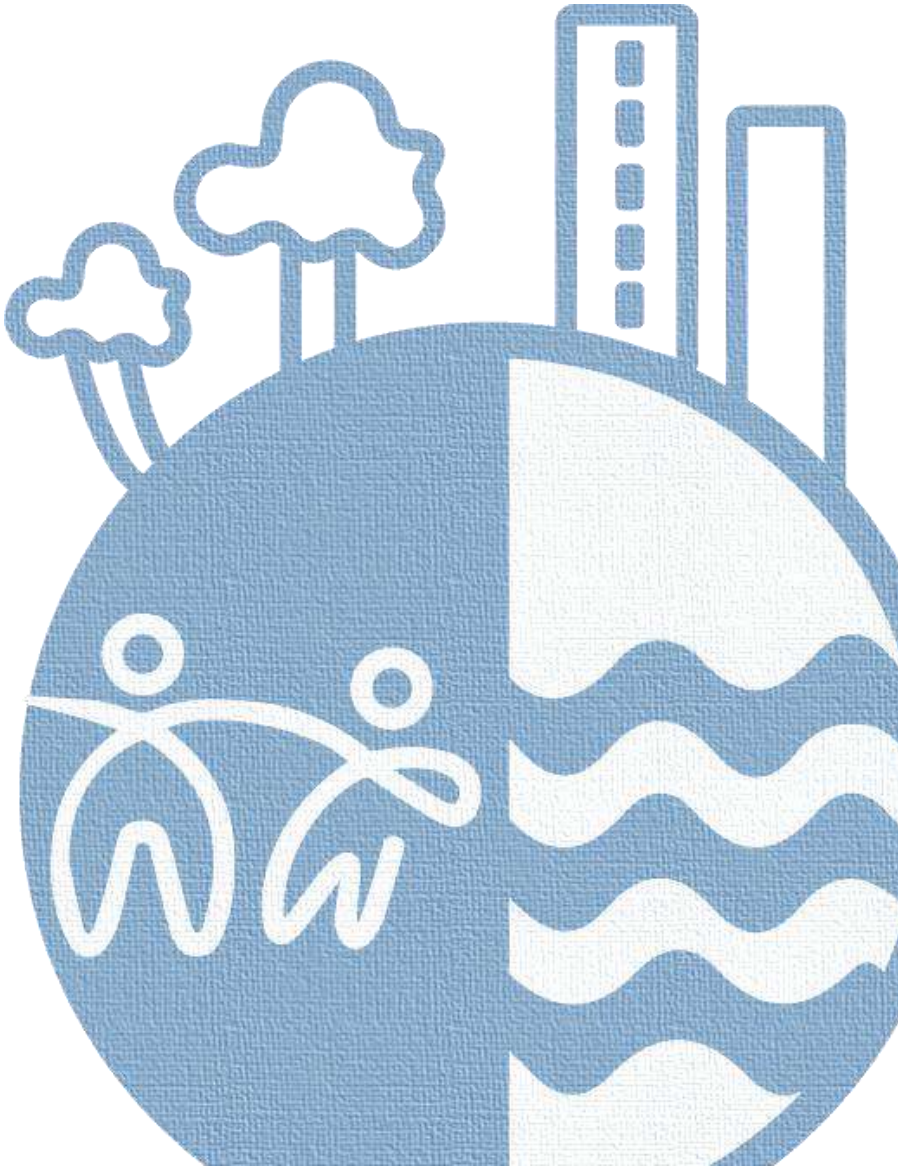
SOLARIS
SOLIDARITY IN CLIMATE CHANGE

SOLIDARITY IN CLIMATE CHANGE ADAPTATION POLICIES: TOWARDS MORE SOCIO-SPATIAL JUSTICE IN THE FACE OF MULTIPLE RISKS

CASE STUDIES INTRODUCTION



Summary

Introduction: Solidarity in climate change

Mitigation policies are insufficient to deal with "dangerous anthropogenic interference" (IPCC, 2018) and adaptation is critical. Climate change adaptation policies need to address physical impacts, but are subject to social, political and spatial trade-offs. In Europe, major implementation challenges arise in relation to democracy, solidarity and social justice. We must anticipate the distributional impacts of deliberative participation processes when forming policies. SOLARIS ("SOLidarity in climate change Adaptation policies: towards more socio- spatial justice in the face of multiple RISks") focuses on social-spatial injustices of Climate Change Adaptation Policies (CCAP). SOLARIS aims to fill the gap in analysis of social justice in relation to climate change adaptation policies. SOLARIS has both scientific and societal objectives and outcomes. It aims to: develop conceptual and analytical approaches to reveal social justice perspectives of CCAPs and explore the policy and decision-making process for a large range of stakeholders (e.g. policy-makers, practitioners, citizens etc.) to facilitate better participatory processes.

Keywords

Climate change adaptation, Solidarity, Social and Spatial Dimensions, Risk Perception, Governance

Our hypothesis

Our hypothesis in the SOLARIS project is that social and spatial inequalities exist and threaten the implementation of climate change adaptation policies and the equitable involvement of affected citizens. Several potential social injustices may occur in face of climate change and policies implemented to assist adaptation:

i) Injustice in the levels of risk experienced and how these will be impacted by climate changes,
ii) Injustice related to the level of contribution to tackling risk and implementing climate adaptation,
iii) Differences in the level of ability to impact decision-making and,
iv) Injustice in the capacity to respond and adapt.

Understanding how these injustices occur and who is advantaged or disadvantaged and in what manner is critical to implementing socially acceptable and just climate change adaptation policies.
This is particularly true for floods, that are among the main climate and weather-related causes of damage in Europe. Through the lens of flood risk management, we will evaluate the design of climate change adaptation policies and the instruments that they use to reduce the risk from extreme events. Concentrating on those strategies which better integrate adaptive actions, SOLARIS focuses on flood prevention, the accommodation of water to reduce impacts and flood preparation and recovery.

Methodology and research questions

A case study approach will be adopted (2 per country) to analyse cases which have implemented, or which are in the process of implementing climate change adaptation policies. This approach permits the study of ongoing participation as well as exampling the socio-spatial inequalities that may only be revealed post- implementation.
Based on multi-disciplinary research from four countries (Belgium, England, Finland, France), the SOLARIS project addresses two questions:
- How can we assess and map socio-spatial inequalities related to the implementation of climate change adaptation policies? We explore what factors make specific groups less involved in climate change adaptation policies and analyse their distributional impacts.

- How are inequalities addressed by adaptation policies? We examine what solidarity mechanisms are implemented and how affected groups are engaged in adaptation policies. Integration in the decision-making process is studied through citizen participation during the processes of definition and implementation.

Through these two research questions, SOLARIS addresses adaptation to climate change through revealing injustice and need for solidarity. It also aims to assess the public participation of citizens during the design and implementation

of CCAP planning instruments in the case of flood risk strategies and how these processes impact on the distribution of outcomes.

Scientific and societal objectives

SOLARIS has both scientific and societal objectives:
- To conceptualise all types of socio-spatial injustices that may occur through CCAP and their implementation,
- To develop approaches for assessing and mapping socio-spatial inequalities and consider the role of public participation in reducing injustice,
- To implement the assessment approach within each of the case studies, applied to the perspective of flood risk and identify cross-case lessons,
- To make recommendations about how CCAPs need to recognise and minimise socio-spatial injustices.

Solaris consortium

Solaris consortium gathers researchers from the University of Tours (project coordination), The National Conservatory of Arts and Crafts, the University Paris-Est-Créteil, the University of Middlesex, the University of Antwerp, and from the Finnish Environment Institute.

Beerse

Administrative region: Flanders
Timeline: 2011-2021
Type of flood: Fluvial flooding
Surface area and number of households: 1.57 ha, ~ 60 households

STAKEHOLDERS INVOLVED

Department of Integrated Water Policy, **Province of Antwerp**

- Decided on the most suitable strategy for the area based on model simulations
- Responsible for acquiring land ownership of the area and financed 75% of the costs
- Hosted citizen participation events together with the municipality of Beerse

Municipality of Beerse

- Municipality financed 25% of the cost of acquiring the land
- Hosted citizen participation events together with the Province of Antwerp

Regionaal Landschap Grote & Kleine Nete (landscape organisation)

- Source of information about the history of the land, the local landscape and e.g. types of vegetation suitable for the area

Approx. **60 local residents**

- Citizens were actively involved in the design of the flood control area
- Citizens could submit ideas to an online platform about the layout of the flood control area

Nature organisations, local advisory boards

- Consultation

FIRST DESCRIPTION OF THE CASE

The municipality of Beerse regularly suffers from flooding, often due to heavy rainfall events causing the river Laak to overflow. The Laak is part of the Scheldt basin. The Laak is characterised by a pluvial regime with large differences in the flow rate. Based on hydrological and hydraulic simulations, the Province of Antwerp decided to establish a flood control area along the Laak, which can be characterised as flood risk mitigation. The chosen location is 1.57 ha in size and located in a depression. The Province of Antwerp bought the land from private owners in 2017. The neighbourhood was actively involved in the design of the flood control area. The construction is expected to start in the summer or fall of 2021.
The construction of a flood control area in Beerse is partly funded by the Interreg CO-ADAPT project.

Focus area. Source: Dienst Integraal Waterbeleid, Provincie Antwerpen

CO-CREATION OF FLOOD CONTROL AREA

Residents were actively involved in the design of the flood control area. The Province of Antwerp first put out a questionnaire to investigate the opinion of local residents about climate change, flood risks and the planned flood control area. Generally, residents supported the plan. Two participation events were hosted together by the Province and the municipality of Beerse, in which residents could decide on the design of the area. In addition to tackling flood risks, residents indicated that the area should be a place for nature experience and recreation. The area is therefore designed as a nature-based solution with multiple co-benefits such as water storage during high discharge events, carbon sequestration, urban cooling, increased biodiversity and recreation.
However, socio-spatial inequalities were not considered in organising the participation events. In fact, residents were invited based on whether they lived in a perimeter the Province randomly drew around the area. This raises questions, such as: Were all citizens at risk of flooding included in the participation process? What is the impact of the participation process on social capital and flood resilience of citizens? And what can be done to ensure fair and inclusive participation processes that contribute to procedural justice?
The construction works for the flood control area are planned to start this year (2021). Therefore, it's not possible to study distributional effects (e.g. green gentrification), because it will take time before these effects are visible.

Residents working on the design of the flood control area during on of the participation events. Source: Dienst Integraal Waterbeleid, Provincie Antwerpen

EXISTING DATA

- Report: Assessment report of the focus area
- Report: Residents' participation in the Laak Beerse flooding area
- Flyer: Design of the flood control area
- No existing reports on the social-economic- demographic characteristics of local residents

Geraardsbergen

Administrative region: Flanders
Timeline: 2017-2019
Type of flood: Fluvial and pluvial flooding
Surface area and number of households: 600 households*

STAKEHOLDERS INVOLVED

Vlaamse Milieumaatschappij (VMM) (Flemish Environment Agency)

- Proposed and funded the project on PLP
- Responsible for contacting the households
- Provided individual, tailor-made advice of suitable PLP measures for each household

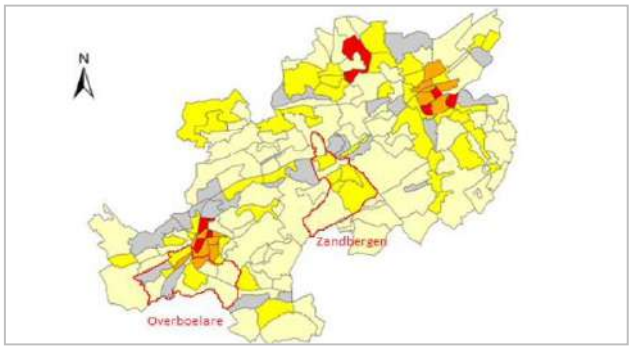
Municipality of Geraardsbergen

- Played an important role in communicating the plans to the public, e.g. the VMM used the municipality's communication channels to reach the local residents
- Especially the mayor played an important role in communication: by showing the mayor supported the plans, the public is more likely to follow

~83 households participated in the project:

- Households are not concentrated in one area but spread throughout Geraardsbergen
- Residents themselves are responsible for arranging the instalment of PLP measures
- Residents are also responsible for paying for these measures, but can get up to €250 compensation
- 7 households fully implemented the advised PLP measures, 18 households partly

Remaining households did not participate in the project, but are still at risk of flooding



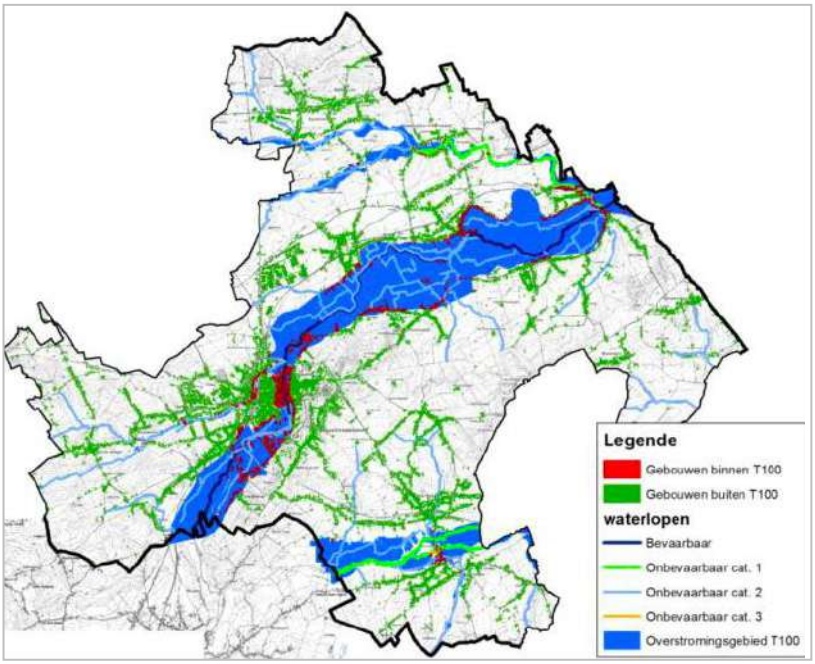
Social susceptibility to flooding in Geraardsbergen. Grey indicates resilient, red indicates extremely socially vulnerable. Source: Coninx & Bachus (2008)

* If a flooding occurs with a statistical return period of 100 years, the potential number of households affected would be 600

FIRST DESCRIPTION OF THE CASE

Floods in Geraardsbergen often occur after extreme rainfall events due to its location in the hilly Dender valley. The Dender is a tributary of the Scheldt and is characterised by large fluctuations in its discharge regime. A continued increase in hard surfaces combined with climate change increases the amount of water the Dender needs to discharge. Large floods occurred in November 2010, January 2011 and June 2016.

This project of the VMM focuses on property-level protection (PLP) in Geraardsbergen, e.g. waterproof interior materials or flood gates. The VMM stimulates PLP because they believe collective measures are insufficient to fully prevent floods. PLP is therefore necessary. ~80 households signed up for this project. These households received individual advise about the protection measures most suitable for their properties, and could apply for a subsidy from the municipality to cover part of the installation costs.



Modelled flood area in Geraardsbergen with a statistical return period of 100 years and an indication of the households located within the flood area, indicated in red. Source: VMM

PROPERTY-LEVEL PROTECTION OF FLOOD-PRONE HOUSEHOLDS

PLP measures in Geraardsbergen can be classified as **flood defense**. Residents were not involved in the preparatory phase of this project. However, the VMM did host information evenings, where residents could ask questions about PLP and sign up for the project. The VMM, together with two technical experts, visited each of the households who signed up and provided tailor-made advice about the most suitable protection measures for each household. Residents can apply for a subsidy from the municipality of Geraardsbergen to cover part of the costs, however this covers only up to €250.

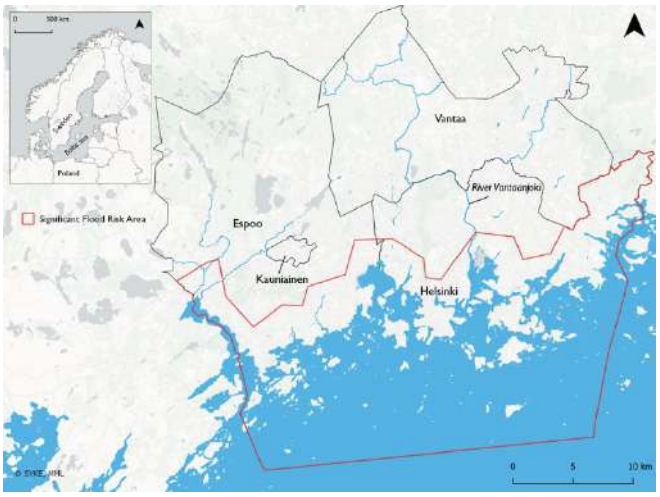
Geraardsbergen and the surrounding area is characterised by a diverse set of social profiles. There are large differences between people with high and low socioeconomic status. The focus on PLP measures, therefore, raises questions, such as: Does VMM's policy on PLP consider differences in the capacity of citizens to contribute to FRM? Although all residents can apply for a subsidy, residents have to pay the installation costs themselves beforehand, which may not be feasible for all. Therefore, there may be a mismatch between the need for PLP measures and the capacity of citizens to implement these measures. If so, what are the consequences of this mismatch in terms of (increased) flood risks and (reduced) resilience of citizens to floods? What can we say about the overall effectiveness of the VMM's policy if socio-spatial inequalities are not considered?

EXISTING DATA

- Report: Implementing property-level protection measures against flooding in three pilot areas
- Report: Results of telephone survey "Analysis of Property-level Flood Protection pilot projects 2015-17"
- Report: Vulnerability of people towards floods. The development of a social flood vulnerability index
- Report: Analysing and evaluating flood risk governance in Belgium
- Paper: Dieperink et al. (2018)
- Paper: Goosse et al. (n.d.)

Helsinki Metropolitan area

Administrative region: Helsinki, Espoo, Vantaa, Kauniainen (municipalities)
Timeline: Spring 2022
Type of flood: Coastal floods, pluvial floods, fluvial floods
Surface area and number of households: 3,697 km^2, 1,3 million residents

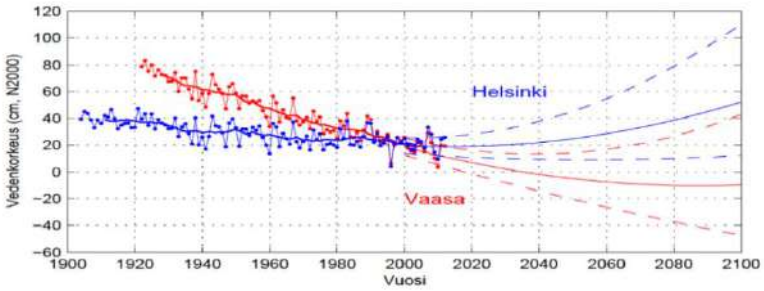


Case study area. Flood risk areas © Finnish Environment Institute.

INCREASING FLOOD RISKS IN HIGHLY POPULATED COASTAL AREAS

The coastal area of Helsinki and Espoo is a significant coastal flood risk area due to the great potential damages, as a result of high population density, important and modern infrastructure and trends in land use. The interest is mainly looking at the coastal flood risk area in the HMA, but in addition to coastal floods, floods resulting from snowmelt and especially heavy precipitation can affect the region.

Currently, the main driving pressures in the region are the economic growth and rapid land use change, population growth and climate change, which together with rising temperatures and sea level are increasing the vulnerability of people and assets to climate related risks. Especially the effect of climate change to flood risk rises significantly by the end of the century. The risk of stormwater flooding is already increasing significantly in the region, causing pressures to manage the risks.



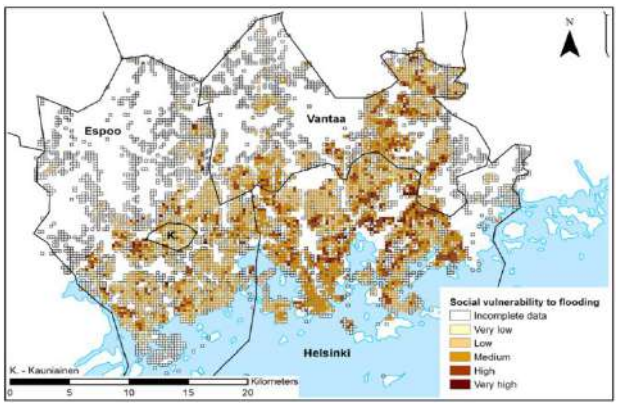
By the end of the century, sea level is projected to rise about 30 cm in the coastal area. Credits: Finnish Meteorological Institute

STAKEHOLDERS INVOLVED:

Finnish FRM involves many authorities and stakeholders from the state level to local level, including:

- **Ministry of Agriculture and Forestry** (funding and steering),
- **Finnish Environment Institute** (expert services, research, water monitoring and warnings together with the **Finnish Meteorological Institute**),
- **Centres for Economic Development, Transport and the Environment** (ELY centre) (flood mapping, management plans, local co-operation),
- **Municipalities**, **regional councils**, **rescue services** (flood groups, local co-operation)

ELY-centres have the responsibility of managing coastal and fluvial floods, while the municipalities are responsible for pluvial floods. **Residents** are responsible of taking care of themselves and their property, and to have insurance covered.



Mapped social vulnerability to flooding in the Helsinki Metropolitan Area. Credits: Kazmierzcak (2015)

SOLARIS KEY ISSUES: EQUALITY AND ADAPTIVE FLOOD RISK MANAGEMENT

Socio-spatial inequalities
Based on an earlier assessment, social vulnerability to flooding varies spatially in the Helsinki Metropolitan Area – in some areas people are more vulnerable than in the others. However, there is a need for deeper interpretation and a more qualitative approach. Together with residents and experts we aim to assess what kind of social vulnerabilities and justice issues there are, and how people experience vulnerabilities in different areas. What are the socially acceptable risks associated with floods in the future? Where are their limits, and why, while keeping in mind that that Finland is a "low exposure low vulnerability" country at the European level?

Flood risk management strategies
Land use planning and building regulations, that prevent construction to the coastal flood areas, are the most important management strategies in the metropolitan area. Other FRM strategies are building levees, green area planning and increasingly, adaptive planning. In adaptive planning, the measures and plans are constantly improved by making use of experience and new knowledge. How do the improved vulnerability analyses link to adaptive FRM and more broadly to climate change adaptation, and how can they be better integrated into policy making?

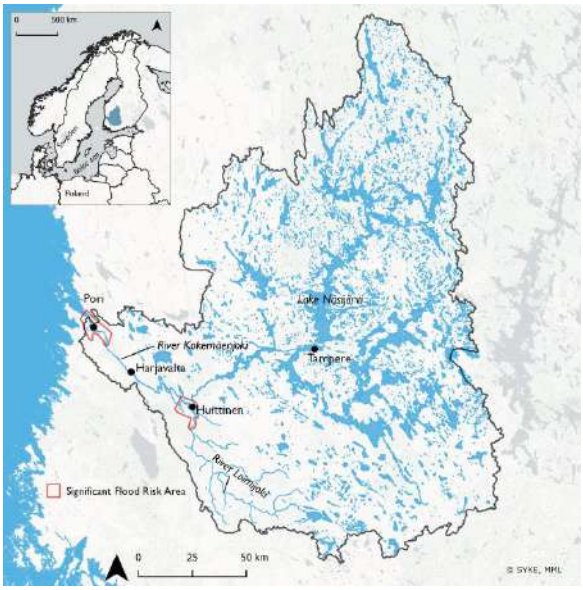
Collaboration with key stakeholders
Validation of relevant vulnerability metrics at local level is essential to improve our understanding of issues relevant to social vulnerability to flooding, which is in turn a prerequisite for socially just flood risk management. We will interview local residential groups and experts and organize workshops on the current and prospective future vulnerabilities in the face of climate change.

EXISTING DATA

- Kazmierzcak, Al. (2015). *Analysis of social vulnerability to climate change in the Helsinki Metropolitan Area*.
- Flood Risk Management Plans for 2016-2021 and 2022-2027 (by Uusimaa ELY centre)
- Municipal and regional adaptation plans and strategies

Kokemäenjoki catchment area

Administrative region: Central Finland, County of Southwest Finland, Kanta-Häme, Pirkanmaa, Päijät-Häme, Satakunta, South Ostrobothnia
Timeline: Autumn 2022
Type of flood: Coastal flood, fluvial flood, pluvial flood, frazil ice, ice jams
Surface area and number of households: 27,100 km ^{2}, currently 15,000 residents at flood risk



Case study area. Flood risk areas are mapped by the Finnish Environmental Institute and ELY centres.

STAKEHOLDERS INVOLVED

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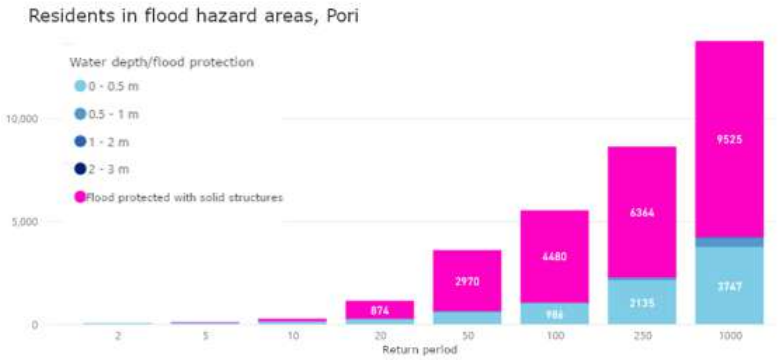
Spring flood in Huittinen, 2020. Varely (2020)

MULTIPLE FLOOD RISKS OF A LARGE RIVER BASIN

Kokemäenjoki is one of the largest river basins in Finland discharging to the Baltic Sea. There are two significant flood risk areas in the basin, Pori and Huittinen. The upper part of the basin has a large number of lakes, many of which are regulated, therefore there are no significant floods in the Näsijärvi lake, while the risk is much greater in the downstream. Many different types of floods occur in the catchment area affecting the riverside towns and agricultural land.

The effects of climate change on the seasonal variation and intensity of flooding is already visible, causing challenges for flood risk management. Winter floods are increasingly common and harder to predict, and intensifying precipitation causes significant stormwater flood risks in urban areas. Due to its location in the mouth of Kokemäenjoki River, which collects its water from the entire basin, City of Pori is one of the most significant flood risk areas in Finland.



Solid structures protect thousands of inhabitants in the city of Pori up to a 100-year flood. Source: Finnish Environment Institute & ELY centres.

SOLARIS KEY ISSUES : BUILDING SOLIDARITY BETWEEN THE UPSTREAM AND DOWNSTREAM

Flood risk management strategies
Flood protection in the city of Pori is part of FRM of Kokemäenjoki catchment area. Efforts to protect Pori from flooding started already in the beginning of the 20th century. Main measures are water regulation in the upstream, dredging, and dikes along the river. Flood prevention and preparedness are the key strategies in Pori, and they are constantly being improved. Climate change is also a pressing issue affecting the future flood risk and required measures. What responsibilities are needed for flood protection and what are the limits?
Socio-spatial inequalities
In the Kokemäenjoki basin, there is the dilemma of the upstream vs. downstream in the case of an extreme flood as the lakes upstream regulate much of the water that flows into the towns in downstream. Thus, does flood risk management privilege the upstream communities and sacrifice the downstream? What are the limits for solidarity? What is a fair deal like along the Kokemäenjoki river between different actors and areas?
Citizen involvement
In Finland, citizens have the possibility to voice their opinions on the FRM plans twice during the process cycle. However, not many opinions on the plans have been received from the inhabitants. With participatory methods, such as focus group discussions and art-based methods, we aim to gain deeper understanding on how to build solidarity mechanisms between the upstream and downstream cities, where the socioeconomic situation and vulnerabilities may differ. How can art-centred methods help citizens to reflect on their vulnerabilities? How to get the citizens more involved in the decision-making process?

EXISTING DATA

- Flood Risk Management Plans (by Southwest Finland ELY centre), pilot studies and previous resident surveys on floods at Kokemäenjoki
- Söderholm et al. (2018). *Collaborative Planning in Adaptive Flood Risk Management under Climate Change*. Water Resource Management, 32:1823-1397. https://doi.org/10.1007/s11269-017-1875-3

La Bouillie, Blois

Administrative region : Centre-Val de Loire, Loir-et-Cher (41)
Timeline : 2000-2021
Type of flood: Fluvial flooding
Surface area and number of households: 400 inhabitants in 2002, no current estimation.

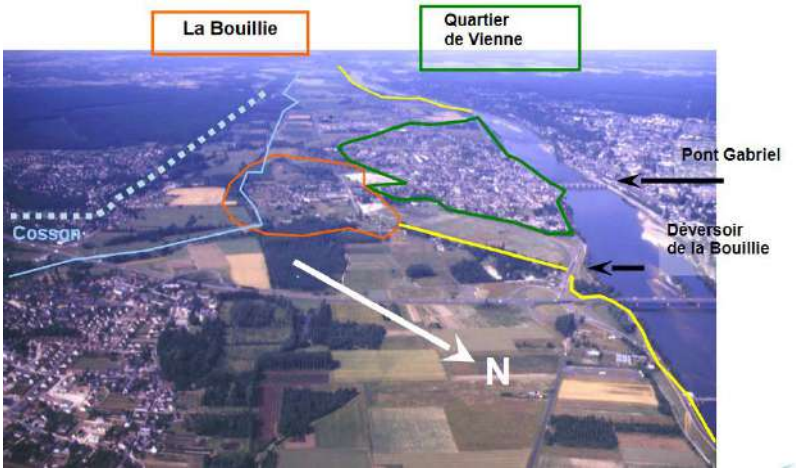
STAKEHOLDERS

Agglomeration
Coordinated the Deferred Development zone (the French "ZAD") process.
Negotiated the local Flood risks prevention plan with the State services and set up urban planning documents.
Coordinated and design the rehabilitation and development project of la Bouillie with private consultants and organised the participatory modules.
Led the ZAD and funded 10% of the global costs.
Responsible for acquiring land ownership in the area.
Municipality of Blois
Involvement in social support measures surrounding the ZAD.
Set up urban planning documents.
State services :
Built the local Flood risks prevention plan negotiated with local policy makers.
Participated in the ZAD creation and in technical committees during its development.
State :
Financed the acquisition of real estate in the ZAD : the fund for the prevention of major natural hazards funded 90% of the costs.
Inhabitants :
Organised public meetings and lead the protest against the ZAD. During the rehabilitation process, some citizens got involved and others seem invisibilised.

A possible future designed for the site by landscapers. Chorème (2010)

DELOCALISATION AND RE-DEVELOPMENT PROJECT IN THE FLOOD RETENTION AREA OF LA BOUILLIE

During the first part of the 20th century, "La Bouillie" district expanded, first informally, behind a spillway and within a discharge channel created in the 18th century. Since 2003 and the establishment of a Deferred Development Zone, housing and economic activities in la Bouillie have progressively been delocated in order to re-establish the flood retention area and improve protection level in neighbouring estates, especially in "Vienne" district. 400 people in urbanized districts, 20 companies and numerous people in informal lightweight dwellings used to live in La Bouillie.
New propositions about the future of the project have emerged. Several non-permanent uses have been proposed, in line with flood risk management. planners ambition to address flood risk issue and build synergies between agricultural, recreative and contemplative uses. To design the rehabilitation process, a consultation process has been launched since February and participatory workshops have been organized.



Location of "la Bouillie district in Blois. Credits : Agglopolys (2017)

FROM A SPATIAL MARGIN TO A NEW CENTRALITY : INEQUALITIES INDUCED BY THE DE-URBANIZATION PROCESS AND NEW FUTURES DESIGNED.

During the de-urbanization process, the risk has firstly been approached through a technical lens in a top-down approach. This technocratic approach reinforced local conflicts and fed the social vulnerability of some inhabitants, mainly among the elderly, from the working class and strongly rooted in the area. Can we notice a former risk overexposure among the most deprived households ?

During the rehousing process, inhabitants were afraid not to be able to find equivalent living conditions. Moreover, these delocations have never been introduced or recognized as a sacrifice for the whole community either which raise recognition issues. Some of the inhabitants created an association to protest and to negotiate "fair" compensation. Eventually, the Agglomeration set up social support initiatives and enhanced compensation rules which pacified relationships. Where did former inhabitants decide to move

The ambition is now to conceive an urban agricultural nature park in the name of adaptation, which can be classified as a Nature-Based-Solution (NBS). This project is part of a development policy for local attractiveness. It gives a new centrality to la Bouillie and intends to transform this historical urban edge into environmental amenities for local inhabitants and tourists. It seems former inhabitants were not attending to participatory workshops to design it : for instance, travellers who have also been living on the territory for decades are invisibilised and their situations are managed separately. It raises core-questions : For whom are the future designed for the site? Who benefit from environmental amenities and who are designing it? Do local policy makers consider differences in the capacity of citizens to participate in this process? Is flood risk management a tool for spatial and social transformation?

EXISTING DATA

- Book chapter : Rode (2014)
- Paper : Rode (2008)
- PhD thesis : Doussin (2009) / Fournier (2010))
- Video presentation of the rehabilitation process : Agglopolys (2021)

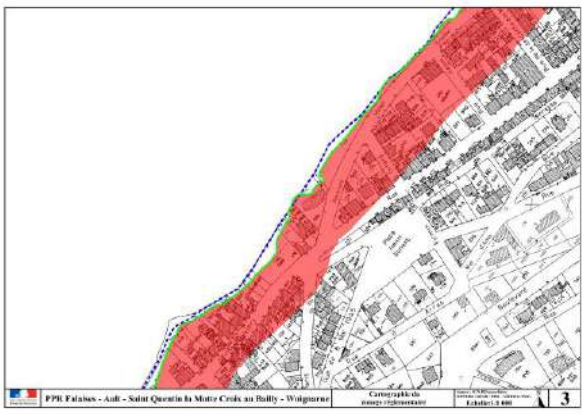
Ault

Administrative region: Somme Department, Hauts de France Region
Timeline: Spring 2022
Type of flood: Coastal risk (cliff erosion mainly)
Surface area and number of households: 6 km^2, 1431 residents

Ault, a city in face of coastal erosion. Credits: Ault Commune

STAKEHOLDERS

In 2011, following the consequences of the Xynthia storm, the State services asked the **Syndicat Mixte Baie de Somme - Grand Littoral Picard** to implement a Flood Prevention Action Programme (PAPI) in order to develop an integrated strategy for the management of the coastline in the short, medium and long term (50 years) in accordance with national requirements. This strategy extends from the Authie estuary to the Bresle via the Somme. The **State services (DDT/DREAL)** are in charge of drawing up the Flood Risk and Coastal Risk Prevention Plans (PPR). In Ault, two PPR were approved, in 2001 and then in 2014. The latter pointed out that areas at risk had to be enlarged, taking into account climate change.
Within this institutional frame, **the municipality of Ault** is supported by the SMBSGLP and its financial partners (Region, Department, Water Agency, etc.) to define a new urban project which takes into account coastal risk.
An association of local residents, "Ault-environnement", is gradually taking over the projects and questioning them. During a few years, they carried out (with the support of the municipality) a legal battle against the PPR but were defeated in 2020.



Extract of the "PPR Falaises" in Ault, identifying areas at major risk during the next century . Credits: DDT Somme

AULT: A "BELVEDERE CITY"

Ault is located along the Channel.
The chalk cliff on which the commune of Ault is located is inexorably retreating at a rate of 30 to 70 cm per year. Several streets have disappeared during the last century and the phenomenon of erosion now threatens nearly 80 houses. In 2001, a first erosion risk prevention plan (PPR) was drawn up by the State services. After major operations to combat the sea, the municipality planed to relocate the most at-risk properties a vast urban redevelopment project.
In 2005, the commune of Ault was one of the five sites selected at national level for an experiment within the framework of the national strategy for managing the coastline. In comparison with other experimental cases in France, local authorities in Ault could benefit from a determined area to relocalize inhabitants.

The "ZAC du Moulinet", a specific area to relocate housing and activities from the coastline. Credits: Syndicat Mixte de la Baie de Somme/DR

SOLARIS KEY ISSUES: EQUALITY AND ADAPTIVE FLOOD RISK MANAGEMENT

Socio-spatial inequalities
Previous researches (Minéo-Kleiner, 2017) tend to show that population living along the coastline and in the area at risk in Ault is older but also more educated than the rest of the local population.
The project to relocate goods and people was initially identified as a relatively viable project, as the relocation site was identified from the outset, with the presence of an available sector within the urban area (ZAC du Fouillet). However, there was a great deal of opposition. Initially, opponents complained about the methods of informing and involving the local population. Indeed, it was mainly through the press that the inhabitants learned about the project. Local opponents also pointed out that the city of Ault did not benefit from the same subsidies than others.

Flood risk management strategies
The project in Ault is in line with recent developments, at least in France, in risk management methods. The issue of cliff erosion is gradually being integrated into a broader question of local adaptation to climate change. If, from the start, a vast delocation project was planned, it was progressively postponed and more attention was given to technical measures to slow down cliff erosion.

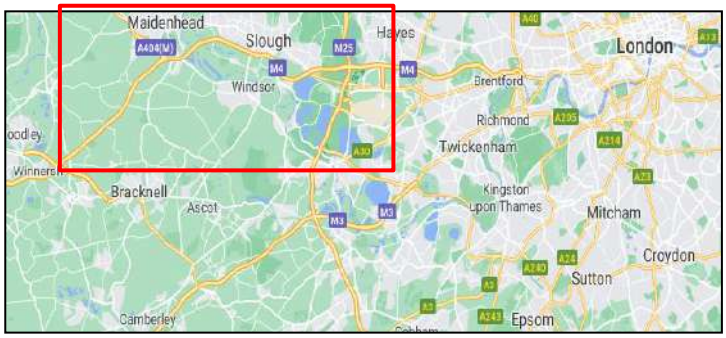
From conflicts to collaboration with key stakeholders
In 2014, a new erosion risk prevention plan was drawn up, further emphasising the importance of the issues at stake.
However, local opposition tends to increase and the project is restructured. While the issue of relocation of goods and people was identified as a priority, the new project places much more emphasis on the implementation of technical solutions to reduce the factors that aggravate erosion (vibrations linked to traffic, infiltration of runoff water, wastewater networks, etc.). However, some inhabitants still live in areas of extreme risk and a new consultation process, at the larger scale along the coastline, has been initiated in 2020 in order to relaunch reflexions.

EXISTING DATA

- www.ault-environnement.fr
- BUCHOU S., Quel littoral pour demain ?, 2019.
- MINEO-KLEINER L., L'option de la relocalisation des activités et des biens face aux risques côtiers : stratégies et enjeux territoriaux en France et au Québec, 2017.
- ZCCS, Projet d'aménagement et de valorisation d'Ault, 2019.

River Thames, West London

Administrative region : Berkshire and Surrey
Timeline: Feb 2022 – Feb 2023
Type of flood: fluvial, pluvial, sewer, overland flow, ordinary water sources, groundwater.



STAKEHOLDERS:

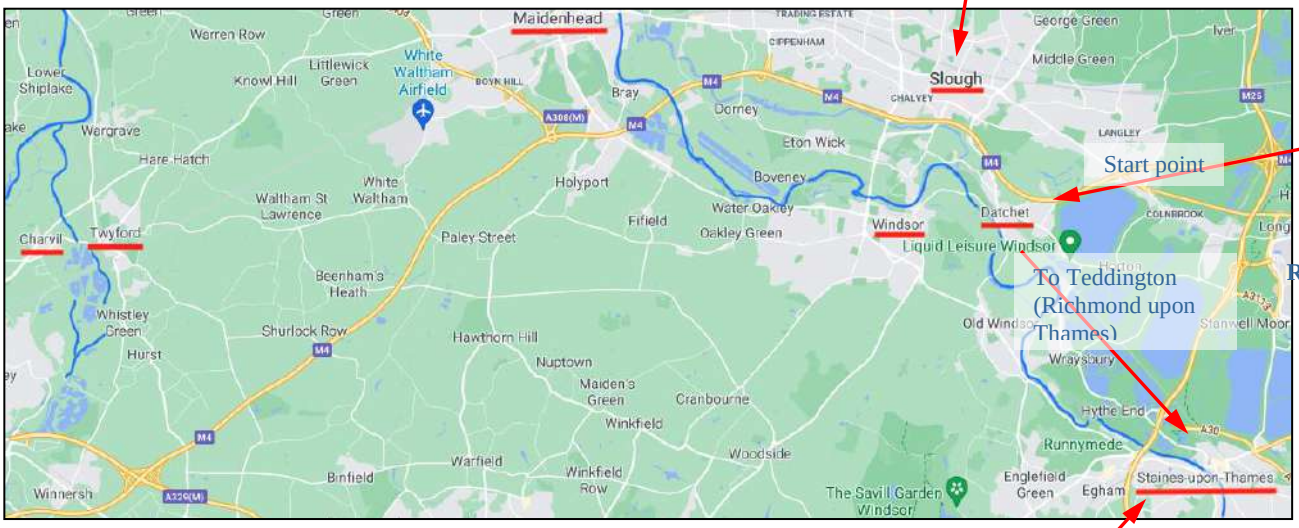
- Environment Agency
- County and borough councils
- Thames Water
- Colne Catchment Area Network (CAN)
- Colne Valley Partnership
- Flood Action Groups

CASE STUDY OVERVIEW

The case study area lies directly West of London. This stretch of the Thames (emphasised in blue) passes through several settlements of interest, including Charvil, Twyford, Maidenhead, Slough, Windsor, Datchet and Staines-upon-Thames (underlined in red). These towns span the counties of Berkshire and Surrey. The area suffered widespread flooding in the winter of 2013/14. We are unlikely to cover all these towns and will narrow down the case study in the scoping phase.

EXAMPLE: SLOUGH

Slough is situated in the Thames Valley on the north-eastern boundary of Berkshire. The Borough covers a total area of approximately 33 km2, and the land generally slopes fro mnorth to south and west to east. There are six main catchments with channels running from north to south. Records of fluvial flooding in 1947, 1969, 1989, 2000, 2001, 2003, 2007, 2009 and 2014, particularly in the areas around Chalvey, Myrke, Langley, Colnebrook, Manor Park and Poyle. Complex system of water management in around the area of the lakes (e.g., Colnebrook) through 'penstocks' (sluices or water gates). Much of the centre of Slough is deprived and the Council (local govt.) announced bankruptcy in July 2021.



River Thames Scheme
PROTECTING our communities
SECURING our economy
ENHANCING our Thames

RTS:

- Environment Agency
- Surrey County Council
- Datchet to Teddington
- Reduce flood risk
- 11, 000 homes
- 1,600

EXAMPLE: STAINES AND EGHAM

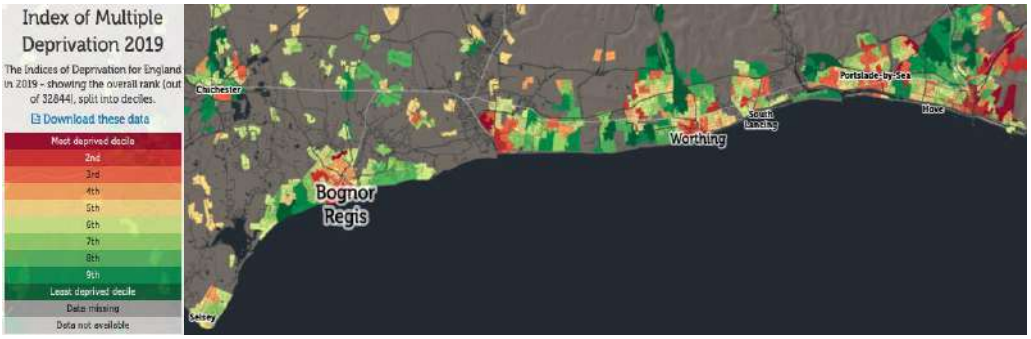
River Ash (not Thames). Serious floods in February 2014. Added risk of contaminated water supplies. Thames Water operates a pumping station when the aqueduct becomes overwhelmed. '2003 Protocol' determines when this should happen. Apparent mismanagement of sluice gates and pumps.

West Sussex

Administrative region : West Sussex
Timeline: Feb 2022 – Feb 2023
Type of flood: coastal flooding and erosion

CASE STUDY OVERVIEW

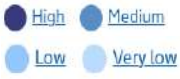
The West Sussex coast suffers from coastal erosion and flooding. Almost the entire coast from Shoreham to West Wittering has taken a 'hold the line' approach. Early research suggests that deprived areas coincide with flood risk areas starkly in the town of Littlehampton (see maps below). Severe flood events in 2012, 2014, and 2018. £14.5m Littlehampton Flood Defence Scheme completed in 2015.

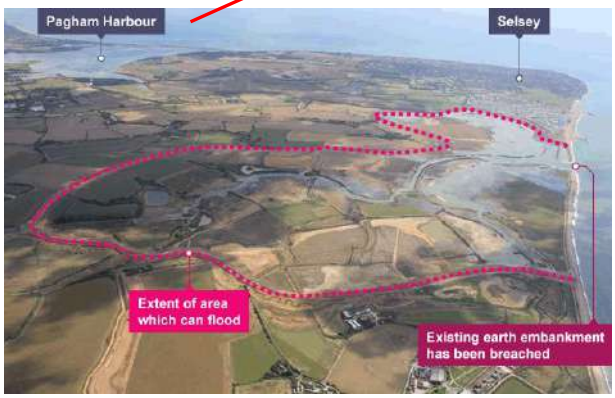


STAKEHOLDERS

- Environment Agency
- West Sussex County Council – Local Lead Flood Authority (LLFA)
- Arun District Council
- Littlehampton Harbour Board
- Littlehampton Flood Action Group
- West Sussex Flood Risk Partnership
- Private engineering companies

Extent of flooding from rivers or the sea (Also, some surface water risk)





BBC Bitesize (secondary school learning resource):
https://www.bbc.co.uk/bitesize/guides/ztffqhv/revision/5

MEDMERRY: BUILDING WITH NATURE

- Managed realignment of the coastline
- Completed in 2013
- Cost £28m
- Earth embankment originally built in the 1960s
- Social benefits: flood protection
- Economic benefits: cattle graze on sea grasses and the meat is more valuable
- Environmental benefit: natural habitat creation
- Interesting questions: community engagement; partnership working; impact on existing inequalities?


Littlehampton floods in 2012


Flood Defence Scheme

Partners

SYKE

ACADEMY OF FINLAND

fhrc
Flood Hazard Research Centre

UK Research and Innovation

University of Antwerp
CRESC | Centre for Research on Environmental and Social change

Belgian Science Policy Office
belspo

citeres
UMR 7324

université de TOURS

le cnam
GeF

Lab'URBA
Université Paris-Est

ANR
AGENCE NATIONALE DE LA RECHERCHE