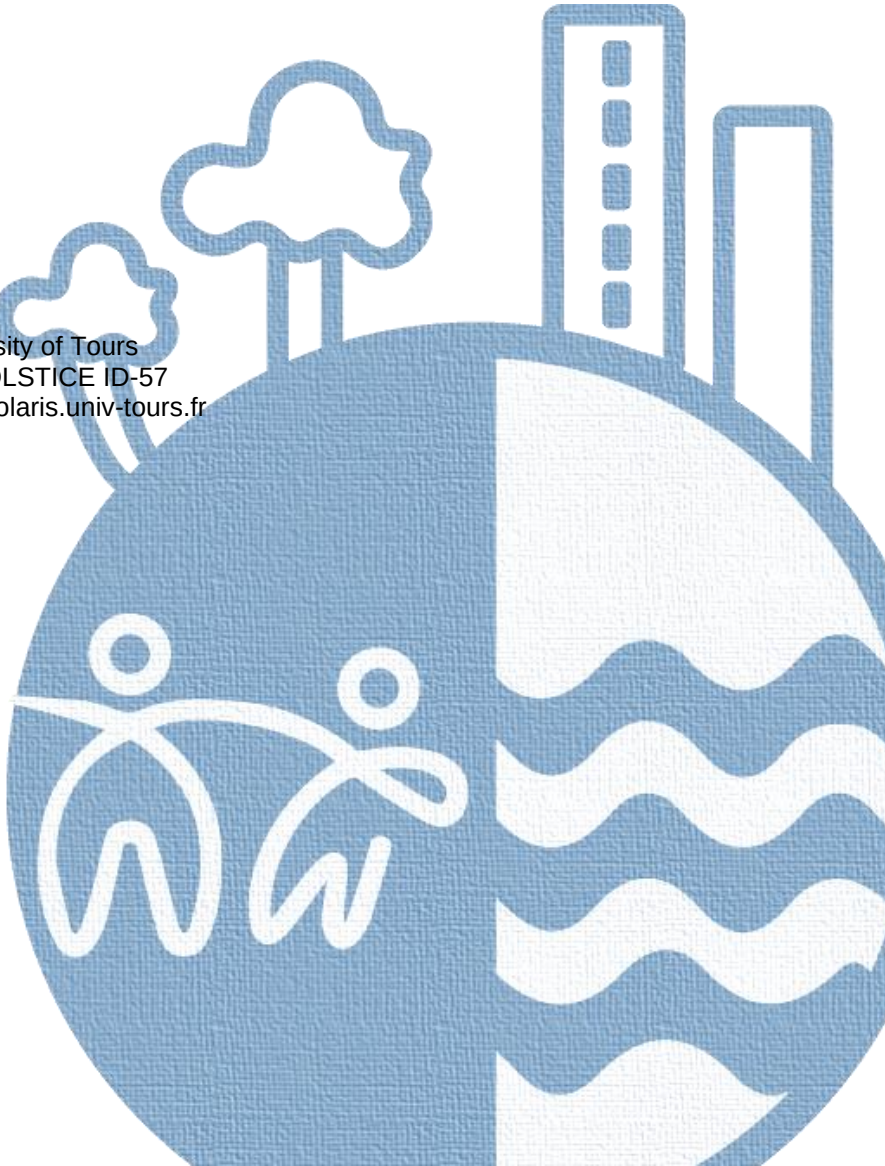
SOLARIS
SOLIDARITY IN CLIMATE CHANGE

CROSS-NATIONAL COMPARISONS OF JUSTICE IN FLOOD RISK MANAGEMENT: RESULTS FROM THE SOLARIS PROJECT

Comparative report



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Author information
Authors are identified at the beginning of each chapter and in the table of contents below.

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1. Introduction to the comparative report

Johan Munck af Rosenschöld, Ann Crabbé, Marie Fournier, Mathilde Gralepois, Sofia Guevara Viquez, Corinne Larrue and Sally Priest

1.1 Background and aim

As climate change impacts are being increasingly felt across the globe including Europe (European Environment Agency, 2024), more focus has been directed towards better understanding the ways in which these impacts will affect regions, localities and social groups in different ways. The recognition that individuals have various vulnerabilities to climate change impacts and that they have different capabilities to adapt to the impacts (Breil et al., 2021) have elevated the question about justice to the core of climate change adaptation (Zimm et al., 2024).

The aim of SOLARIS is to analyse spatial and social issues, assuming that there is a spatial dimension in social vulnerabilities – and vice-versa – in light of climate changes. How should climate change adaptation policy and concrete measures be developed considering those cross-cutting notions, so that no one is overly burdened – socially and spatially - by the planned measures? Do interested parties have sufficient possibilities to participate in decision-making processes that are relevant to them? Are the needs of socially vulnerable groups taken into consideration when developing adaptation measures?

Flood risk management (FRM) is an important and recurrent expression of both how climate change adaptation is being realised in practice and how justice concerns are dealt with (Thaler et al., 2018). Justice is an increasingly significant theme within the FRM literature (de Goër de Herve, 2022; Gralepois et al., 2024; Paauw et al., 2024). Similar to the discussion on climate change adaptation more broadly, the FRM literature has studied justice from distributive, procedural and recognition perspectives and has provided valuable insights into the role of justice in FRM. FRM provides an interesting point of departure to study justice, as FRM itself can be seen to consist of different strands, or strategies, by which flood risks are being managed. The different strategies – flood defence, prevention, mitigation, preparation, response and recovery – highlight that risks are being managed at different times (before, during and after a flood event) and across sectors (urban planning, water managers, rescue services etc.). In addition, and more interestingly from the point of view of this report, the different strategies also highlight the different ways that justice concerns arise throughout the FRM process, in different European countries.

Drawing on cross-national comparisons of justice in FRM provides an additional important element to the discussion. The spatial, social, political and administrative contexts matter in understanding the role of justice in FRM. Indeed, highlighting different national contexts serves to better illustrate the ways in which justice is considered in FRM as well as drivers and barriers to address justice more effectively. This forms the background for this comparative report.

This comparative report was written as part of the research project “SOLidarity in climate change Adaptation policies: towards more socio-spatial justice in the face of multiple RISks” (SOLARIS)[1], funded by the Joint Programming Initiative "Connecting Climate Knowledge for Europe" (JPI Climate) and its SOLSTICE programme[2]. The project set out to develop conceptual and analytical approaches to reveal social justice perspectives of climate change adaptation policies and to explore the policy and decision-making process for a large range of stakeholders (e.g., policymakers, practitioners, citizens etc.) to facilitate better participatory processes. The SOLARIS-project builds on, but also extends the discussion on FRM further by considering these justice dimensions together and conducts a cross-national comparison of FRM in four European countries.

The goal of this comparative report is to present the core results stemming from the cross-country comparative analysis of the data collected as part of the SOLARIS-project during the Work Package

[1] More information: https://solaris.univ-tours.fr/
[2] More information: https://jpi-climate.eu/programme/solstice/

3 (WP3). This is done by highlighting what we call “comparative fact sheets” presented in Chapters 2-6, where we focus on particular themes that emerged as cross-cutting issues, specifically interesting and important in our analysis. Therefore, this report should not be seen as a comprehensive account or “database” of all possible cross-country comparisons and findings within the project. Rather, we focus on selected key topic areas of interest through which a comparative analysis can highlight something more than collecting the findings and results from each country.

1.2 Methodology and data

The comparative analysis

The comparative analysis was conducted in multiple steps and combined both top-down and bottom-up methodological approaches. In relation to the former, we developed as part of the project a comparative assessment grid (Task 3.1 of SOLARIS) that structured the broader framing of the comparative analysis. This assessment grid highlighted a selection of issues that were deemed central based on a literature review of the scholarly debate on justice in FRM, and by an attempt to systematise central elements of the comparative analysis. These themes included: the integration of justice in FRM policies and the existence of rules related to it, the procedures, traditions and effects of participation, the types of knowledge that are utilised by policymakers, and perceptions of social vulnerabilities within FRM policy. The assessment grid helped to crystallise and structure the comparative analysis, and further, the comparative fact sheets presented in this report.

The bottom-up part of comparative analysis was driven by close reading of the data gathered in the project and by developing research questions based on what these data was showing us. As is usual in empirical research projects, some of the findings from our analysis were in line with the existing scholarly debate on justice in FRM, but in other cases our findings provided new insights and made us investigate these topics more closely. Together with the contribution from the assessment grid, this curiosity of what the data tells us sparked the ideas for the comparative fact sheets.

The empirical protocol and data collection

The research in the SOLARIS project has been conducted through an empirical protocol carried out during the SOLARIS during WP2 (empirical field work), started in March 2022. The empirical protocol aims to provide guidance during case study investigation to ensure that the work is conducted in a coordinated fashion and that the results and analyses produced may be comparable in WP3 (comparative analysis). To operationalise the comparison, we adopted a two-tier approach: i) the research is “research questions” oriented, i.e., the SOLARIS researchers look for similar issues and questions; and ii) conducting case studies using three main empirical tools: 1) grey literature/document analysis, 2) interviews, and 3) observant participation.

The SOLARIS project set to answer three research questions, which formed the basis for the analyses conducted in the project[3]:

Q1: How and when are issues of inequality and justice addressed? How does FRM link up with climate change adaptation policies?

Q2: What participation procedures are in place? What are the effects of the participation processes?

Q3: What types of knowledge about inequality and justice are available? Are they being used? What are the steps to integrate all types of knowledge, including lay knowledge?

To conduct the comparative analysis, we made use of a wide range of data and material gathered in the SOLARIS-project. But, at the big picture, the SOLARIS consortium looks for similar issues and questions with three main empirical tools: 1) grey literature/document analysis, 2) interviews, and 3) observant participation. Finally, this comparative report is based on extensive literature review of the scholarly discussion on justice in FRM, document analysis of policies, legislation, guidelines and

[3] Our research deliverables and reports are available here: https://solaris.univ-tours.fr/

reports related to FRM, interviews with national- and local-level experts, organized stakeholders such as NGOs and associations as well as individuals and inhabitants (see Table 1)

In addition, and iteratively, each country and researchers had the opportunity to experiment with other data collection methods: art experiment (Finland) and field trips (France). These were not systematically implemented in the four countries, but they were presented, discussed, debated, and integrated into the analysis on the project level. Finally, it is important to remember that dissemination activities (performed as part of WP4) are important for data production: local groups discussions, advisory committees, web-documentary, conferences and the final conference. Even if they are not part of the data collection as such, they are crucial to reformulate questions, to analyse the data from a different perspective or using another analytical framework and to precise or complete the results if needed. We also build on scientific peer-reviewed papers published as part of the SOLARIS project.

Table 1. Number of data collected and analysed in the SOLARIS project.

Data	France	England	Belgium	Finland	In total
FRM policy documents	86	34	24	43	187
Interviews	53	28	36	49	166
Local discussion groups	2	1	2	2	8

The background material, including more in-depth information and analyses on the national and case-study level can be found in other published reports from the SOLARIS project:

- Individual country reports from Belgium, England, Finland and France, available here: Country reports – Solaris (univ-tours.fr)
- Handbook of case studies factsheets, available here: Case studies factsheets – Solaris (univ-tours.fr)

1.3 Structure of the report

This report is structured as follows. In the following five chapters, we present the core results from our comparative analysis, focusing on key themes that emerged in our analysis. Finally, we conclude the report with expanding on the previous chapters and provide a list of important questions that can be considered to improve the integration of justice into planning FRM policy and measures.

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2. Degrees of justice in climate change adaptation policies and flood risk management: How is the concept implemented in public policies?

Mathilde Gralepois

The risk of flooding remains the number one natural hazard in Europe and “precipitation extremes are increasing in severity” as said in the European Climate Risk Assessment edited by the European Environment Agency (European Environment Agency, 2024). Global warming having direct links of attribution with the frequency of river floods in Europe (Alfieri et al., 2015; Swain et al., 2020; World Weather Attribution, 2021), the intensification in flood occurrences has anthropogenic factors, such as intense urbanisation and the presence – or not – of dikes, dams, or reservoirs. The recurrence of recent catastrophic floods in various European regions continues to raise the issue of strengthening policies for mitigation and adaptation to climate change. More and more literature highlights the growing interest in analysing common policy challenges of climate adaptation and flood risk management (Driessen et al., 2018; Gralepois et al., 2024; Paauw et al., 2024; Thaler et al., 2018). However, these discussions do not appear to be complete and nor offer concrete suggestions for policy implementation in Europe. European institutions are beginning to integrate issues of justice in climate related policies, such as in the Adaptation Strategy (European Commission, 2021) or the European Green Deal 2030 (The European Green Deal, 2019). As such, the legal context is strengthened. Even recently, the European Council voted a recommendation on fair transition towards climate neutrality4, and strengthened its strategy on Climate Adaptation5. Undoubtedly, the intentions are there. Nevertheless, results are neither sufficient, nor tangible and even sometimes are anti-effective (Breil et al., 2021; European Environment Agency, 2022).

To face the global consequences of climate change, the United Nations Environment Programme (UNEP) entitled its Adaptation Gap Report in 2022 “Too Little, Too Slow” (UNEP, 2022). While Europe calls for “Striving to be the first climate-neutral continent” in the European Green Deal, there is a lack of empirical knowledge to reinforce justice issues in adaptation policies, including those of flood management. Even if the reasons for this are different, the final effects are converging. The integration of justice in both climate adaptation and flood management policies is too slow and too weak. Little has been produced to operationalise the notion of justice, from a qualitative perspective, at the level of the policy formulation. To recap, a key question concerns how justice should be incorporated in the selection of policy instruments and in climate policy designs. The classic current definitions of the Intergovernmental Panel on Climate Change (IPCC) provide six common criteria for defining justice in terms of procedural, distributional and recognition justice (see Table 2.1).

Table 2.1. Six concrete criteria for detecting justice in public policies. Source: IPCC Sixth Assessment Report (2022).

Procedural justice		*Distributional justice*		*Recognition*	
Participation in problem resolution	Diversity of knowledge	More beneficial effects	Less burdening effects	Integration of perception	Integration of capabilities

The comparative approach aims to provide an answer from a public policy perspective, through the analysis of four European countries: Finland, Belgium, France and England. More precisely, the light

[4] Council of the EU, Press release, June 2022 : https://www.consilium.europa.eu/en/press/press-releases/2022/06/16/council-takes-action-to-ensure-green-transition-is-fair-and-inclusive/

[5] EU Mission on Adaptation to Climate Change Portal : https://climate-adapt.eea.europa.eu/en/mission/

is shed on the barriers to the practical integration of justice on adaptation policies and especially in flood management at national policy level. Hence, national institutional strategies, programs or rules modify – more or less –the local policies, in an urban context. The comparative approach can offer a cross-national analysis, which illustrates the similarities and the differences of four patterns of addressing – or not – the barriers to justice in climate adaptation and flood management since the 1980s. The contribution is to typologise and to analyse obstacles that inhibit climate adaptation and flood management to tackle and implement concretely the issue of justice.

Shi's roadmap for research on justice in urban climate adaptation (Shi et al., 2016) offers framework to analyse i) if national policies integrate justice in climate adaptation and flood management, and ii) to what extent national policies on climate adaptation and flood management alter local policies in cities (see Table 2.2). This roadmap for research on urban climate adaptation justice is a synthesis and a tribute to the work of JoAnn Carmin on urban adaptation in cities and social vulnerability in face of climate change especially on the Global South (Carmin et al., 2012, 2013). It is striking to see how their work echoes with the issues at the European level. It is very instructive to read their research through the prism of public policy analysis: how does the notion of justice alter the policy tools in climate change adaptation?

Table 2.2. Major research questions for urban adaptation justice. Source: Shi et al. 2016

Broadening participation			
i.e. to engage community and advocacy groups; create specific support	which conditions?	which strategies?	which trade-offs?
Adaptation planning			
i.e. to demand for data and expertise; cost of implementation; staff and resource capacities	which tools?	which lessons learnt?	
Scales of governance			
i.e. geographical specificities (climate and governance); tensions between authorities; sectorisation of priorities	which regional policies?	which cross-cutting issues?	which evaluation?
Designing for spatial justice			
i.e. balance between physical-infrastructural and socio-institutional approaches;	which maladaptative effects?	which responsibilities?	

With those questions in mind, the analysis will cross-reference certain elements collected for their relevance through the compilation of national reports of England, Finland, Belgium and France6, with the questions of the Shi et al.'s grid. Also, two articles provide additional in-depth rationalisation of results from SOLARIS research (Gralepois et al., 2024; Paauw et al., 2024). Each section comes from Shi et al.'s research questions for urban adaptation justice, and the results come from SOLARIS research.

[6] Reports and all final products can be found on SOLARIS website: https://solaris.univ-tours.fr/?page_id=1241

2.1 Broadening participation

In the issue of justice in public policies, the questions of procedural justice are crucial. Shi et al. (2016) suggest that research focuses more on how to engage concretely the communities and advocacy groups; and how to create specific support for them. Under which conditions? With which strategies and if there are, on what nature of trade-offs? Those questions could be answered through the work done by SOLARIS researchers on the research questions n# 2 on participation. We frame questions of participation in climate and flood policies by asking: What participation procedures are in place? What are the mandatory rules? What are the ad-hoc participation mechanisms? What effects of participation processes?

Main conditions

Participation as legal requirement. From a procedural justice perspective, most countries and regions in Europe have integrated the notion of "public involvement" in the construction of public policies since the late 1990s, in the path of several international texts on public or citizens' involvement in environmental policies. The 1998 Aarhus Convention guarantees three rights to the public: public participation, access to environmental information and access to justice where the other two rights have been disregarded7. In France as in Finnish political culture, participation is considered to have both intrinsic and instrumental value. Citizen participation in decision-making is a constitutional principle and a civil right that implements the ideals of democracy and equality. Still, legal requirements are highly valued by the stakeholders (Järvelä et al., 2018), both for climate adaptation and flood management. Participatory processes are often mandatory. Nevertheless, they are still lacking resources for engagement, skilled personnel, and sufficient time for a comprehensive approach.

Diversification of professional skills as main success to broaden participation. The success of a participation is often interpreted minimally by the plurality of knowledge and professional skills (water management, spatial planning, urban infrastructures, etc.), i.e. a network of stakeholders from several policy domains. In Flanders for example, climate and flood policy instruments such as official narratives, datasets and rules are elaborated from different policy domains even if the Environment Ministry is still the concentration of 'legitimate' knowledge. The transversality and the importance of tackling the climate issues through a multi-sectorial approach could be seen as a starting point. Nevertheless, flood management has more recently been opened to a multi-layered approach including not only defence and prevention, but also information, preparation and recovery.

Concrete engagement of communities as main challenge. It is often challenging to effectively engage some groups within communities, thereby questioning the representativeness of participation. The participation challenge is not always given the necessary capacity to achieve its objectives. In England, participation success is also often considered the presence – or not – of Flood Action Groups. Even if actors, such as the Environment Agency, are investing considerable resources and even if the case of Flood Action Groups is a brilliant initiative, both engagements also highlight the limits of capacity and capability to involve the "left behind" people. At the end, citizens' feedback has been rather limited; comments come from official local stakeholders and organisations.

Main strategies

Public authority as principal stakeholder. There is a long tradition of flood risk management by public authorities, stemming from a deep-rooted belief that it is public authorities' responsibility to manage flood risks. This makes these public authorities well-respected sources of information on flood and climate change risks. If local population initiatives exist, national authorities claim legitimacy in organizing participation, having legitimate knowledge, accepted expertise and values. So, the main conditions of participation are organised and regulated by national public authorities. Even though there is a noticeable evolution towards shifting tasks and financial responsibilities to local

[7] These rights have been enshrined in EU legislation through two major directives, namely 2003/4/EC and 2003/35/EC.

governments, central governments are still very dominant actors, particularly in determining the policy contents. As will be illustrated in the next section, these policy contents are mainly inspired by engineering perspectives on flood risk and climate adaptation, underexposing justice issues. This does not open the decision process to the local population, especially the most vulnerable communities.

Increase of possibilities but still limited participation. Climate adaptation policies tend to broaden participation, including in flood management, even if the research observes a strong resistance to the inclusion of flood management in climate adaptation policies. Undeniably, public consultation efforts are realised since the 2020s, as illustrated in England by the Flood and Coastal Erosion Risk Management Strategy, essentially in the basis of surveys and quantitative approaches. In Finland, mandatory participation requirements relate more to top-down information than consultation and coproduction; for instance to allow access to the proposals, opportunity to comment on the proposals in writing or via internet, etc. To sum up, two difficulties remain: first, these participatory processes do not reach the more marginalised groups, because participatory processes are too formal (survey) and often too narrowly focused (quantitative approach). Then, the main approaches to participation focus on understanding hydrological phenomena, rather than thinking about solutions for the future of cities.

Which trade-offs

Different degrees of negotiations. When communities participate, negotiations must be found. Differences appear in the research. First, there are differences between consultation on strategy making, and consultation on planning itself. Then, the social and economic characteristics of communities obviously play a role during potential trade-offs. During participation in Flood and Coastal Erosion Risk Management in England, the land ownership constellation of owners tends to force to more individually focused negotiation. In Finland, the strong role of economic interest groups is associated with low political ambition in climate policy rather than the inclusiveness of climate policy networks (Gronow et al., 2019). The Finnish political system is often described as corporatist, as different interest groups have relatively high power in decision-making, including environmental policy making (Vesa et al., 2018, 2020).

Informal participation in case of lack of concrete participation. Informal participation can be presented in two faces. On the one side, as in England, it is interesting to underline the importance of informal interactions, for example when inhabitants come to speak with engineers when they are working in situ. Finally, different means of trade-offs have been observed (to consider the wider place that a house or a specific flood-prone for instance) which raises the notion of upscaling/changing scale in flood management solutions in England and France. The Finnish Climate Panel has stated in its report that, from an inclusion perspective, it is important that participatory processes 1) have real impacts that participants can identify, 2) provide feedback on how listening to citizens' perspectives has been used, and 3) provide a role for NGOs in policy processes (Järvelä et al., 2018). In this perspective, the instrumental value of participation refers to the benefits of participation for the effectiveness of environmental policy making. This perspective may create tensions with political strategies that employ participation as a tool for political effectiveness, that is, in the interest of stronger and more rapid acceptability. On the other side, the spontaneous mobilisations of inhabitants, NGOs or communities are organised to protest the lack pf participation. These groups are often seen as obstacles by public authorities, and obviously it slows down the decision process and the concrete implementation of climate adaptation or flood management projects as in Ault and Blois in France. Nevertheless, they could – and should - be seen as a mechanism to reveal vulnerabilities and inequalities to reduce.

2.2 Adaptation planning

Without the capacity of practical action, both strategies will stay “too little, too slow”. This section questions the concrete capacity to plan climate adaptation and flood management for the future: the data and the type of expertise required, but also the funding capacity, the cost of implementation and the resource capacities (human, social, economic...). Those needs could partly be identified throughout the SOLARIS country reports, and more specifically through the SOLARIS’s research question n°3 on knowledge: What types of knowledge about inequality and justice are available? Is there a requirement for developing and /or compiling data? Are they being used? What are the steps to integrate different types of knowledge, including lay knowledge?

Which tools?

Predominance of technical knowledge and engineering solutions. The prevalence of public authority knowledge leads to the legitimacy of technical instruments based on statistical proofs, engineering skills and infrastructural solutions. Climate adaptation and flood management tools are characterised by top-down data, coming from a limited network of experts, focused on technical and engineering knowledge. For example, Adaptation policies at the regional level in Flanders are prepared only by the Flemish Taskforce Adaptation, and the knowledge is as much a compilation of existing data than a special production of knowledge. Said differently, it gives a little room for new data, new knowledge and even new questions. For example, in France, the issue of coastal retreat is multi-factorial and includes cross-cutting issues of planning, defence, or local development. Finally, these policy contents - mainly inspired by rational, engineering perspective - underexpose justice issues.

Contradiction between existing data on vulnerability and the capacity to expand justice. In the four countries, there is a high-quality environmental, technical, hydrological, socio-economic, and demographic data available in national and local institutions. Even if the date exists, even if compilation is possible, there is a lack of comprehensive information dedicated to questions of justice in climate and flooding issues. For floods in Finland, the central information system in flood risk management is the national Flood Information System. The system maintained by the Finnish Environment Institute continuously compiles information on flood maps: floods that have occurred, flood risk management measures designed and their progress. It is maybe in England that, in SOLARIS project, we observe the bigger contradiction between, on one side, the rich data on vulnerability that exists at the national level on inequality8; and one another side, the capacity to expand justice and equality considerations more explicitly into climate adaptation and flood management implementation. Once again, the cost-benefit analysis measures and the Flood and Coastal Erosion Risk Management Grant-in-Aid allocation represent the most comprehensive consideration of local inequality, that can be used in climate and flood policies.

Which lessons learnt?

Best practices exist locally. We found some best practices in spatial planning for flood management in the four SOLARIS countries that may be conducive to considering justice and equality in policies. For example, in Finland, flood risk prevention through spatial planning is the main responsibility of municipalities and is strongly based on the municipal autonomy and local self-governance. Laws and regulations ensure broad participation rights for residents and service users, with opportunities for citizen influence often in the initial stages of planning processes. Hence, flood risk prevention is locally and democratically organised, which likely contributes to procedural justice in flood risk management (Begg, 2018).

Participation processes can bring fresh perspectives to decision making (O’Hare & White, 2018) which positively contributes to the sensitivity of decision outcomes to justice and equality in floods. However, recognition of differences in the capacity of groups to engage in participation processes is

[8] such as the Indices of Multiple Deprivation, the Neighbourhood Flood Vulnerability Index or the Climate Just maps.

crucial to ensure that a diversity of perspectives, experiences, and needs are heard (Paloniemi et al., 2015).

Few evaluations and lesson transfers are observable. Firstly, the connections between adaptation and flood risk management are still weak and controlled, if not restrained, by the public authorities. More generally, we observe the lack of linkage between adaptation policy and flood risk management. For example, there are two different notions of justice, confirming this lack of articulation. One larger notion of justice in climate adaptation policies, whereas the other is a technical and restrictive notion in flood risk management. In terms of best practice in spatial planning for flood management, in Flanders, those who rent or sell their property are obliged to disclose flood risks, a measure called the 'duty to inform'. It ensures tenants or buyers are informed about the existing flood risks of the building or plot of land they are interested in. The role of inequalities (and potentially of justice) in flood risk management in England is receiving more analytical attention at the national level. The Environment Agency updated their report on social deprivation and the likelihood of flooding, in April 2022 (Environment Agency, 2022). The National Flood Risk Assessment uses different flood risk exposure categories. Although it is not clear yet how these studies will inform flood risk management practice, a focus on these data is encouraging.

2.3 Scales of governance

The challenges facing research on climate change require tackling one of three strategies (Zimm et al., 2024): mitigation, adaptation or the recent "losses and damages". At European country level, climate policy responses have been firstly framed by protection and defence strategies (Gralepois et al., 2016), then mitigation as a second answer (Edmonds et al., 2023; Fournier et al., 2016) and more recently by more adaptative options (Paavola & Adger, 2006). Echoing Shi's recommendations for research strategies (Shi et al., 2016), this section discusses the need for research into geographical specificities in climate and governance. It also calls for the study of tensions between authorities, sectorisation of priorities and consequences of evaluation. As those topics have been partly already covered, this section focuses on climate change and flood exposure in each country and institutional-political governance specificities.

Which political governance and regional policies?

Strong welfare system despite gradual neoliberal reforms. As in the history of European legal and institutional construction, the four countries have a political and institutional history rooted in a culture of welfare and solidarity since the Second World War, which makes it possible to look at how the consideration of justice is evolving. At a general level, the welfare systems are based upon equal opportunity and equality of citizens before the law (Smeyers & Buyst, 2016). They also have a liberal understanding of welfare state: inequalities are mainly derived from one's position in the labour market. Many voices claim that the labour market is not sufficiently inclusive because employment rates are low and welfare dependency is high (Marx & Cant, 2019). Inequality reduction is implemented through redistributive fiscal policies, through social minima, as in France for example with active solidarity income, social housing policies, disabled adults' allowance, solidarity allowance for the elderly, family allowances, etc.

Decentralisation, an important expectation. There is a strong public sector with a tradition of centralisation until the 1980s. Since then there has been a trend of decentralisation. Concerning climate adaptation and flood management, policies are decentralised, with high expectations on local governments. Even if roles and responsibilities may be well defined in law, such in France with the attribution of River, wetlands and floods management to municipalities in 2018 or as through the National Flood Risk Act in Finland. But in practice, the situation becomes more complex. Responsibilities are increasingly shared between the central and local authorities. Responsibilities on defence, mitigation, prevention are devolved from national affairs to local authorities, but national authorities keep a final capacity to drive a decision on one strategy or another, essentially through

funding capacity and the traditional legitimacy of expertise. Implementation is very top-down and imposed mainly through regulatory instruments. This top-down effect is particularly pronounced in the field of flood risk management. Some responsibilities, such as preventing further development in flood risk areas, are also decentralised to local authorities. However, they often lack the resources to execute effectively and efficiently these responsibilities. Decentralisation does not mean more capacity for action. Furthermore, considerable cultural and socio-economic differences exist between regions, with poverty remaining a real problem.

Which climate exposure and cross-cutting issues?

Flood increase, linked on climate change and land use. The four countries face different types of floods: fluvial, pluvial and surface water run-off, and coastal flood risks due to sea submersion and erosion. if Finland has faced lower flood risks than the other countries, England, Belgium and France are expected to suffer high levels of rainfall. Climate change projections show an increase in the average temperature, with an increase in the frequency and intensity of precipitation. As a result of the increase in extreme events, cost and damages caused by flash floods will increase by 130% in France (Andre & Marteau, 2022). These changes in temperature and precipitation patterns are changing the nature of the flooding system. The diversity in the climate and in the land use result in high levels of variability in flood events and flood risk (Marsh et al., 2016). These issues are compounded by the high population density and surface hardening in Flanders (Kellens et al., 2008). This prevents infiltration and contributes to surface runoff during rainfall, even though built-up areas are also expected to increase in the future by 30-50% (Poelmans & Van Rompaey, 2009). We also underline a considerable acceleration in coastal exposure. During the 20th century, floods often had a tidal cause in Flanders, whereas recent events are mostly caused by fluvial and pluvial flooding (Mees et al., 2016). Coastal erosion rates are causing significant concern, with 28% of coastlines across England and Wales deemed vulnerable (Kay et al., 2020; Met Office Hadley Centre for Climate Science and Services, 2021).

2.4 Designing for spatial justice

This last section asks researchers to study how justice is integrated into infrastructural projects and urban design processes; and how to balance between physical-infrastructural and socio-institutional approaches. The subject includes the idea of maladaptation and the subsequent responsibilities - or not - linked to any negative side effects. Here again, to keep in line with the Shi et al.'s framework (2016), particular attention is paid to the specificities of flood defense (infrastructure) and flood risk prevention (planning).

Which responsibilities?

Considering planning in flood risk decision: a step towards more local decisions. The recent strengthening of flood risk management thought planning prevention results from a lack of instruments that sufficiently reduced floodplain urbanisation (Mees et al., 2016). The countries have strengthened the presence of spatial planning regulations in flood management since the 1990's, as In France with the Flood Risk Prevention Plans (PPRI) and as in England, with for example the Planning Policy Guidance (2001), the Planning Policy Statement (2006), the Planning Policy Framework (2012), and Making Space for Water Policy (2014). Policies linking defence and prevention are strengthened by mandatory requirements such as the 'sequential test' in England or the Flemish 'water assessment'. However, planners' responsibility in flood management was not explicitly recognised until the introduction of multi-layer water safety in 2013 (Kaufmann et al., 2016). Most flood risk management initiatives and schemes require planning permission, especially local planning permissions. Interactions between flood management and land planning challenge the traditional top-down approach with, for example, the Action Program for Flood Prevention (PAPI) introduced in 2001 (Larrue et al., 2016), which increases the involvement of municipalities in flood management (Guillier, 2017).

Toward more individual responsibilities? In Finland, planning is a strongly decentralised and a democratically organised process that underlines the importance of the self-governance of residents. According to the Finnish Local Government Act, residents and service users must be granted broad rights to participate in and influence decision making. The municipal governments, in turn, are obliged to consider residents' interests and needs in their activities. However, even with far-reaching participation opportunities for residents, the resources of different groups of citizens to participate are not equally divided creating an environment for potential political power imbalances. In England, riparian owners carry significant responsibilities in for flood risk management. However, these responsibilities are highly dependent on the capacity of those to manage the assets that they own despite the responsibilities and obligations of riparian owners to manage watercourses being defined. Lack of understanding on behalf of asset owners and any ambiguities could create opportunities for blame to be shifted following a serious flood event. Any lack of clarity on flood risk management responsibilities is not a stable basis for tackling any injustice or inequality issues.

Which maladaptive effects?

Lack of attention to social differences. Technical expertise, engineering and scientific knowledge dominate in flood management, but in climate adaptation strategy too. This may be linked to their advocacy belief that flooding is a technical and hydrologic problem that can be solved by protective infrastructure. Efforts are still focused on reducing the likelihood of flooding and global warming effects, determined by the probability of flooding or by the carbon emission pathway and, subsequently, their potential economic losses. Traditionally, in France, flood management experts were mainly hydraulic engineers and hydrologists. It is diversified since the 1970s. Although there is also still a high level of trust in these types of knowledge in England, knowledge has been complemented by multidisciplinary knowledge. There are ongoing efforts to consider social vulnerability in determining risk to include lay and contextual knowledge. Nevertheless, in Flanders and France, the social component of vulnerability is operationalised through the number of buildings in a flood risk area, and the economic impact is determined based on compensation paid by the disaster fund. Issues on social vulnerability of individual households are not directly addressed (MDEM et al., 2018; MTE, 2023).

Emerging debates on negative impacts of adaptation. The negative environmental and biodiversity impacts of draining create tensions between flood risk management, natural resource use and environmental protection needs. Floods are not an exception to this, as illustrated by the example of the conflict related to the building of the channel in Säpilä Peninsula in Finland. Some actors in Kokemäki and Huittinen expressed concern about the adjustment channel and its potential adverse effects on ground water, Natura2000 sites, surface water quality, none of which are matters of social justice alone, but concerns of environmental health and heritage. Thus, this case study raises not only questions of social justice, but also concerns related to environmental protection. From a different perspective, local controversies between flood prevention and climate adaptation actions still raise the difficulties to preserve open space for water to reduce flood risks. In England, for example, although spatial planning prevents most building on flood prone land, there is constantly high housing demands. The discussion between the needs of local development and the necessity of protecting regions from flooding does not seem to find a consensus, either in the face of projections of increasing flooding, or in the face of the injustice of the impacts and efforts to mitigate them.

2.5 Conclusions and take-home messages

- Most countries and regions in Europe have integrated the notion of "public involvement" in the construction of public policies since the 1980s. Participatory processes are often mandatory. Nevertheless, they are still lacking resources for engagement, skilled personnel, and sufficient time for a comprehensive approach. Citizens' feedback has been rather limited.

- The prevalence of public authority knowledge leads to the legitimacy of technical instruments based on statistical proofs, engineering skills, and infrastructural solutions. Tools are characterised by top-down data, coming from a limited network of experts, focused on technical knowledge

- In most countries, there is a big contradiction between, on one side, the rich data on vulnerability that exists at the national level on inequality.; and on the other side, the weak capacity to expand justice and implement equality considerations more explicitly into climate adaptation and flood management implementation.

- As in the entire history of European legal and institutional construction, the four countries have a political and institutional history rooted in a culture of welfare and solidarity since the Second World War. Most countries have recently devolved defence, mitigation, prevention from national affairs to local authorities. Nevertheless, national authorities keep a final capacity to drive a decision on one strategy or another, essentially through funding capacity and the traditional legitimacy of expertise.

- In two SOLARIS countries, there is a trend towards increased individual responsibilities: England and Finland. In both cases, even with far-reaching participation opportunities for residents, the resources of different groups of citizens to participate are not equally divided creating imbalanced political environments.

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3. Technocratic vs. holistic perspectives on risk and inequalities

Sofia Guevara Viquez and Corinne Larrue

This theme is directly linked to the third Solaris research question, which focuses on the question of knowledge, i.e., what kind of knowledge is available and used to define risk and inequalities? What does this knowledge illuminate and what does it not? What is the role of lay knowledge, particularly in relation to tackling inequalities? The comparative approach will be inductive, drawing on the qualitative fieldwork undertaken in each case study. It will highlight the common challenges faced by actors in all cases and the differences in how they deal with them. This question is particularly important for the knowledge framing of the implemented solution. On the one hand, it is a matter of recognising the different views of a problem related to flood risk and, on the other hand, it is a matter of recognising the different outcomes that an operational action can have.

The literature on the concepts of recognition and vulnerability highlights the challenges that risk management faces in addressing social inequalities. Failure to recognise social vulnerability in policy formulation can actually exacerbate inequalities (Thaler et al., 2018). Martin et al. (2013) emphasise that recognising social vulnerability means considering its plurality, which means that there are different ways of looking at a situation, different ways of being vulnerable to risk, which need to be recognised when formulating risk management policies in order to increase their legitimacy. The question is how to identify these vulnerabilities and based on what kind of knowledge (Paauw et al., 2024)[9]. Furthermore, the literature on vulnerability points to the importance of considering lay knowledge when formulating risk management responses (O'Keefe et al., 1976). The first reason is the relevance and appropriateness of interventions within a specific local context. The idea is to work with communities from the design stage of risk management interventions, thus avoiding vertical and decontextualised interventions (Wisner et al., 2004). In addition, the authors point out that local people live with the risk daily and have therefore developed a knowledge of it. Recognising and working with lay knowledge strengthens local capacity (Wisner et al., 1977).

The chapter will develop two main ideas that emerge from the comparison: The dominant technical representation of the risk of flooding and the difficulties in taking into account lay knowledge. In this chapter, we will first show the centrality of technical knowledge and infrastructural approaches within CCAP and FRM in all countries. Based on the results of the research we will show that social data on at-risk populations are not available in all case studies, and when they are, they are not really used (1). Secondly to explain this observation, we look closely at the actors working on risk management at local and national levels (in the cases studies where this question was addressed[10]), and we are also exploring how different types of discipline co-exist and interact between risk managers and practitioners (2). Thirdly, we examine the place of lay knowledge in addressing inequalities in the implementation of public policies: how is this kind of knowledge considered in framing solutions (3)? What are the challenges for practitioners to work with it (4)?

3.1. The importance of technical knowledge in CCAP and FRM

Risk management interventions are based on technical, modelling, and quantified data

Based on the analysis of public policies, the comparative approach shows that in all countries there is a strong emphasis on technical knowledge, even in the case of England where, as we will see, data on risk takes into account aspects of social vulnerability. All national policies mention the role of observatories, the use of modelling, quantified data, maps, the cost of damage analysis and the

[9] Article under review
[10] In particular in Blois (France) and in England

need to develop environmental services, especially as the amount of data collected and used in modelling is huge (Guevara Viquez et al., 2024; Paauw & Crabbé, 2024; Smith & Priest, 2024). Observatories aiming at measuring physical phenomenon using clear indicators are a priority in all countries, particularly for coastal erosion. The following quotation illustrates this central role of a technical and vertical knowledge been disseminated through these observatories:

> "*we can't take measures without knowing the effects of the retreat of the coastline on our territories.* ***The key point, then, is this knowledge*** *[...]* ***which is therefore disseminated, in conjunction with the observatories****,* [the key] *is to inform the municipalities concerned so that they understand why it is important to make a commitment. So there's a real effort in terms of knowledge, and education, to explain*." (Interview, February 2023, France).

Technical definitions of risk continue to dominate risk management policymaking. This central role of technical knowledge could widen the gap between policymakers and residents. It may also limit the possibility of mobilising a holistic approach to vulnerability that recognises different situations, as the argument from authority would remain focused on technical knowledge. Cases in all countries illustrate this phenomenon: in Blois, the issue of La Bouillie spillway was for several years framed exclusively by the technical question of risk, excluding the social situation of the inhabitants and the impact that de-urbanisation would have on their paths from the discussion. Indeed, in 2003 practitioners (state, municipality, and intermunicipal actors) undertook a delocation and de-urbanisation project of the spillway. This involved the relocation of 400 people and 23 businesses due to informal and formal processes of occupation of the area. From a study carried out a few years earlier, the state services and the intermunicipal actor Agglopolys had the social data to understand who lived in this area and what their relationship was with the territory. This study gave an orientation based on this strong relationship with the territory of the people living in the spillway. But this data was not taken into account when the delocation project was made public. The practitioners (re)discovered it two years later, after a large mobilisation of the inhabitants (Guevara Viquez et al., 2024). Similarly, in Finland the construction of the Säpilänniemi adjustment channel in the Kokemäenjoki watershed is mainly based on modelling and forecasting and does not consider possible existing vulnerabilities of impacted populations, such as farmers, in the area (Rekola et al., 2024).

Except for emergency measures11, in all countries there is thus an emphasis on infrastructure solutions, and the case of Kokemäenjoki in Finland and Blois in France show that the focus on infrastructure and technical aspects leads to low levels of individual participation. Framing the debate around technical and infrastructural solutions also frames the legitimate public for discussing public policy (Guevara & Cardinal, 2024). In Blois, the residents understood that their concerns could not be confined to the technical aspects of risk management solutions. They felt that they did not have the legitimacy to question the practitioners in this field, that they would not be heard, which led the mobilisation to focus its energy on the social compensation instruments.

…even though policies do have a vulnerability approach

Despite the importance attached to technical knowledge, it is possible to find justice issues in CCAP. The issue of justice is in all countries more explicitly formulated in CCAP, in comparison to FRM, but still the approach remains vague and lacking clear and concrete actions on how to address it. In FRM, three approaches to social vulnerability can be identified within the four countries, even if the social indicators to address it are generally unclear.

The first approach refers to the case of France, where vulnerability seems to refer to exposure (localisation) and the characteristics of building to resist an event, regardless of social status.

[11] In Finland for instance, for preparedness, authorities are particularly cautious to know if possible victims may be homeless, disabled of elderly.

Documents focus on infrastructural responses, even when using the notion of vulnerability. However, at the scale of the cases studies, some information can be available when it has been produced by local authorities, as is the case for la Bouillie in Blois.

The second approach identified refers to the cases of Belgium and Finland, where different degrees of social vulnerability are recognised, but still from an infrastructural perspective. In the two countries, for example, flood maps identify the locations of old people's homes and kindergartens. However, these are linked to specific buildings that are easily identifiable. In other words, elderly people who do not live in old people's homes and families with children are not identified in the same way. The approach is thus based on a large category of groups and buildings (elderly, children) without knowing who we are talking about and what their resources are: ""I don't see this as a question of any group of people at all, but just what kind of property someone has" (Interview, local authorities, Helsinki Area). This approach contrasts with the pathways approach of the IPCC (IPCC, 2023).

We can mention some efforts that go further in the understanding of vulnerabilities, which means integrating vulnerability issues and the physical dynamics of the hazard. In Finland, for instance we can mention the work done by Kazmierzcak (2015) to map social vulnerability to flood, but it still lacks a qualitative basis. This work has not really been validated by local actors due to the lack of discussion and qualitative inputs. In France, the Ministry of the Environment published in 2018 a new methodological guide to produce a vulnerability index at the scale of territories. This new method is supposed to frame the next generation of risk prevention documents (MDEM et al., 2018). But still, in these two experiences, the public policy approach lacks individual perspectives of vulnerability beyond crisis management.

Thus, in three countries (France, Finland, Belgium), although the social dimension of risk is mentioned in the policy and experts acknowledge their importance (‘But I understand that there are probably differences between people in how they can respond to it”, Interview local authorities Helsinki Metropolitan Area, Finland), the social indicators to address it remain unclear[12]. The diversity of the social status of the inhabitants is not really considered in the implementation of the policy. In the Geraardsbergen case, for example, the measures promoted focus on property-level measures to prevent water from entering houses as collective flood protection measures in the area have been exhausted. Examples of property-level measures include: waterproof interior materials, non-return valves and floodgates. However, the tools provided to implement these property-level measures depend on individual resources to finance them. The practitioners did not take into account the socio-economic income of the inhabitants (do they have the means to implement these measures?). Also, in none of the countries, is there a distinction between tenants and landowners. The notion of vulnerability is framed by crisis management, following the objective of knowing what is at stake in case of flooding. What type of facilities? how to plan the reaction?

England is the exception and illustrates a third approach because the existence of the Neighbourhood Flood Vulnerability index (Sayers et al., 2017)[13] illustrates that social vulnerability is recognised. However, the availability of knowledge does not always mean using it. In West Sussex, for example, one FRM measure aims to support individual action to maintain natural watercourses on their properties: but practitioners are not using the index to explore whether residents have access to information on how to implement FRM solutions, nor whether they have the material and social resources to do so (Smith & Priest, 2024). Thus, projects are undertaken without exploiting existing social vulnerability data in their conception. Such a statement can be linked to path dependencies and existing closed epistemic communities as developed below.

[12] In the case of Finland, one could point to the role of anticipation for the city of Kokemaki. As there is no (recent) event in the past, there is no knowledge of who will be affected and what resources they have to recover.

[13] See: https://www.climatejust.org.uk/mapping/

In conclusion, the case studies highlight the need for clearer indicators for addressing social justice issues and their availability at a stage and in a form where they can be used. We can point out that practitioners must question the nature of the population affected by the policy to be implemented: from the outset, the technical diagnosis of potential damage must be complemented by a socio-territorial analysis. Questions need to be asked about social vulnerability to flooding and the spatial distribution of the costs and benefits of policy implementation. The concluding chapter of this report addresses such questions.

3.2 How to explain the central role of technical knowledge in CCAP and FRM?

Several factors explain the central place of technical knowledge in CCAP and, in particular, in FRM. These factors have to do with practitioner's backgrounds, but also with the political legitimacy given to one particular type of knowledge.

Epistemic communities within flood risk management are indeed plural. In particular, we can find engineers and spatial planners interacting within the five flood management strategies: flood risk prevention, defence, mitigation, preparedness and recovery (Hegger et al., 2014). A closer look at the dialogue between these epistemic communities reveals, on the one hand, a lack of social science backgrounds among professionals working in the field of risk protection. On the other hand, spatial planners and some water managers have a social science background, but despite policy instruments calling for more dialogue between these types of profiles (planners and risk managers), how to address social issues remains a challenge (Paauw et al., 2024).

Box 3.1. PAPI as an instrument calling for more dialogue between planners and risk managers.

PAPI is a coordination tool between all different types of actors affected by the same risk perimeter (Guillier, 2017).

It allows for a multi-sectoral and multi-partnership action to prevent floods:

- To reinforce defence infrastructures
- To reinforce risk awareness
- To consider water management obligations (water understood as an aquatic environment) while taking into account risk in planning (Line of action 4).

For instance, in Ault, the actors involved in the PAPI belong to different scales of intervention: the region, the SMBSGLP (multidisciplinary teams), the department, the Water Agency (where we will find engineers in water and sanitation), the State (civil engineers and technical assistants). But within the PAPI formulation process, there is no place for the social department, for example. It is taken for granted that local politicians know and represent socially vulnerable residents.

Then human aspects seems disconnected from the technical aspects: "it was more the technical side that prevailed, with the risk of flooding, the number of properties and the fact that we needed a procedure to reduce the vulnerability of the sector and the people. Then [the other issue] there was the human aspect, the question of rehousing people, and the possible proposals from other sectors where there was also the question of travellers," (Interview, Blois, DDT, April 2022).

From fieldwork, the central role of technical knowledge among the debates within the strategies is related to its political value, particularly structural measures (dikes, groynes): "And so they [municipalities] arrive usually with this will [to reinforce the defence system], we, the state, agree" (interview, State services France, April 2024). In some interviews, practitioners emphasise the role of the local level (municipalities) in building bridges between different types of knowledge and collecting relevant data. Indeed, the fieldwork suggests that proximity to the residents' situation obliges local authorities to take into account the social dimension of risk (Ault, Blois, Beerse). But

responses are generally limited to social housing approaches and property compensation, as for example the case of Ault shows.

This raises the question of legitimacy: what knowledge is considered legitimate to support a choice to invest in flood defence or to invest otherwise? Field work shows that this political legitimacy might also be linked to Cost-Benefit Analysis (CBA) (see also Chapter 6):

> *"There is a tool […] it is what we call the cost-benefit analyses […] these analyses must be positive or almost positive for us to be able to grant funding to the BARNIER fund. If these works turn out to be too costly in relation to an ineffective protection strategy, it means that there may be other actions to be implemented... (France, State services, April, 2022).*

Finally, the question of the possible actions undertaken based on available knowledge remains open, i.e. revealing (in)justice(s) might not always mean dealing with it. In the case of Blois, the fieldwork shows that, after the mobilisation of inhabitants, local managers decided to put in place a social compensation process and guidance to help the inhabitants of the spillway to find an equivalent alternative home. In several cases, however, the de-urbanisation process meant a loss of the centrality of their localisation and a social downgrading (Guevara Viquez et al., 2024).

3.3. The marginal place of lay knowledge

IPCC reports emphasise the importance of lay knowledge ("indigenous knowledge", "local knowledge", "lay knowledge", "citizen science initiatives") for the effectiveness of adaptation actions (IPCC, 2022). But what the SOLARIS fieldwork shows is that the notion of lay knowledge is vague and that local authorities have difficulty in working with it. In three countries (France, Belgium, Finland) lay knowledge is not involved in designing local policies.

In England, the role of the National Flood Forum through the Flood Action Groups could be highlighted to better understand the situation of local people and enable them to anticipate times of crisis. It is a clear example of capacity building for local organisations and residents. In principle, Flood Action Groups are supposed to work in a bottom-up dynamic. But from the fieldwork, practitioners may understand the injunction as another way of implementing FRM measures in a top-down dynamic. The Sisley case shows that flood action groups have been the mechanism to disseminate solutions from policy makers to other citizens (i.e., to justify top-down decisions) (Smith & Priest, 2024).

In addition, lay knowledge is sometimes sidelined because it does not coincide with public policy: in this case, it is summarised and delegitimised because it is seen as the expression of a local interest of a few. To illustrate this, we can mention the case of Ault, where a relocation project to combat coastal erosion has been contested by residents since 2013. Several practitioners met during the fieldwork emphasised that the challenge to the project was led by residents who did not want their individual situation to change: "That's not what they wanted to hear, because the only thing they were interested in was repairing the cliff" (Interview, practitioner, 8-11-2023). Fieldwork shows that this statement, although not completely wrong, was also incomplete. The residents' mobilisation did not deny the phenomenon of erosion, but clearly demanded that a democratic debate be held to decide collectively what to do about it. They denounced the top-down approach of a relocation project that had been promoted among professionals but not with the residents. (Guevara Viquez et al., 2024).

Lastly, lay knowledge might be sidelined because of its plurality, which is used to delegitimise it. "Everyone has a different opinion. In all kinds of areas, we can no longer achieve large majorities, because there are a thousand agenda items on which everyone has a different opinion. In other words, there is a cacophony of answers […]." (Belgium, Government official, August 2021). The

quotation shows that for practitioners to work with this plurality of voices remains a challenge. This delegitimisation does not equally refer to the plurality of expert opinions when discussions are taken only among experts and officials. These opinions are framed as 'multidisciplinary insights'.

In other words, the fieldwork shows that there are two preconceptions about lay knowledge that relate to what lay knowledge is and how it should be. Firstly, practitioners assume that lay knowledge is naive because it does not always agree with the proposed solutions. Disagreement is interpreted as naivety about risk. Secondly, there is a normative idea of how lay knowledge should be in order to work better with it. Practitioners believe that lay knowledge should be homogeneous. Thus, the plurality of viewpoints encountered when working with lay knowledge prevents practitioners from actively using it as a resource.

3.4. The practical challenge to seize lay knowledge

From the fieldwork with practitioners, it can be emphasised that the ability to work with lay knowledge is linked to a question of human resources at local level: in most cases, local authorities have only a small number of people to implement policies, while working with lay knowledge can be very time-consuming. The two quotes below illustrate this gap between the expected results and the resources allocated:

> *"that's really crucial to start a debate and to get people aware of the problems that will occur now and also in the future. So we used all the maps and the material we had to build up a kind of website where people could fill out. […] And then we took them on a trip along the water course […] And then we started up the debate, but it took a very long time and it was a very time consuming process […] to arrive at a not very innovative solution" (Practitioner intervention, SOLARIS Conference, February 2024).*

> *"…some local authorities have better expertise than others, or more weight on the importance of managing their coast. Some local authorities – I mean the whole country wide but also within our partnership – have a lot more resourcing for their coastal management teams and associated activities, but some don't. Like, in Great Yarmouth we have had just one person for years. And then he retired and there was nobody. There is a new recruit now come in but it used to be a team of, like, four or five, back in the day, um, engineers." (England, Practitioner, Interview, April 2022)*

The issue behind these quotes is how to gather lay knowledge: "if you are looking to solve a problem in a particular place, you have to talk to a lot of individuals, gather all of that lay knowledge, and that takes time, and that's time that most organisations don't have" (Interview, England, February 2024). Contrary to scientific and expert knowledge presented in classical ways such as reports or oral presentations, working with lay knowledge means to actively search for and gather it.

Which participation tools to gather lay knowledge? Lay knowledge could be gathered through participation, but as many practitioners expressed during the interviews, in civil society organisations power relations are also a challenge. Not all citizens are equally able to speak and be heard in participatory spaces (see chapter 5): "I think for me, around this theme, what particularly fascinates me is the question of whether we are reaching vulnerable people with our participation processes. […]. But we know that we always only get a certain group, and that small group will not necessarily be completely representative of the average people in flood-prone areas" (Government official, Blegium, Septembre 2021). The literature on participation underlines that sometimes the plurality of voices is silenced by a few people who have the time, the skills and (social, cultural) resources (Petit, 2022).The challenge is therefore to strengthen the capacity at the local level to hear (and act on) this plurality of voices.

In some of the case studies, it is possible to hear this plurality of voices, bringing a new insight in the debates in the literature on participation. In England we can mention the National Flood Forum, which provides support to enhance local capacities in flood risk management through the promotion and guidance of Flood Action Groups. Now, the capacity of these groups to make change in policy making depends also on the resources of the inhabitants involved within the action groups.

It is also important to look closely at the way local organisations are organised and to take the time to understand the different solidarities between different residents. In Ault (France), although some practitioners emphasised that there were two types of residents ("there are those who live by the sea and say: "I want the view", and then those who live up there who say: “But we don’t give a damn about it””, Interview, former elected official, 18.11.2022), the fieldwork shows the capacity of the mobilisation led by Ault Environment to give a voice to marginalised residents who do not live in large houses near the coast. The fieldwork shows the capacity of Ault Environment to build knowledge from multiple residents and multiple sources of information (expert and non-expert, artistic and popular knowledge), and in doing so to rally a large part of the residents to its cause.

Within the methodologies of the SOLARIS project, one can mention an example of diversification of participation spaces, through the use of art. In Finland, the empirical protocol mobilised the use of art to facilitate the exchange with inhabitants14. The use of art is attractive, it arouses curiosity, it is also original, but it also raises challenges. In particular, during this experience, the challenge was related to the language used from the artist (English) and inhabitants (Finnish).

3.5. Conclusions and take-home messages

How can we help policy makers to use more social information? To apply a more anticipatory participation approach? To apply a more holistic view on problems?

- It is important to recognise that basing public planning actions solely on a technical approach to risk can lead to bias in participatory processes. Practitioners may consider taking steps to reduce this bias in order to improve issues of recognition and equity in FRM.

- There is the need for clearer indicators to address social equity issues in FRM The notion of vulnerability in FRM refers to exposure (localisation) and to the characteristics of a building to withstand an event. This means developing individual and comprehensive approaches: taking into account individual and local specificities, attachments and different resources.

- There is a need for resources (in terms of human resources and disciplines) to work with lay knowledge in order to allow the acknowledgment of lay knowledge and its plurality (including the possible conflicts). This means work from a solid base with residents, taking account of where they are and their situation.

- Importance of diversifying the format of participatory spaces to collect and work with lay knowledge. All the cases show that the existent participatory mechanisms are insufficient to collect all the alternative voices concerned (in the short, middle or long term) by the implemented measures.

[14] See: https://solaris.univ-tours.fr/?page_id=1054

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4. Power (im)balances, participation and recognition in flood risk management

Marie Fournier, Jérôme Cardinal, Sofia Guevara Viquez, Mandy Paauw, Aino Rekola, Glen Smith and Sara Todorovic

4.1 Public participation in FRM: What are the socio-spatial challenges?

Flood risk governance and management has diversified over the last years (Hegger et al., 2014), with greater emphasis on prevention, mitigation and recovery. Diversification of strategies may be an incentive for policy makers to go beyond their traditional technical approach and address social dimensions of flood risk management. In France, often described as a very bureaucratic country, “public participation” is mandatory during the formulation of Natural Risks Prevention Plans, local authorities are responsible for public information, and we encounter more and more innovative public participation approaches carried out by public authorities during the implementation of flood risk management projects. In addition, the increasing interest on innovative concepts such as multi-functionality, Blue-Green Infrastructures or more recently nature-based solutions facilitate the integration of natural hazards management into more systemic projects, which conciliate various environmental and social objectives (biodiversity and landscape protection, leisure and education...).

This attention given to public participation in FRM policies is present in all SOLARIS countries and case studies. It has been reinforced in the last years, as national adaptation plans have also recently introduced the notion of justice in climate policies. Justice is said to be an important issue, and specific attention is given to the vulnerability of some communities (elderly people, low-income populations...), which might be more affected than others. If this indicates a recognition of differences in social vulnerability in face of climate change, can we really see this notion to percolate in FRM planning and implementation? Does it have any impact on the design of public participation processes in FRM policies, which is traditionally strongly based on infrastructural and technical approaches?

This chapter is based on the comparison of SOLARIS case studies and points out 4 main results:

- In most cases, public participation in FRM combines participation procedures and processes with the ambition to improve the involvement of inhabitants and local communities; depending on the local context, we see innovative approaches.
- There are always boundary conditions to participation: topics are not all debated in the participation processes we studied.
- Participation processes often fail to involve all target groups or do not consider inequalities among target groups.
- “Uninvited participation” (Waagenar, 2014) sometimes plays an important (and unexpected) role in the definition and implementation of the policies; as such, it should be better considered.

4.2 Public participation in FRM: Really innovative?

In most (not all) SOLARIS case studies, mandatory participation procedures were combined with participation processes to improve public involvement. If mandatory procedures give legal legitimacy to the plans or projects, participation processes often prove to be necessary to facilitate

implementation and build political legitimacy (Vodoz et al., 2008). Participation procedures mainly remain limited to information and consultation if we consider some classical "ladders of participation" provided by the literature (Arnstein, 1969; Fung, 2006). Most participation processes in the SOLARIS case studies stem from an instrumental rationale (to resolve conflicts or generate legitimacy for policymakers), or, at best, from a substantive rationale (Glucker et al., 2013; Uittenbroek et al., 2019).

Box 4.1. Mandatory participation procedures, a first (but limited) modality for public participation.

In Finland, at the level of Helsinki Metropolitan Area, participatory processes related to FRM are those of FRMPs and land use planning and more attention is now being paid to participation in municipalities. However, in the interviews conducted, several stakeholders criticised the success of participation and information sharing. So far, flooding has mainly been discussed in the context of risk and flood communication by municipalities and was not considered particularly successful.

In La Bouillie in Blois (France), around the year 2000s, public inquiries and public meetings were implemented during the definition of the Flood Risk Prevention Plan (Plan de Prévention du Risque d'inondation) but also when the Deferred Development Zone (Zone d'Aménagement Différé) was designed to relocate houses and companies settled in La Bouillie estate. However, they were strongly contested by residents and public authorities had to implement additional participation processes to limit tensions.

In Ault (France), the relocation project created a major conflict between the NGO Ault Environment and the municipality. Ault Environment activism is partly motivated by the residents' feeling that they were not considered or consulted in the formulation of the project. Difficulties in accessing the expert reports also played a role. Among institutional stakeholders, there was a consensus about the mistakes made in the past regarding the 2013 relocation project, both in terms of communication strategy and social approach.

From our interviews with policymakers in several SOLARIS case studies, it appears that participation does not yet belong to the tradition of engineers, even though they all know the importance of the topic. In the Helsinki Metropolitan Area, policymakers were sceptical about how much participation would improve the outcome of the decisions.

> *"It's probably the public participation that is a bit of a grey area. In some matters, it is asked, and, in some matters, it may be asked a little less. But the fact that... that finding the philosopher's stone, that how much help it is that we would get a lot of public opinion. Will there be something in every issue that the bureaucracy has not noticed or understood? Of course, there are comments that this area of ours should be the first to be protected [...] But sometimes I wonder, even in these big consultations, whether it is possible to get from the public any content to the plans, for example, so that the content would change. But as they react to it with such a small number of people, it is terribly difficult to draw any conclusions."*

In Slough (England), policymakers pointed out potential negative side effects of unplanned participation processes:

> *"…you end up doing more damage than good. So we deliberately […] did not want to engage too soon before we're ready, which actually has turned out to be a major blessing because we really haven't been ready to talk to people. So we […] would have done a lot more damage by attempting to engage with people and make any promises, or just set people's hopes up of what they might get out of it. And then let people down and."*

However, in some SOLARIS cases, more innovative participation processes were designed and implemented. Sometimes, they were a prerequisite or a condition to get public fundings for the projects and brought out the importance of procedural justice in FRM. In the French cases, innovative participation processes were also designed in a later stage, mainly in reaction to conflictual situations and to reduce oppositions and initiate a new local dynamic. As such, the implementation of innovative procedural approaches was identified by policymakers as a response to conflicts.

Box 4.2. Innovations in participation: A prerequisite in policy implementation.

In Beerse (Flanders), residents were involved in the design of the flood retention area, which was funded by the Interreg 2 Seas CO-ADAPT project (2014-2020, 2S06-023). CO-ADAPT provided funds that allowed the provincial government to hire external consultancy organisations specialised in participation and stakeholder management. An information flyer was distributed to around 1.000 families located in the area, announcing an online survey, and inviting them to two participation events. The participation events were hosted by the Province of Antwerp in collaboration with the Municipality of Beerse and one of the consultancy organisations, and were framed as 'co-creation' processes.

In La Bouillie area (Blois), to end the conflictual situation stemming from the beginning of the 2000s, the municipality designed and put forward integrative participatory processes; several open and thematic focus groups were carried out with most local stakeholders to redefine the future of the area. Participation processes became the cornerstone of the redevelopment project planned from 2021 onwards.

4.3 Boundary conditions for participation in FRM

If participation is a key part of policy design and implementation, what are the topics that are deemed relevant to discuss and how open is participatory processes? Is the question really about floods and the flood risk management strategies?

In SOLARIS, several case studies show that participation processes often do not open up the debate about the very technical dimensions of flood risk management. Protection levels or water capacities of future infrastructures are not debated, rather aspects of the projects more generally. This evolution is very noticeable as flood management is more and more integrated into broader nature-based solutions or blue-green infrastructures, but it leaves aside hydraulic and hydrological objectives of the projects, which remain in the hands of water and flood managers. This strategy tends to limit conflictual situations, which have often proved to crystallise around technical notions and choices (see the case of la Bouillie, in Blois), but it undermines debates concerning the flood issue itself. It also undermines the discussion about socio-spatial inequalities in face of the flood risk induced by the projects and does not tackle them.

Box 4.3. Nature-based solutions for flood risk management: What is the debate on floods?

In Beerse (Flanders), the fundamental objectives for the flood retention area (e.g., physical boundaries of the area, minimum water buffering capacity, maximum costs), were predetermined by the project initiators alone. Participation processes focused solely on secondary aspects. Residents were invited to participate in co-creation events, planned within the context of the CO-ADAPT project. Yet their impact was confined to the design/landscaping phases of the flood retention area – such as the placement of benches or street lights – with no discussion on the suitability of a flood retention area to solve flooding locally.

In La Bouillie (Blois), the definition of new flood management strategies was left out of the participation processes implemented in 2020 and 2021. Flood risk regulations, settled by the central government administration, framed the technical possibilities for the project. Then, several flood management technical strategies were identified as scenarios provided by a consultancy firm (working for the central state services) and were introduced as such, non-negotiable, during the workshops. These scenarios had been designed with different professional, associative or institutional local stakeholders, before public participation processes were implemented.

4.4 Questioning the "who": Do participation processes involve all target groups and consider inequalities among them?

If topics debated in public participation proved to be quite limited, the SOLARIS case studies also focused on the target groups involved in those processes. Indeed, empirical work identified a diversification of participants in most participation processes, which can be explained by the diversification of objectives among FRM projects. As a result, flood managers and local authorities' ambition to gather a wider variety of interests and representatives.

However, the most vulnerable target groups (mainly among local inhabitants) are missing in most cases. Furthermore, it appears that little is done to facilitate more equity in participation processes among target groups. This situation was denounced by inhabitants, for instance in La Bouillie (Blois, France):

> *"All these people from the Bouillie, obviously, they weren't the cream of the crop, but they were good, honest people. They had worked all the time, small jobs, and then at the end of the day, they were thrown out, like dogs"*

Box 4.4. Towards a better integration of the social dimension of Flood Risk Management by institutional stakeholders?

In Geraardsbergen (Flanders), it was recognised by institutional stakeholders that it can be more difficult to reach socially vulnerable communities and to get them to participate in the implementation of FRM policy. Those with fewer financial means or those who rent their homes may have been less interested in the information meeting organised by the VMM and the Municipality of Geraardsbergen on property-level protection measures and might not have joined the meeting in the first place. However, few efforts were made by the VMM or the municipality to ensure that socially vulnerable groups were present at the information meeting and questions remain around the representativeness of the participation events.

In Beerse (Flanders), residents located further downstream from the flood retention area were not involved in the co-creation processes, and their socioeconomic and demographic characteristics remained underexplored. The project initiators did not actively seek to identify or include socially vulnerable groups in the participation procedures and their voices may not have been heard. As one of the flood risk engineers involved in the development of the project explained:

"*We organised two participation evenings and provided an information flyer in the neighbourhoods surrounding the flood retention area. […] That is where it stopped for us. We did not ask questions such as: Who are we forgetting here? Who are we not reaching at all? We tried to account for the elderly as a target group, but we did not get much of a response to that".*

In Finland, both regional authorities and municipalities are required to involve stakeholders in FRM. However, the use of participatory tools or their outputs seems not widely known or understood. From empirical work carried out on the Kokemäenjoki catchment area, it appears that inhabitants and locals are willing to participate and are well informed about the possible benefits and trade-offs of different FRM solutions, However, not all stakeholders may have the same opportunity to influence FRM because they may lack resources or knowledge to participate. Communication between the different stakeholders along the river seems to be lacking, as participation processes mainly involve organisations, such as municipalities, and not residents.

To conclude, social inequalities are more and more recognised by flood risk managers. This was clearly stated by interviewees from the local authorities, for instance in Blois:

Perhaps we didn't realise that we were breaking the memory of people who had lived there for years, who saw themselves ending up there [...] it was a modest population, which had built up through mutual aid... A real neighbourhood life, a real social life"

However, there remain barriers to the design of proactive strategies towards the most vulnerable target groups and still little recognition of the necessity for a more equitable involvement of all target groups. In this context, collaboration between flood managers and "social policy" representatives could be a first step towards a better involvement of socially vulnerable populations, as well as the integration of more social studies/indicators in flood risk assessments.

4.5. "Uninvited participation": Conflicts and informal participation as influencing FRM?

This last section will consider examining the issue from a different perspective. Stemming from the notion of "uninvited participation" (Wynne, 2008; Wagenaar, 2014). "Uninvited participation" can take several forms, such as self-organisation among communities in parallel of public policies and participation processes or the emergence of conflicts in face of public policies (Martinais, 2015). Consequently, protest and resistance should also be considered as relevant and functional forms of participation (Roth et al., 2019; Forester, 2009). Giving room to conflicts may be a more productive way of dealing with them, more than trying to enforce consensus through participation processes that are not acknowledged by all contending parties (Mouffe, 2005; Uittenbroek et al., 2019).

Box 4.5. What are the capacities of local conflicts to challenge the legitimacy and robustness of FRM?

Different SOLARIS case studies gave evidence of the impact of conflicts and local oppositions on flood risk policymaking.

In La Bouillie area in Blois (France), in the beginning of the 2000s, the strong local opposition which quickly emerged against the relocation project revealed to institutional stakeholders the variety of situations in the area at stake and led to the consideration of more vulnerable groups by policymakers. Consequently, local authorities designed for instance "kitchen table conversations" with all residents to explain the project and define tailor-made solutions for most locals. On this aspect, strong improvements were made by the municipality, even if more recent empirical research still identified the remaining difficulties of considering some communities (such as travellers). In 2020, when a new agri-environmental project in the La Bouillie floodplain was launched, local authorities paid great attention to public participation processes, to rebuild trust and consensus locally.

In the case of Ault (France), the strong opposition led by the NGO Ault Environnement brought to light the inconsistency of relocation perimeters and the lack of consideration of individual situations. The NGO Ault Environnement also provided alternative proposals to the relocation project (partly based on grey-green solutions to slow down runoff and coastal erosion). Consequently, this conflict progressively evolved from a frontal opposition and unresolvable conflict to a more common construction.

4.6. Conclusion and take-home messages

To conclude, in most (if not all) our case studies, procedural justice was addressed in policymaking, and we encountered quite a wide variety of methodological tools implemented by flood risk managers to initiate public participation. From very traditional (mandatory) tools (such as public inquiries or public hearings) to more innovative methods (such as the implementation of focus groups in Blois), attention has been given to public participation by institutional stakeholders. The latter do not always see the need for more "advanced" participation processes, but they acknowledge the challenge which remains to involve all stakeholders and among them the most vulnerable. The integration of

the flood risk issue in a broader perspective of climate change and its combination with other issues (such as biodiversity protection or local development) seems to facilitate more innovative processes.

Some key “take-home messages” can be drawn from this chapter and the empirical results of the SOLARIS case studies. Participation processes would improve by integrating two key issues which often remain unanswered:

- **What are the topics open to debate and discussion in those processes?** Integration of the flood issue in broader planning strategies involving various objectives (such as adaptation to climate change, biodiversity protection and so on...) facilitates the implementation of more proactive participation processes. Targets groups are often more diverse and represent complementary issues. Participation processes may be implemented at a wider spatial scale and, as such, facilitate the enlargement of interests. However, attention should also be paid to keep in the debate the more technical aspects of flood risk management, even though such issues might appear more difficult to address in open discussions.

- **How to better integrate all target groups?** If specific indicators exist in England to identify vulnerability among the target groups, this issue proves difficult to answer still in many situations. Our empirical results point out the importance of better addressing the social dimension of FRM projects, which often remain quite technical. The extensive use of social indicators in preliminary studies, the design of proactive strategies towards the most vulnerable groups to better involve them in participation processes, and the involvement of “social policy” representatives in FRM policy making could all contribute to improve this situation.

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5. Justice issues relating to the allocation of investment to manage flooding

Sally Priest, Jerome Cardinal, Ann Crabbé, Marie Fournier, Mathilde Gralepois, Sofia Guevara Viquez, Mandy Paauw and Glen Smith

Investment in flood risk management and the value of assets are intrinsically linked. Access to the benefits of FRM has also been argued to be "inherently unfair" (Johnson et al., 2005; Johnson et al., 2008). The (un)fairness of FRM is principally a question of who benefits from the measures and who pays for them (Begg, 2018). Previous studies have considered how flood risk management has impacted fairness through the distribution of investment (including Hudson et al., 2019; Penning-Rowsell & Pardoe, 2012; Penning-Rowsell & Priest, 2015; Thaler & Hartmann, 2016; Kaufmann et al., 2018). The importance of considering the maintenance, improvement or (re)distribution of asset value is important when considering social justice implications including social deprivation and social spatial inequalities. Analysing the extent to which FRM decisions are achieving this in relation to asset value or use is essential to understanding the intended or unintended consequences of decisions.

This section will draw on evidence from the SOLARIS case studies and countries to assess examples of (in)justice in the allocation of resources and any consequently any redistribution of value. It links closely to the two of the SOLARIS research questions: How and when are issues of equality and justice identified and addressed in FRM? And what is the role of (and access to) knowledge in FRM? The discussion will principally focus on the distributional consequences of flood risk management and its outcomes. It focusses on three key areas of comparison; how resources/investments are allocated, cross-spatial redistributions of risk (intragenerational justice) and temporal justice considerations.

5.1 Processes of allocation: Fairness of approaches to the distribution of investment in flood risk management

How resources are allocated are a societal choice and often reflect wider views on individual and collective responsibility and broader notions of the acceptability of risk. Scholars have considered how allocations of resources or financial investments in flood risk management benefit certain groups over others and linked these to different conceptual notions of justice (e.g., Johnson et al., 2007; Thaler & Hartmann, 2016). Kaufmann et al. (2018) present different theoretical understandings of distributive justice including Utilitarian (highest benefit for society); Rawlsian 'maximin rule' (favour the most vulnerable); Egalitarian (equal rights of protection) and libertarian/elitist (individual responsibilities). These offer a frame through which to consider our countries and cases and look to how resources are allocated.

Across all cases at a national level there are a mix of allocation mechanisms depending on the strategy of flood risk management being considered. In most countries and in our cases, there is a mix of public (coming from different mixes of national, regional or local levels) and private (i.e. business or individual property owners) funding. The extent to which those benefitting from flood risk reduction varies both in terms of national policy (e.g. in England there is the policy of Partnership Funding where local authorities, businesses and individuals are required to contribute a percentage of funding) and on a project-by-project case. The SOLARIS case studies are illustrative of these differences in balance between the directness of funding provided by those benefitting. For example, the Medmerry Managed Realignment Scheme and the Jubilee River were 100% financed by national funds; the de-urbanisation project in La Bouillie, Blois was 90% financed by national funds with 10% by local government; and the retention project in Beerse, Belgium is 75% provincial level and 25% municipality financed. So, the level at which local communities and those benefitting from finances

varies considerably, not only between the SOLARIS cases, but often also within counties and between projects. Wider notions of cross-solidarity in flood risk management are discussed further in the next section which examines cross-spatial justices.

The process of investment is fundamental to who benefits from and who pays for flood risk management and any distributional outcomes. The SOLARIS findings from the country level highlights too greater a reliance on CBA (cost-benefit analysis) approaches to flood risk investment (Paauw et al., 2024) and as such the perspective that investment will being the most economic benefits for society (e.g. a utilitarian approach which brings differentiated standards of protection).

Many of the CBA approaches in the countries (e.g. Finland, France, Flanders) had policies and guidance which focussed almost exclusively on protecting the largest number/highest value of assets at the lowest cost. The use of flood modelling data to distinguish risks does mean that there is a high likelihood of the riskiest areas being reflected in the analyses being undertaken. However, little or no account is given to the (in)ability of individuals, households, or communities to take responsibility nor those groups which are more adversely affected by flood impacts. Indeed, the focus on CBA may be exacerbating inequalities as it will allocate investment towards higher asset areas which are likely to have a higher presence of expensive assets and associated wealthy people.

England has for some time had a modified-CBA approach which whilst still placing an emphasis on analysis which requires flood risk investments to deliver a certain number of benefits to costs, also recognises when allocating funds whether they will be used to benefit more socially deprived households (Environment Agency, 2022). The English Partnership Funding approach requires projects to be funded by both national (i.e. government) as well as local (e.g. local authority, business, homeowner, developers) partners. However, the balance in finances which must come from national versus local sources is modified dependent on the vulnerability (as defined by socio-economic deprivation) of local communities. Within any FRM project households will be allocated to one of three deprivation categories (20% most deprived communities, 21% to 40% most deprived communities and 60% least deprived communities using the Index of Multiple Deprivation (ONS, 2019)) and a scaling payment tariff used (e.g. properties in the most deprived band will be scaled 2.25 times those in the least deprived band); thereby allocating schemes which benefit deprived households more funding. Whilst this is a positive modification, the requirement of local partners to provide any funding has been questioned (e.g. Thaler & Priest, 2014) as these areas are more likely to have lower budgets, they are more likely to have many other challenges demanding attention (e.g. housing, healthcare) and are those less able to mobilise additional funds (e.g. through local levy taxation).

SOLARIS findings also highlighted that there is a willingness of flood risk management authorities to consider differences in social vulnerability and efforts have begun to better map and understand both the characteristics of groups and their locations (Paauw et al., 2024), but currently these are not routinely embedded decisions to allocated FRM investments.

The Smarter resilience concept being delivered in Slough, presented in the Thames, West London case study (Box 5.2) also highlighted the differences in resource allocation and selection of measures between different types of flood risk. In contrast to its close neighbouring communities whereby larger scale flood alleviation channels were/are being implemented, the nature of the surface water risk in Slough makes it more complicated to solve and necessitates a much more localised approach. Whilst localised Sustainable Urban Drainage Systems (SuDs) and localised water retention may best suit the technical needs of the flood risk; it is also acknowledged that these options require local communities to better prepare and respond to flooding. This may be challenging in the context of Slough which has a high socio-economic vulnerability and who may struggle to become resilient. There is a justice question here concerning how different risks and communities are treated. Some risks suit highly structural interventions which do not require significant community involvement and which, in this case, have been implemented to reduce the risk to highly affluent

areas (as in the case of the Jubilee River). This is in contrast to some instances where is it more difficult to employ only structural solutions and whereby a more vulnerable local community must actively participate in building resilience (as in Slough). The question emerges if we are asking too much from those who have the lowest capacity and capabilities to respond?

Resource allocation mechanisms, such as CBA, most commonly favour the highest risks and situations where assets are grouped together. For communities and properties which are at lower risk or where there are fewer properties, the experience of a flood might be no less devastating, yet they will be less likely to obtain funding for community measures, so must look to more individual measures. Property-level resilience (PFR) measures provide a more local approach to managing flooding and were present in several cases (e.g. Geraardsbergen, Belgium; Thames and West Sussex, England). Investment in these cases was often funded by the individual homeowner according to market principles (e.g. elitist/libertarian). This was modified to some extent in the Geraardsbergen case whereby expert advice was provided by the Flemish Environment Agency (VMM) and the Municipality to residents about which measures to select, and which were feasible. Whilst a subsidy was available to those adopting measures, it was too low (max. up to €250) to make a significant difference to the cost of resilience and open the scheme for those where finances are a barrier. Although not present within the SOLARIS case studies (it will be implemented in the River Thames Scheme – although the scale is yet unknown), the Environment Agency have funded property-level resilience as standard measures. This coupled with Defra Flood Recovery Grants of up to £5000 which are available following some exceptional events and Flood Re's BuildBackBetter scheme which offers up to £10,000 for flooded properties has expanded the potential for PFR to be implemented to homeowners who would never have been able to afford resilience and through using different mechanisms of funding and allocation (e.g. post-event recovery, insurance) have also widened the pool of available resources.

5.2 Cross-spatial flood risk management and its impact on justice

Investment of public funds will invariably involve the pooling and redistribution of resources from one (often larger) group to another. Moral and practical (and recognised by theoretical concepts of justice e.g. Utilitarian, Rawlsian) considerations recognise that taking actions which benefit individuals directly also have wider benefits for society. However, within flood risk management there may also be more local transfers of benefits. Cross-spatial (in)justice can be created during the implementation of flood risk management as one area and its inhabitants may benefit from actions taken within or by another locality. Upstream-downstream solidarity is one such type of benefit transfer and for which justice challenges have been identified in previous studies (Seher & Löschner, 2018; Löschner et al., 2019; Kaufmann et al., 2021).

As discussed by Kaufmann et al. (2021) there are many complexities when assessing how spatial transfers of both risk, benefit and value may manifest from investment decisions. The Beerse case study (see Box 5.1) offers evidence of a range of issues concerning investment and who benefits. Firstly, it provides an example of the inter-spatial transfers of risks and benefits as highlighted by the notion of upstream-downstream solidarity, (i.e. the flood retention area in Beerse provides benefits for properties downstream where flood risks are more significant); however it has required the acquisition of land from private individuals upstream. Whilst this has reduced the risk for some, there are a couple of key fairness questions relating to the distributional consequences of this project: are those benefiting from reduced risk contributing to the costs? Are there any justice concerns relating to those who no longer have the land which was used for flood retention?

The project was funded entirely from public funds mostly from the Province of Antwerp, with a quarter from the Municipality and therefore those benefiting from reduced risk, whilst contributing through taxation, have not directly contributed to this increased protection. Private landowners were initially unhappy about the compensation offered at the beginning of the project and the realisation that they

would lose out financially to solve flood risk problems for others. They did, however, have the power to develop a legal challenge and both delay the scheme but seemingly secure satisfactory terms on which to sell their land. The financial loss to landowners therefore may have been limited. However, it is unclear how much pressure was placed on these individuals to sell the land or the extent to which the land may have had non-monetary value (i.e. familial attachment) or held future plans for (re)development which were not able to be realised.

This provides an example of distributive approaches (intragenerational solidarity) to flood risk management whereby collective funds (in this case via taxation) are utilised to the benefit of a smaller number of households as well as to some extent avoid broader disruptive impacts on the community. However, we may challenge whether investments whereby private assets (in this case land) are being purchased by public money (re)distribute wealth and power. Coupled with this, relates to whether the risk reduction experienced by those protected downstream of the flood retention area offers additional benefits such as the maintenance of assets or their increase in value. It is, of course, too soon to undertake an analysis of any impacts and the difficulty of assessment (e.g. establishment of a counterfactual, complexity of separating out the risk reduction from other market effects) may ultimately make understanding this relationship very challenging. However, it is likely that the risk reduction will not have harmed the value of these properties; not least because the intervention which would have highlighted their risk is located at a distance.

Box 5.1. Implementing a local flood retention area in Beerse, Belgium.

Beerse is at risk of both pluvial and fluvial flooding with a small number of affected households. The Province of Antwerp conducted hydrological and hydraulic modelling and a nature-based solution was determined to be the optimal solution. This involved the creation of a flood retention area (1.57ha) along the Laakbeek upstream of those properties at risk. Private land was acquired for the project and the retention area opened in November 2022, funded by both the Province (75%) and Municipality of Beerse (25%). The case provides some interesting results concerning processes of participation, but also provides an example of benefit transfer (e.g., concerning who loses and who pays for flood risk management) as well insight into asset value transfer. Participation investigations (see Section 5) have highlighted that there were some deficiencies within the process including how socially vulnerable groups were represented and not encouraging sufficiently early engagement which would have permitted stakeholders to have a greater impact on proposals. Findings indicated that private landowners were initially reluctant to sell their land for retention and extensive negotiations were required mediated by a third-party partner (Regionaal Landschap Grote and Kleine Nete). Landowners brought a legal battle against the Province of Antwerp which delayed the project and secured terms in which they were prepared to sell.

Similar instances of asset transfer are highlighted in the case study of La Bouillie, Blois in France. In this case the project ‘de-urbanised’ an area and led to questions and concerns about whether the compensation provided permitted all families to re-settle with an equivalent standard of living (housing). However, in this case there was some nuancing of funding mechanisms with those who were more deprived being offered enhanced compensation. Like the situation in Beerse, whereby the local private landowners brought a legal case against the project to improve financial terms, the inhabitants in La Bouillie also joined together to create an association to represent their interests. However, the area which was de-urbanised is set to be transformed into a new natural urban agricultural park providing environmental amenities to local inhabitants. This is seen to be a positive step as 90% of the de-urbanization project has been nationally financed by the fund for the prevention of major natural hazards (Barnier Fund) and so it seems appropriate that this area should benefit as many as possible. However, access and benefits are inherently not evenly distributed. Those inhabitants who live on the periphery of this new area have been arguably less impacted financially by the changes (i.e. their properties have not been acquired and they have not had to relocate). But it may be these inhabitants who are set to benefit most as they will have direct access to the new park (and the new centrality created) and in the future this may also materially impact the value of their properties. Many of those who have been displaced via this process (and who may have resided in the area for many years and who were strongly rooted to the area) now reside some

distance from the newly planned amenities. The cost of relocating to an equivalent property nearby their original one was prohibitive because of the high real estate prices in this neighbourhood.

5.3 Investments over time: Temporal differences in justice outcomes

Flood risk is not static and nor are attempts to manage risk with interventions often being implemented over many years. This is particularly the case when the full spectrum of flood risk management options is utilised. Large-scale engineering-based measures which were often more traditionally implemented (Hegger et al., 2016) are arguably more static (although still require maintenance). In contrast, those interventions which require community awareness and action (e.g. emergency flood plans, flood evacuation, property-level resilience measures) can be more susceptible to different justice challenges emerging. Communities are frequently changing and, as such, the capacities and capabilities of individuals within those communities may also alter – including the extent to which they are able to take active (and sometimes expensive) approaches to manage their risks.

The example of Beerse (Box 5.1) provides an example of spatial cross-dependency and how an intervention in one area can not only affect the flood risk, land use and potentially land and property value now, but also in the future. It raises the question concerning how fair are investment decisions taken now for future inhabitants, but also whether interventions adopted on the basis of today's conditions will actually be effective in the future. It is necessary to continually review both the resilience (including the ability of communities to respond, recover and adapt) of communities as well as the justice implications of 'longer term' interventions.

Intergenerational equity in environmental risk and climate change adaptation is clearly of interest internationally (Byskov et al., 2021; de Goër de Herve, 2022; Pollack et al., 2024). This often considers how and whether actions (or inaction) today will lead to deteriorating conditions for future generations to solve (e.g. the heart of the climate crisis). However, path dependency within decision making and its impact on justice is complex and will inherently exist within environmental risk situations in which decisions and resource investment stretch over a long period of time. The Ault case study in France highlights a situation where the lack of investment in risk management has reduced possible options. In contrast to other similar areas of coastline in France, Ault has not received recently any pre- or post-event state funding for its defence infrastructures, for instance, for the dike "83" against the erosion coming from the sea. This lack of national funding and a situation that they deem as 'unfair' has been used by local opponents to argue against a larger-scale project to relocate, and that if this were implemented that they would lose out again. Therefore, rather than focussing explicitly on relocation and managed retreat and a response built on adapting to coastal change, projects are now focussing on the redesign of underground sewer networks to maintain resilience of the community. This is setting a predetermined path for future decisions around protection and the 'locking in' of flood risk management towards a certain approach (Breen et al., 2022; Seebauer et al., 2023). Whilst this might be considered to be a fair approach to recognise the desires of the current community and a way of recognising previous lack of investment, it is unclear what the needs and burdens placed on future generations might be.

The River Thames (England) case study (Box 5.2) specifically focused on investigating temporal justice impacts over a stretch of the river to the west of London. This area is at risk from different types of flooding and has experienced many floods in the past. By adopting a wider view of investment (i.e. not focussing in on one project at one point in time) enables justices to be examined in a broader sense. The case at a project level illustrates many of the social-spatial justices examined in other sections (e.g. how representative was participatory processes, and did they make a difference, whose stakes are recognised etc). However, it also illustrated those included or not included in flood risk management decision making are more widely impacted. Of course, the first issue is one of distributive justice; who is protected and who is not. When the Jubilee River was

being planned the flood risk management interventions stretched over a longer section of river and investigations included areas downstream (which are now in the benefit area of the River Thames Scheme). In the 1990s when the final decisions on the scope of the Jubilee River were being made the benefits in these eastern sections were not sufficiently high (i.e. the total asset value) and of great enough to justify funding. Since 2002, those properties included in the scheme have avoided flooding several times, whilst those downstream, and not included, have flooded several times (most notably in 2003 and 2014) and are indeed still waiting for increased protection as the River Thames Scheme is still to be implemented.

The temporal dimension in this example is also compounded by other changes to the allocation of resource and highlights potential structural injustices which may become embedded in the system. Between the late 1990s when the Jubilee River was planned and financed, and the design and proposed funding of the River Thames Scheme, the approach to resource allocation in England has changed from one of sole national funding to one where local partners are required to contribute (i.e. areas benefitting must part fund). Whilst this may suggest greater fairness for society as a whole (i.e. those areas benefitting contribute more), it introduces another temporal injustice as areas which have not benefitted from having their risk reduced for c. 20 years (and lived with the consequential flooding) also now must contribute a higher proportion towards the funding, than they were originally protected in 2002. The case highlights how decisions taken at specific points (i.e. the decision of which areas to mitigate in 2002) has ongoing consequences (both positive and negative) for those affected and how the justice implications of such decisions propagate.

Box 5.2. Reducing flooding from the River Thames, West London

The area considered covers 16,200 km^2 to the west of London with a population of c. 1 million. It highlights decisions concerning broadly three main schemes which have been or are being implemented over a period of c. 40 years. The *Jubilee River Scheme* is principally a flood alleviation channel opened in 2002 and funded entirely by central government funds. It protects 3,000 properties from fluvial flooding. The *River Thames Scheme* is a project which has been proposed and evolving ever since the Jubilee River had been implemented. It affects areas immediately downstream (Datchet to Teddington) and consists of a range of interventions including a flood alleviation channel (and associated gates and weirs), deepening of the existing channel, natural flood management with water retention areas and some property level resilience measures. It aims to protect 15,000 homes and 1,600 business and is estimated to cost £640m (as of 2024). Despite being discussed for more than 20 years it is still to be implemented with key concerns about whether it will expose areas further downstream to additional risk and how it will be funded. Implementation is ongoing as the project was approved by both the Environment Agency and Defra in 2010 and 2011 respectively and there has been extensive communication and consultation with the public. As of May 2024, the project team are appointing the contractor to build the scheme. A third project in the region is the *Smarter flood resilience - sponge catchments for people and nature* in Slough (EA, 2024) which in contrast to the other two is principally at risk from surface water flooding and where the overall town suffers from high deprivation (it is the 56th most deprived area in the UK against the 252-322 of the towns in the other two schemes – out of 326 nationally). The type of risk experienced means a focus on smaller scale natural measures including Sustainable Urban Drainage (SuDs) approaches, natural retention as well as working with local communities and business to better prepare and recover from flooding. The project receives funding from national government as it is part of the Environment Agency's *Flood and Coastal Resilience Innovation Programme* (2021-2027). However, these approaches are local authority-led, and the bankruptcy of the lead partner Slough Borough Council has reduced their capacity to implement, potentially affecting the ambition of the project.

Whilst one might argue that (in)justices such as those highlighted in this section is inevitable as resources at one point of time are finite and as risks, and knowledge about those risks, evolve but there is a great challenge of how to manage the legacy of the effects of past investment processes. With limited resources there will always be difficult decisions to make about where to invest limited resources and where assets are, or are not, protected. Whilst most governments and institutions have processes in place to steer the investment of public funds at the point of investment, it is clear

from our findings that the full justice implications of these investments are not fully elaborated and importantly fed back into future decisions. Considerable improvements are needed in the evaluation of investments in flood risk management and particularly considering temporal aspects (i.e. not just at the point of completion of an intervention) to really understand how risk and benefit have been (re)distributed. It is increasingly important to consider this in the situation when public funding goes on to have a private benefit, either directly through risk reduction or less directly through impacts on property or land value.

5.4 Conclusions and take-home messages

- Flood risk management interventions have the potential to re-distribute value, wealth (and to some extent) power both positively (i.e. those recognised as being more deprived offered more in compensation) and negatively (i.e. some suffering losses in asset value).

- There is often a disconnect between those benefiting from flood risk management and flood risk management investment (both intra and intergenerational solidarity) – whilst this is often a consequence of many different types of public investment, it almost always absent from flood risk policy.

- Overall, there is a lack of recognition of the additional benefit 'value' that investment in flood risk reduction can bring. This may be through the actual or perceived impact of risk reduction on asset values and other factors (e.g. availability and affordability of insurance).

- Not only do we better need to consider and reflect the fairness of asset investment both spatially and temporally, but also consider are we creating whole communities or social groups who are being left behind? Not only in how in terms of their risk reduction, but also in the secondary or tertiary benefits that investment may bring. Justice concerns in flood risk management should not only be limited to risk reduction but consider wider notions of value, wealth, and power.

- Findings highlighted the importance of justice path dependency and how decisions taken now may relieve or place increasing burden in the future. Inherently, with limited resources, some will benefit and other will not. Recognising the truly critical points of decision and their impacts on justice would go some way to revealing potential injustices. The next step would be how to mitigate these or look to restorative justice (i.e. how to redress any significant negative impacts), however the first step should be to add these to the discussion.

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6. Distribution of responsibility between public and private actors in flood risk management and its implications for social justice

Ann Crabbé, Mandy Paauw, Sally Priest and Marie Fournier

Flood risk management is no longer an exclusive responsibility of governments. Across Europe, citizens are increasingly expected to participate in the implementation of flood risk management. Obviously, not all citizens have the same capacity to take up this responsibility, reinforcing existing social inequalities. In this chapter, based on SOLARIS research and inspired by existing insights from literature, we introduce how responsibilities were legally distributed and how and why they are shifting today. Next, we discuss reinforcing trends that we witnessed, that support a shift from public to private responsibilities and focus on the implications for social justice. We conclude with some 'take-home messages'.

6.1. Managing flood risks: whose responsibility?

Who has a legal obligation to manage flood risks? Traditions in England differ from other countries studied. On the continent, the approach is based on idea of 'legal security' (Code Napoleon) and clear-cut responsibility/accountability, mainly for those with statutory power to manage water. Whilst in the UK, there is regime based on administrative discretion (common law) where there is historically much more a shared responsibility for managing flood risk, including between national, regional and local governments; insurance markets; private individuals; and businesses at risk. In contrast to England, individuals on the continent often do not consider themselves responsible, but instead point at the responsibility of the government.

Since the 2010s, the countries studied in SOLARIS are **evolving from a primarily flood defence approach towards flood risk management**. In flood management a risk-based approach is used, emphasising the need to address both the probability and the consequences of flood and stressing the importance of collaboration between spatial planners, water managers, emergency and recovery actors (Vitale, 2023).

In flood risk management, five basic types of strategies can be identified: flood risk prevention (through proactive spatial planning), flood defence, flood risk mitigation, flood preparation, and flood recovery (Hegger et al., 2014). In literature and in practice, it is increasingly argued that a diversification, coordination, and alignment of these flood risk management strategies will make urban agglomerations more resilient to flood risks (Driessen et al., 2016).

Fitting the risk-based approach, some countries like the Netherlands and Flanders have introduced the concept of 'multi-layer water safety' (Kaufmann et al., 2016). It aims to reduce flood risks by integrating defensive measures against floods (layer 1), resilient spatial planning measures (layer 2) and effective disaster management measures (layer 3) (Bossoni et al., 2021), and appeals to the responsibility of multiple and diverse actors (water managers, spatial planners and emergency/recovery actors).

The broadening of the actors considered responsible does not only entail involving multiple policy sectors, but also multiple types of actors like governments, (insurance) businesses, knowledge actors, individuals etc., pushing flood risk management (with competent governments) towards **flood risk governance**.

In contrast to classic perceptions on the organisation of flood management in which there is a hierarchy of governments responsible for flood management, we witnessed in SOLARIS **shifting**

responsibilities between layers of government, as illustrated in Box 6.1. In this box we highlight shifting responsibilities in France between central government and municipalities.

Box 6.1. Accelerating shifting responsibility between municipalities and central government services in France

For long, French central government was the cornerstone of FRM. However, more and more responsibilities have gradually been devolved to French municipalities since the first decentralisation laws adopted at the beginning of the 1980s.

Historically, French mayors are responsible for public safety and, as such, control the integrity of protection works under their responsibility (such as dikes and dams), but they have gained new responsibilities in the fields of prevention, preparation, crisis management, and recovery, since the beginning of the 21st century.

Hereafter, we provide an overview of relevant legislations in that context.

- Following the 2004 Law on the reform of civil security, municipalities are now responsible for **crisis management** when flood events can best be handled at a local level, whilst central government services manage events of greater magnitude (Cans, 2014). This law also reinforced the role of Mayors by creating the local Municipal Crisis Management Plan (*Plan Communal de Sauvegarde,* PCS); all municipalities covered by a Natural Risks Prevention Plan (*Plan de Prévention des Risques Naturels Prévisibles*) must also provide and display a *Document d'Information Communale sur les Risques Majeurs* (Local Information on Major Risks), attached to the Municipal Crisis Management Plan.

- In 2014, following the adoption of the MAPTAM Law, a new competence for **River, wetlands and floods management** (*Gestion des Milieux Aquatiques et Prévention contre les Inondations* (GEMAPI)) was attributed to municipalities. This competence was created to facilitate the integrated management of water and flood issues at local level. The MAPTAM Act defines several competences for municipalities: (1) river basin management, (2) maintenance and works on rivers, canals, and lakes, (3) defence against floods and sea surges and (4) protection and restoration of rivers and wetlands.

- Finally, in 2021, the Climate and Resilience Law attributed new responsibilities and legal mechanisms for French municipalities to better deal with **coastal risk**. Coastal erosion will no longer be integrated into Natural Risks Prevention Plans designed by central government services; instead, municipalities will define a Local Map on Exposure to coastline retreat and delineate those areas exposed to retreat (over a 30-year horizon and 100-year horizon).

A specific pre-emption right for adaptation to coastline retreat was also provided to municipalities. This pre-emption right is modulated following provisions on the pace of coastline retreat. At last, a new real lease (for adaptation to coastline erosion) was created by the Ordinance on sustainable development of coastal areas exposed to coastline retreat (6th of April, 2022).

Once again, this new mechanism was created by the French legislator so that municipalities may acquire buildings located in vulnerable areas and contract this new lease with former landowners. Among other specificities, the duration of the lease may evolve, taking into account the pace of coastline retreat.

6.2. Shifting responsibilities: from public to private

The shift from government to governance is not only induced via the installation of a risk-based approach, as described previously. It is strengthened by other trends. We witness **a shift towards 'smaller governments'** where government budget cuts stimulate government agencies to reduce their ambitions about what they themselves can do in flood risk management. In response to scarce budgets, we witness diverting of financial responsibility, e.g., from one governmental layer to another, in response to scarce budgets.

The trend towards smaller and financially less powerful government agencies clings to a liberal view on governments' role and to an outspoken **belief in the potential of market players** to solve societal problems. For example, insurance companies have been attributed financial responsibility in the recovery strategy and increasingly in the prevention strategy, even though practices differ, as illustrated in Box 6.2.

Box 6.2. Illustrating the opposing role of insurance companies in France (Barnier) and UK

Flood insurance in the UK is primarily provided by the private market and flooding has been a longstanding standard peril of both home buildings and contents insurance policies. Therefore, the responsibility for recovery resides with the homeowner to take out insurance cover for their assets, although for properties with mortgages, buildings insurance is required by the lender and so there is some incentivisation for cover (Penning-Rowsell and Priest, 2015). Flood is a standard peril within a composite insurance policy (along with other perils such as fire, theft, wind damages etc.) and as such there is cross-subsidisation via the grouping of perils.

Since 2016, the UK approach to flood insurance has moved closer to that of the CATNAT approach offered in France with the implementation of Flood Re. The aim of Flood Re is to maintain the availability and affordability of flood insurance (Flood Re, 2023a). This operates as an industry-led pooling of insurance whereby insurance companies can cede the highest flood risks into the scheme which will pay the claims. Flood Re also works to maintain the affordability of flooding, with the insurance premium for the flood component of the insurance being capped for homeowners. Since its inception, Flood Re has "backed insurance for more than 526,000 households" (Flood Re, 2023a;15), many of which may not have been able to access or afford insurance if it were not for the scheme.

The pool creates a more systematic approach to cross-subsidisation of flood risk as a levy is charged to each insurer which is gathered from all domestic insurance policy (Alexander et al., 2021). In contrast to the CATNAT scheme there is no requirement for the designation of flood event to be made for Flood Re to play a claim. Furthermore, whilst any surplus in the Flood Re pool can be utilised to raise awareness and undertake research and develop initiatives to increase resilience, they do not provide finances to deliver large-scale flood risk management similar to that with the Barnier Fund. They have, however, worked to design and engage insurers to deliver the BuildBackBetter scheme which provides up to £10,000 of additional funding following a flood claim to deliver resilient reinstatement (Flood Re, 2023b).

These trends have been accompanied recently by an **"advanced liberalism"** approach in which individuals are (more and more) made responsible to inform themselves about their risk and to take appropriate actions, (sometimes) supported by empowerment initiatives of the government. For some academics and policymakers, particularly those who adhere to a resilience approach, this 'responsibilisation' of residents is a sensible and imperative transition (Snel et al., 2022), as resident behaviour can on the one hand contribute to flood damage mitigation and adaptation and, on the other hand, taking measures themselves increases the resilience of individuals and households in case of a flood event. The consequence of it being that residents can, or should, mitigate and adapt by implementing measures that, for instance, retain water or minimise damage at the property level. Based on earlier research (e.g., Snel et al., 2022) and confirmed in SOLARIS research, we see differences though in the role of residents and their responsibility in flood risk governance (see Box 6.3).

Box 6.3. Comparing Flanders and UK on residents' responsibility in FRM.

Property Flood Resilience (PFR) in Flanders is still in its infancy. In recent decades, there has been a growing understanding that collective flood protection measures alone will likely be insufficient to fully prevent floods. The importance of flood risk prevention and preparedness are also increasingly recognised, accompanied by a focus on non-structural measures (in addition to dikes and embankments). This includes measures to be taken at the level of individual properties, to prevent water from entering buildings. The Flemish Environment Agency therefore increasingly stimulates the implementation of PFR measures. To increase awareness and interests in these measures, the Flemish Environment Agency

conducted a handful of pilot projects in various municipalities in 2015 (Sint-Genesius-Rode, Beerse) and 2017 (Lebbeke, Sint-Pieters-Leeuw, Geraardsbergen). In these pilot projects, homeowners can sign up to receive individualised advice on the PFR measures that are most suitable for their homes. Technical experts then visited each of the households and provided tailor-made advice on the measures most suitable for their properties. However, these pilot projects have only been executed in a limited number of municipalities and are, at present, not available region-wide.

In comparison to Flanders where PFR is stimulated but without any obligations for the homeowners to implement measures on their homes, flood risk management in England is legally the responsibility of the homeowner. National and local authorities in England have opportunities to act, but few statutory responsibilities which require them to act to deliver flood risk management. Property-level flood insurance has been part of the English landscape since the early 2000s. It is recognised to have a huge potential to contribute to resilience and is estimated to be cost effective for a large number of homes and could reduce [total UK] risk by about 16% (Environment Agency, 2021b). However, despite this, the uptake of measures is currently limited with a "relatively small application" (Environment Agency, 2019). As such, and in contrast to Flanders, a number of structured initiatives have focussed on supporting the awareness and uptake of these measures. These structural initiatives primarily have focussed on supporting financially the uptake of these measures either proactively, before floods occur (e.g. Defra Pilot schemes 2009-2012; JBA Consulting, 2014) but also as part of the Government Flood Recovery Framework (DLUHC, 2021) which adopts approaches following flooding (e.g. Repair and renew grants; Defra/MHCLG, 2015; Property Flood Resilience Repair Grant Scheme; MLUHC/Defra, 2023, BuildBackBetter; Flood Re, 2023) to facilitate resilient reinstatement.

6.3. Implications for social justice and recognition of social vulnerabilities?

The implementation of a risk-based approach, resilience-thinking and advanced liberalism have as a result for flood risk management that residents are increasingly considered responsible for taking measures. However, social reality brings about that not all residents have the same capacities and capabilities for self-reliance. This brings about the question of justice and recognition of social vulnerabilities in flood risk governance.

Reflections on justice imply considering the fairness of the allocation of resources, capital and wealth across different members of society. As Barraqué pointed out: today floods are no longer to be considered as a force majeure (an act of God) but as an issue of the welfare state (Barraqué, 2014; Thaler & Hartmann, 2016), in which the distribution of the good and the bad is to be discussed and societal choices have to be made. Questions emerge including 'should flood protection affect taxpayers who do not live in risk area?' (intragenerational solidarity) and 'how will today's policy choices affect future generations?' (intergenerational solidarity). Based on earlier research and in SOLARIS, it turns out that these issues of justice are barely discussed in flood risk management (Doorn, 2015).

From our SOLARIS research we learn that governments in flood risk management acknowledge social inequalities, but within governments some experts acknowledge it more than others (cf. Box 6.4).

Box 6.4. Difference in acknowledging social justice issues between spatial planners and water managers.

The various experts involved in FRM all differ in their background, knowledge base, expertise, and approach to FRM. Experts in flood defence are mainly (hydraulic) engineers and hydrologists, although in England the expert group has been diversified due to the introduction of new disciplines since the 1970s. Flood defence experts often aim to improve public safety through infrastructural flood protection, with a focus on economic efficiency and value for money (i.e., largest number of properties protected against the lowest possible cost). Flood risk is often seen as a technical problem, determined by the probability of a flood event and potential consequences, usually in terms of economic losses. Although in England there are ongoing

efforts to consider social vulnerability in determining risk, in the other countries this is mostly overlooked. Justice issues are often not seen as a FRM problem.

Experts in flood risk prevention, on the other hand, have more diverse disciplinary backgrounds, ranging from history to political sciences, communication, architecture, archaeology, sociology, spatial planning, as well as engineers. The goal of planners is often to provide a pleasant public space for all, one in which people and water can coexist. Where flood defence aims to control and contain water, experts in flood risk prevention aim to give water the space it needs. The multifunctionality of land is considered as important, which inherently means that planners need to balance and integrate different interests and perspectives. Additionally, stakeholder engagement processes are prominent, meaning that local perspectives are often considered. This has increased the sensitivity of spatial planners to justice considerations in FRM.

This also results in different understandings of justice in FRM in the two policy domains. Flood risk engineers often perceive measures as 'just' when they equally protect everyone against flooding, and as many houses as possible. There is little attention to who might be experiencing the impacts of flooding more intensely than others, or, in other words, who 'lives' in the houses that need protection from flooding and what their specific needs are. In contrast, spatial planners acknowledge the importance of differing capacities to deal with flooding, and often perceive flood risk measures as just when the most vulnerable, both in terms of exposure and socioeconomic and demographic characteristics, receive extra support, what aligns with a Rawlsian approach to justice.

The implications of this being that spatial planners will more likely question the effectiveness of programmes inciting property level protection if they are not accompanied by social programmes that empower people to assess the risk, to jointly develop knowledge on PLR measures' effectiveness etc. Flood risk engineers turn to programmes inciting property-level protection for the residual risk, but are easily frustrated by the relatively small application by households (as financial incentives and expert advice are provided), but in contrast to spatial planners they are less inclined to turn to the development of accompanying social programmes as this is considered to be 'out of their field of expertise'.

6.4. Conclusions and take-home messages

- Based on neoliberal ideas on the role of governments, we see an evolution towards **'smaller governments'** and an outspoken **belief in the potential of market players** to solve societal problems. Insurance companies, for example, have been attributed financial responsibility in the recovery strategy and (increasingly) in the prevention strategy, even though practices differ. Governance arrangements with both public and private actors are a reality, but need careful consideration about who bears responsibility.

- In flood risk management, government agencies are confronted with budget cuts, which stimulates them to reduce their ambitions in what they themselves can do in flood risk management. An **"advanced liberalism"** approach is witnessed, in which individuals are (more and more) considered responsible to inform themselves about their risk and to take appropriate actions.

- Social reality brings about that not all residents have the same capacities and capabilities for self-reliance. Flood risk are not equally distributed over territories, with residents with lower socio-economic status and socio-economic position being less likely to take preventive measures and less likely to be resilient after a flood event. Sometimes but not always, empowerment initiatives are taken by the government. Empowerment is crucial to support individuals in the process of shifting responsibilities.

- Considering their different capabilities and capacities, citizens are not always aware of their responsibilities, nor are they equally represented in political discussions on the topic. This leads to pertinent **questions on justice and recognition of social vulnerabilities** in flood risk governance.

- Recognition of differences in social vulnerability by public servants is not a given nor self-evident. Even though public servants acknowledge that flood risk policies should better take into account social vulnerabilities, in practice few steps are taken to create more 'just' flood risk management. Recurring budget cuts and the trend towards downscaling the size of government administrations, incites public administration to prioritise, often at the expense of taking up the challenge to work on FRM justice.

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7. Conclusions: Advancing socio-spatial-temporal justice in flood risk management

Johan Munck af Rosenschöld and Aino Rekola

This comparative report has highlighted multiple dimensions and empirical expressions of justice in flood risk management (FRM), which emphasises the need for treating justice in a multifaceted way. In this final chapter, we build on the central lessons learned from the preceding chapters, discuss these in relation to existing scholarly discussions on justice and carve out guiding questions that can be utilised in FRM planning to better integrate the breadth of justice issues into decision making. In this comparative report, we have mostly engaged with the three most commonly known justice dimensions with different empirical expressions: distributive, procedural and recognition justice. The preceding chapters helpfully illustrate a myriad of ways in which justice concerns permeate FRM and showcase the importance of taking on justice concerns in planning FRM measures.

This comparative report has also shown that these three justice dimensions are closely interrelated. It can even be argued that to enhance distributive and procedural justice, recognition justice needs to be properly addressed. If we cannot identify the most socially vulnerable social groups, their needs and related structural barriers, a 'just' distribution of risks and benefits as well as truly inclusive participatory processes will most likely fail.

In addition to the three "standard" dimensions of justice mentioned above, this report has also shed light on additional dimensions, or scales, of justice that we will focus on more in detail in this concluding chapter. These include the social, spatial, and temporal scales. We argue that these scales both align with, and cut across, the distributive, procedural and recognitional justice dimensions, and provides additional insights into the different expressions of justice in FRM.

7.1. Social, spatial and temporal perspectives to justice in flood risk management

Do we really need another layer of justice that potentially can blur and unnecessarily entangle an already sometimes messy debate on justice? Our answer is a cautious "yes". Despite running the risk of rendering the discussion more complex, broadening the scope of justice concerns in FRM is valuable for various reasons. First, it indeed helps us to better understand the breadth of justice and the different interpretations of it. Justice is, as argued widely by the scientific literature, both a complex concept as well as a complex empirical phenomenon. Acknowledging the fact that this is the case is a strong argument for further disentangling the issue. Second, and interrelatedly, by gaining a better understanding of the breadth of justice, we become better placed to design and advance novel ways of addressing justice in FRM in practice, which we will return to later in Section 7.2. Juxtaposing social, spatial and temporal justice, on the one hand, and distributive, procedural and recognition justice, on the other, has already been conducted by earlier research (e.g., de Goër de Herve, 2022; Fünfgeld & Schmid, 2020), and we build on this work to better identify key justice issues that are relevant for FRM and for identifying and developing new means of improving them.

In the rest of this section, we give a very brief overview of to what extent, and how, social, spatial and temporal perspectives of justice have been discussed in scientific literature on FRM and, where relevant, in adjacent disciplines.

Social justice

Discussing social justice as being a separate dimension of justice may seem counterintuitive at first. We argue that discussing social justice separately here has important conceptual value. By being able to separate between the social, spatial and temporal as lenses through which we view distributive, procedural and recognition justice opens up new ways of analysing and acting on (in)justices in FRM. Social justice can be seen to be the most often referred to dimension of justice in the FRM literature. For this chapter's purpose, we see that social justice represents the vast array of approaches to justice that concern FRM's impacts on inter-social group relations. The focus lies in other words on exploring how FRM measures affects socio-economic groups in different ways and how the measures influence the relationship between them.

Being a central focus in the SOLARIS project and in the academic debate on justice more generally, social justice was considered in all chapters included in this comparative report, even though not necessarily labelled as such.

Spatial justice

Spatial justice is central to FRM, not least through very established discussions on upstream-downstream issues that highlight the spatial dimension of flood risks and the measures taken to mitigate these. Despite this, spatial justice, as such, is not as explicitly referred to in the literature as might perhaps be expected (Walsh et al., 2023). In contrast, in urban planning and geography (e.g., Soja, 2010) spatial justice is and has been discussed extensively, and much can potentially be learned from this discussion. In the field of ecosystem services and urban planning, Langemayer and Connolly (2020) argues against the notion that spatial justice is reduced to a form of distributive justice (i.e., how benefits and costs are dispersed between localities and communities), but instead puts forward the idea that spatial justice can be used as a lens to examine also procedural and recognition justice dimensions.

In FRM, for example Seher and Löschner (2018) discuss equity as part of catchment-based approaches to FRM in Austria in order to balance upstream and downstream interests. By adopting the concept of "spatial imaginaries", Walsh et al. (2023) point to the diverging understanding and interpretation of space in FRM, which in turn generates various perceptions of injustice among different actors. Rufat et al. (2020) argue that the trend of individualisation of flood risk reduction and downscaling of FRM has tended to overlook social but also spatial injustices. In addition, the question of the scale at which the spatial dimension of justice is assessed is important: in flood risk management, it is in terms of the risk territory (November, 2002) that we need to think. For the purpose of this chapter, we see spatial justice in FRM to be a condition, where communities, localities, cities and regions are treated in a fair way both within and between one another and where there is sufficient understanding of how flood risks as well as benefits and costs of FRM are dispersed across spatial scales.

In this comparative report, spatial justice was primarily discussed in two chapters. In Chapter 3, spatial justice was investigated by analysing how justice concerns in FRM are integrated into spatial planning. Chapter 6 highlights cross-spatial justice from the point of view of transfer of risks between areas and benefits and upstream-downstream solidarity as well as regional aspects more generally. It also considers the different treatment of neighbouring areas and different types of risks within a region.

Temporal justice

The role of time in justice is, in itself, nothing new. The notion of "intergenerational justice", where justice is extended to include also future generations and social relations, has received much attention not least in the climate change discussion (Skillington, 2019). Likewise in FRM, temporal justice has been understood to include justice considerations "between current and future living entities" (de Goër de Herve, 2022, p. 2). Addressing justice between the now and the future is important as it forces us to broaden the temporal scale by which we assess justice in FRM and

makes us aware of the often long-term nature of many FRM measures (such as green and grey infrastructure). However, we also argue that we need to consider temporality from the now into the past. Understanding path dependencies and legacies of inequality and social vulnerability to floods, for example, is important for tackling justice issues in FRM in the present, as they form the underlying conditions for how current FRM measures and flood risks are felt and interpreted. With this in mind, we treat temporal justice in FRM as a condition, where policies and measures sufficiently take into account historical and future inequalities as well as long-term flood risks.

Temporal justice was dealt perhaps less explicitly throughout the report. In Chapter 6, temporal justice was discussed from the point of view of how flood risks and benefits arising from FRM measures have been dispersed across time. It points to the importance of considering the "benchmark" of justice not only according to the status-quo, but also taking into consideration long-lasting injustices within FRM. Time and temporal concerns were also dealt with in Chapter 4, stressing the time and resources needed to integrate lay knowledge into the implementation of policy.

Taken together, the juxtaposition of distributive, procedural and recognition justice, on the one hand, and social, spatial and temporal justice, on the other, produces interesting insights that can help develop the discussion on justice in FRM further by broadening the scope through which justice questions and concerns can be dealt with. With this in mind, a selection of justice concerns is presented in Table 7.1.

Table 7.1. Potential injustices in flood risk management across various dimensions and scales. Based on de Goër de Herve (2022) and the key results from the comparative analyses.

Justice dimension	**Scale of justice**		
	Social	*Spatial*	*Temporal*
Distributive	Flood risks as well as costs and benefits of FRM measures are often dispersed unequally across social groups.	Flood risks as well as costs and benefits of FRM measures are often unequally distributed between geographical areas.	The legacy of distributive injustices is not properly taken into account when planning FRM measures.
Procedural	Most vulnerable populations largely absent in participation processes.	Populations from socially and spatially segregated areas tend not to participate in formal FRM processes.	Past, ingrained injustices are not sufficiently addressed when conducting participatory processes in FRM.
Recognition	Tailored measures to address social and structural vulnerabilities in FRM is largely missing.	FRM measures tend not to be sensitive to structurally occurring inequalities between communities, villages and cities.	Addressing long-term social vulnerabilities related to FRM measures is not often undertaken.

7.2. Measures to move toward socio-spatial-temporal justice in flood risk management

In the following, we clarify through the three key scales of justice a set of guiding questions that can be utilised to help structure, and consequently make more efficient, the inclusion of justice concerns into FRM decision-making. The list of questions is based on, and extends, the work of Kivimaa et al. (2023) on evaluation criteria for climate policy as well as de Goër de Herve's (2022) review of justice in the flood risk management literature. Our list is non-exhaustive, but sheds light on important aspects that can advance a more holistic approach for justice in FRM. The common goal of this exercise, we identify key issues that can help practitioners to better improve on justice in flood risk management from social, spatial and temporal scales (see Figure 8.1).

Social justice

KEY OBJECTIVE

Develop the means to reduce social vulnerability to floods by taking into account structural inequalities and different levels of adaptive capacity.

Based on the results from this comparative report as well as findings in the academic literature on FRM, it is crucial to continuously improve the integration of social justice into FRM. Flood risks as well as impacts of FRM measures are not justly distributed across socio-economic groups and, more often than not, the most socially vulnerable population lack the capacity and capabilities to participate in existing participatory processes. In addition to these, the specific needs of socially vulnerable groups are rarely identified in FRM, which emphasises the demand for rethinking the existing ways in which justice is treated.

Questions supporting the development of socially just FRM:

- Who are the key beneficiaries of the proposed FRM measure? Are these benefits targeting actors, who already have higher adaptive capacity and/or lower social vulnerability to floods? [distributive justice]
- Are there social groups that are disadvantaged in terms of the impacts of FRM? [distributive justice]
- Are key stakeholders included in the participatory process and are their voices heard in a meaningful way? [procedural justice]
- Do people have equal opportunities to be heard and participate in the FRM process? [recognition justice]
- When planning participatory processes, could resources be earmarked for actively engaging with socially vulnerable groups? [recognition justice]
- Who is responsible for the practical implementation and costs of FRM actions? [recognition justice and recognition justice]

Spatial justice

KEY OBJECTIVE

Develop the means to analyse and distribute costs and benefits between geographical areas in a just manner

As already noted, spatial justice is a key consideration for FRM, as floods, more often than not, connect localities, communities and cities along a watershed, for example, and the measures to tackle flood risks can affect a larger geographical area. Therefore, developing the means to both assess how justice is dispersed across space and how justice can be improved paying attention to interrelatedness of space is important. Another important point is how this spatial distribution of risks, costs and benefits is perceived and by whom.

Questions supporting the development of spatially just FRM:

- Are there areas that will benefit from the planned FRM measures? [distributive justice]
- Are there areas that will be negatively affected by FRM measures? [distributive justice]
- How is this spatial distribution of costs and benefits perceived and by whom? [distributive justice and procedural justice]
- Have stakeholders from different relevant/affected areas been integrated into the decision-making process? [procedural justice]
- Have tailored means to pay attention to the specific needs of areas populated by socially vulnerable and marginalised social groups been developed? [recognition justice]
- Does the communication related to FRM measures take into account various social and cultural backgrounds of specific areas? [recognition justice]

Temporal justice

KEY OBJECTIVE

Strengthen the adaptability of flood risk management to avoid path dependencies that cause future injustices and address existing path dependencies that may form the basis for current injustices

The temporal scale of justice needs to be strengthened to ensure that decision making in FRM considers effectively decisions taken in the past and path dependencies, which create injustices in the current and that current decision making does not create new or reinforce existing path dependencies. Understanding that FRM has a long legacy and that decisions taken today will affect the vulnerability of social groups and areas over a longer period of time will be of critical importance.

Questions supporting the development of temporally just FRM:

- Have “[h]istorical trajectories of marginalisation that have led to socially unequal distribution of vulnerabilities” (Fünfgeld & Schmid, 2020, p. 444) been identified in when planning the FRM measure? [distributive justice]
- Has the distribution of long-term effects of the planned FRM measure been assessed? [distributive justice]
- Has the younger population (i.e., the ones who are affected by the long-term effects of FRM) been activated in planning the FRM measure? [procedural and recognition justice]
- Has the elderly population been involved in the in the planning of the FRM measure, where relevant, e.g., in terms of accessibility? [procedural and recognition justice]
- Are “[h]istorical patterns of geographic hegemony and exploitation” (Fünfgeld & Schmid, 2020, p. 444) identified and addressed in FRM planning? [recognition justice]

7.3. Connecting the dots going forward

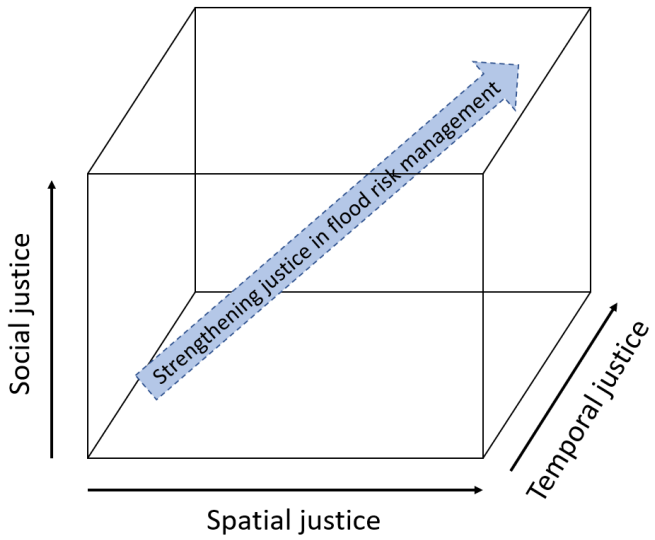

Figure 7.1. Strengthening the three scales of justice in flood risk management.

This chapter has brought forward the idea that justice can be disentangled along (at least) three scales: social, spatial and temporal. Doing this allowed us to pinpoint specific supporting questions on how to tackle these in FRM. Nevertheless, it is important to consider that, as is the case with distributive, procedural and recognition justice, that the three scales are, too, interconnected (see Figure 7.1). For example, path dependencies of previous decisions can contribute negatively to both social and spatial justice and reduced capabilities to respond to flood risks on an individual level. The inability to sufficiently consider social justice and structural inequalities can lead to unjust distribution of costs across geographical scales and locked-in trajectories, where decisions taken in the now will affect negatively affect socially vulnerable groups in years to come. Taken together, this highlights that the three scales of justice mentioned above need to be treated in tandem and that the possible negative and positive feedbacks should be attempted to be identified when planning FRM measures. Addressing the co-dependencies of both the scales and dimensions of justice can be a

complex endeavour. However, doing this is necessary to ensure that our engagement with justice is sufficiently broad and inclusive and that we are able to address the “justice gap” existing in flood risk management across Europe.

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