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‘Leaving No One Behind’ in Climate Resilience Policy and Practice in Europe

Overview of Knowledge and Practice for Just Resilience

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List of Acronyms

EIONET	European Environment Information and Observation Network
ETC/CCA	European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation
EU	European Union
MRE	Monitoring, Reporting and Evaluation
NAP	National Adaptation Plan
NAS	National Adaptation Strategy
NRC	National Reference Centres
SDG	Sustainable Development Goal
UN	United Nations

Executive Summary

Climate change impacts affect people in different ways and some members of society will find it more demanding to adapt their living and working conditions and their livelihood to changing climate conditions. Already under present conditions, vulnerability to climate change impacts is not equally distributed between different geographic locations and between individuals within the same area. Social and economic conditions determine to a large extent differences in how persons are affected by climate impacts and their ability to deal with them.

Managing climate change adaptation and transition to a climate resilient society in a just and inclusive manner requires awareness about which conditions generate injustice in terms of how burdens from climate impacts are distributed and how costs and benefits from adaptation measures can be distributed in a fair and equitable way.

Overview

The present technical paper provides an overview of knowledge and practice for just resilience in Europe as a scoping exercise based on a rapid review of scientific literature on social impacts of adaptation and resilience, information from National Reference Centres, input from the Expert Group on Just Resilience, established for this analysis, information from regulatory reports on national adaptation progress and a screening of the Climate-ADAPT database. The context of the technical paper is European policy developments, notably the EU Green Deal and the revised EU Adaptation strategy, which stresses the importance of achieving resilience in a just and fair way in order for adaptation benefits to be shared equitably. For purposes of clarity, the technical paper uses the step-wise approach proposed by the EU Adaptation policy guidance framework – the Adaptation Support Tool - for exploring current knowledge and practice. The technical paper concludes with barriers and enabling conditions for just resilience, actionable recommendations for policy-makers, adaptation planners and practitioners and identifies a number of knowledge gaps and directions for future research.

Step 1 - Preparing the ground for adaptation

The first step of the Adaptation Support Tool – preparing the ground for adaptation - introduces key elements to build the basis for a successful adaptation process including the concept of just resilience in adaptation; understanding social vulnerability, distributive impacts of climate hazards and distributive and procedural aspects in adaptation responses as well as the need to consider just resilience in the adaptation cycle. The concept of just resilience relates to i) how different groups of society are affected by climate change impacts (distributive aspects in the impacts of climate change) and ii) how benefits and burdens of adaptation responses are distributed across different groups and how different groups experience fair and transparent processes with a fair distribution of political power and participation in policy-making (distributive and procedural aspects in the adaptation responses to climate impacts). Just resilience should not be limited to avoiding aggravating existing inequalities, but should ideally take into consideration the underlying causes of pre-existing inequalities. Just resilience strategies, policies and programmes therefore need to be inclusive of all groups in society to address underlying vulnerabilities at all steps of the adaptation policy cycle, or as a minimum, aim not to widen existing gaps, introduce new risks or vulnerabilities and avoid maladaptation. This requires that social vulnerability and resilience is well understood by policy advisors, planners and practitioners.

Step 2 - Assessing climate change risks and vulnerabilities

The second step of the Adaptation Support Tool – assessing climate change risks and vulnerabilities - introduces the importance of addressing vulnerable population groups in climate risk and vulnerability assessments, i.e. understanding, mapping and assessing which groups experience inequality in exposure to climate change impacts and ability to deal with them to design appropriate and just adaptation actions. Here it is important to understand underlying preferences, risk perceptions and concerns influencing behavioural responses to risks and vulnerabilities. Elderly, the young, pregnant women and children, people living alone,

but also rural population, low-income groups, and indigenous people as well as residents in coastal areas are particularly vulnerable to climate impacts with uneven distributive impacts including heatwaves, flooding, droughts, increased air pollution, cold, desertification and erosion. Gender equality and gender mainstreaming is an aspect that is important in ensuring just resilience in climate change adaptation. Also, cross-border impacts of climate change and adaptation responses requires a transboundary approach taking both justice and connectedness into account.

Step 3 & 4 Identifying and assessing and selecting adaptation options

The third and fourth steps of the Adaptation Support Tool – identifying and assessing and selecting adaptation options – stress the importance of identifying the right options and considering the impacts that different adaptation options may have in a local context before selecting the preferred adaptation option. Properly identified, assessed and selected adaption measures ensure that protection from climate change impacts is provided in an equitable manner to all members of society without generating disproportionate impacts in particular on disadvantaged or silent groups. Such assessments carried out ex-ante need to integrate social effects and the process of identifying, assessing and selecting options needs to pay attention to the procedural aspects, especially since assessing and selecting adaptation options can be a process involving substantial conflicts between social groups. Socially just adaptation options can be chosen either to specifically address the needs of disadvantaged groups or designed in a way that no disproportionate burdens are created for those most vulnerable. Both aspects need to be respected in the choice of adaptation options. For instance, nature-based solutions such as urban greening actions that aim at reducing urban outdoor temperatures and that also support social cohesion, health and wellbeing could be designed in collaboration with local residents and users. The risk of gentrification that can follow from making a neighbourhood more attractive through nature-based solutions and hence more expensive can be mitigated by focusing adaptation measures inside public housing estates and intervening on the housing market. No-regret and win-win adaptation solutions can provide both social, environmental and/or economic benefits regardless of the occurrence of climate hazards.

Step 5 - Implementing adaptation

The fifth step in the Adaptation Support Tool – implementing adaptation - provide an overview and EU country examples of how just resilience is currently addressed in national plans and strategies. The review suggests that although social justice and equity is increasingly recognised as a policy challenge, such considerations are less progressed in adaptation planning and practice. Creating synergies and integration between policy areas and cross-sectoral action have the potential to substantially advance progress towards just resilience together with strong political leadership, inter-departmental coordination and dedicated resources. Three cases from Malmö, Paris and Barcelona exemplify how cities across Europe work to integrate just resilience in adaptation. Step 5 in this report stresses the importance of participation and involvement as a prerequisite for recognising inequalities and ensuring equity throughout the planning and implementation of adaptation options. Special attention is needed in how involvement processes are designed and facilitated with disadvantaged groups as stakeholder engagement does not automatically guarantee effective and fair adaption outcomes. As those most affected by climate change are likely to be the already disadvantaged groups, the explicit recognition of climate change as a matter of social justice could help address power inequalities in communities.

Step 6 - Monitoring and evaluating adaptation

Step 6 in the Adaptation Support Tool – monitoring and evaluating adaptation – stresses the need to monitor the social impact of adaptation actions and its distribution over different population groups and over time to ensure that adaptation actions and policies do not worsen or create new inequalities or unintended effects. As social justice is an abstract concept, expected and potential outcomes first need to be translated into specific measurable dimensions. Relying on existing indicators and datasets from different policy contexts can be a cost-effective solution, but even when combining from different sources, eventually not all aspects of justice related will be covered. Step 6 in this report provides an overview of indices related to climate or weather impacts and developed by the disaster resilience community, which may provide a useful basis for designing just resilience indicators. These include indicators relating to exposure and sensitivity of individuals

or groups and other indices that measure societal processes related to social inequalities. The review of existing indices underlines the importance of clarifying policy goals for which progress should be monitored, to track progress over time, to ensure the involvement of target groups and to identify indicators in a participatory way rather than indicators designed 'behind the desk'. Also deciding on whether monitoring should start from the individual, community or social level and how to gather data on a regular basis is essential.

What is needed to make just resilience happen

Barriers in relation to advancing just resilience in adaptation include a relatively weak body of experience and knowledge about the social factors that drive individual or communities' vulnerability, which leads to a lack of practical guidance available to support e.g., cities in addressing just resilience in their adaptation strategies and planning. Also, there's a lack of specific methods for the identification of vulnerable groups, partly due to an incomplete understanding of drivers of social vulnerability, a lack of data to identify socially vulnerable groups and a lack of tailored indicators to monitor progress over time towards just resilience in adaptation. Enabling conditions would, i.a., involve strengthening interdisciplinary approaches and multi-governance approaches, both horizontally and vertically, including strengthening collaboration in transnational regions. Also, preparing the ground for adaptation in terms of building capacity, good governance, facilitation of information flows, effective coordination and appropriate dedicated funds is key to advancing an effective integration of just resilience in adaptation policies, plans and implementation. Based on literature review, survey of National Reference Centres, Climate-ADAPT, EU Country Reporting as well as input from the Expert Group on Just Resilience and practical example cases, this report provides a number of actionable recommendations for policymakers, adaptation planners and practitioners and identifies knowledge gaps and directions for future research.

1 Introduction

1.1 Background and context

'Leaving no-one behind', which is the central transformative promise made in the UN Agenda 2030 and operationalized in the SDGs (UN, 2015), has entered as a key element in recent and forthcoming EU policies and initiatives related to climate change and sustainability – the European Green Deal[1] policy package, the EU Adaptation Strategy, the FIT for 55 package[2] and the EU Mission on Adaptation to Climate Change[3]. The concept is grounded in the principle of 'just transition', which stipulates the need to achieve a fair and prosperous society in which there are no net emissions of greenhouse gas emissions by 2050 in a just and inclusive manner.

The EU Adaptation Strategy introduces the notion of 'just resilience'. It underlines that "achieving resilience in a just and fair way is essential so that the benefits of climate adaptation are widely and equitably shared. "Unequal exposure and vulnerability to climate impacts of different regions and socio-economic groups worsens pre-existing inequalities and vulnerabilities."(EC, 2021). The Adaptation Strategy furthermore stresses the importance of understanding the nexus between climate hazards and socio-economic vulnerability.

The Mission on Adaptation to Climate Change[4] sets out a vision for a climate-resilient Europe that is built on a principle of a "resilience of social and economic systems with a commitment to equity, social justice and to leave no one behind". It highlights the need for inclusive and deliberative governance processes towards fair transitions and the need to address underlying drivers of inequality and poverty.

At the international level under the Paris Agreement, parties, including the European countries, are to "respect, promote and consider their respective obligations on human rights the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as gender equality, empowerment of women and intergenerational equity" when taking climate action. Countries are also asked to submit and regularly update adaptation communications, which *inter alia* are to address the social aspects[5].

1.2 Aim, scope, methodology and target audience

The aim of this technical paper is to describe the conceptual basis and explore the practical implications of the 'just transition' in the context of adaptation and climate resilience - 'just resilience'. This is done in view of the policy goals set by the European Green Deal and the other relevant policy documents 'to leave nobody behind'. The paper develops a knowledge base in the context of climate change by synthesising available knowledge from both literature and practice and highlighting important gaps. The knowledge base on just resilience generated is organised according to the adaptation policy cycle in the Adaptation Support Tool[3] (See Figure 1) in order to explore how the lens of social equity/justice apply throughout all stages of the adaptation planning and implementation cycle. The overview of just resilience in the climate change adaptation context provided is backed up with insights and examples coming predominantly from the EEA member countries and cooperating countries. The paper ends with a discussion and conclusions, as well as actionable recommendations and needs for further research.

[1] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1596443911913&uri=CELEX:52019DC0640#document2

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52021DC0550&from=EN

[3] https://climate-adapt.eea.europa.eu/eu-adaptation-policy/eu-mission-on-adaptation

[4] EU Mission on Adaptation — Climate-ADAPT (europa.eu)

[5] UNFCCC Adaptation communications, https://unfccc.int/topics/adaptation-and-resilience/workstreams/adaptation-communications.

- Step 1: Preparing the ground for adaptation
- Step 2: Assessing climate change risks and vulnerabilities
- Step 3: Identifying adaptation options
- Step 4: Assessing adaptation options
- Step 5: Implementing adaptation
- Step 6: Monitoring and evaluating adaptation

Figure 1 The adaptation planning, implementation and monitoring cycle serves as conceptual framework for just resilience.

The target audience of this technical paper is policy advisors, planners and practitioners, and researchers and interest groups working on climate change adaptation at the national and local levels. The presented conceptual base and findings will guide future work conducted by the EEA and the ETC/CCA.

Methodology

The paper draws on five main sources of information:

1. Literature review, of both scientific and grey literature (See Annex A on details of the literature review methodology);
2. National Reference Centres' (NRC) Request for Information, specifically for the purposes of this paper.
3. Inputs from the Expert Group on Just Resilience, specifically created for the purpose of this paper.
4. Reported data on national adaptation progress submitted under the Regulation on the Governance of the Energy Union and Climate Action.
5. Screening of the Climate-ADAPT database, including the Urban Adaptation Support Tool[6].

Box 1 below provides a quick overview of each of the five sources of information that fed into the technical paper. More details are found in Annex A.

Box 1 Overview of main sources of information for the technical paper

1) Literature review: Both scientific and grey literature on the social impacts of adaptation and resilience have been reviewed. Relevant peer-reviewed papers have been retrieved through a key-word based search from three major scientific databases. This search yielded 540 unique articles, of which 153 articles have been considered most relevant and analysed in greater depth. The selection and screening of grey literature took place through a snowballing approach and includes previous EEA publications and ETC/CCA technical papers as well as policy papers pertinent to the topic. The literature review, while systematic, does not purport to be comprehensive. Instead, the aim of the literature search was to create a highlight of relevant practical cases and a sense of topics and dimensions of just resilience covered in literature.

2) National Reference Centres' Request for Information: The EEA-EIONET National Reference Centres (NRC) for Climate Change Impacts, Vulnerability and Adaptation and NRCs for Environment and Health have been invited to contribute content on just resilience in their respective countries. Specifically, they have been asked to provide inputs on examples of unequal distribution of climate change impacts; policies, strategies or legal frameworks that address uneven impacts of climate change, social groups with particular vulnerabilities, or uneven distribution of costs and benefits in adaptation approaches; other research projects, knowledge sources or reports from their country on just resilience. Annex B contains the NRC Request for Information and template. In addition, the topic of just resilience was discussed during an EEA-EIONET meeting with oral exchange held in June of 2021 and inputs from the meeting have been incorporated into this document.

[6] EEA, Urban Adaptation Support Tool, https://climate-adapt.eea.europa.eu/knowledge/tools/urban-ast/step-0-0

3) Expert Group on Just Resilience: A group of experts was invited to provide feedback on the preliminary findings of the technical paper and inputs on further topics to be discussed. Inputs were collected through an online meeting and in written. Annex C provides a list of the experts who participated in the meeting and Annex D contains a report of the meeting with findings of the discussions.

4) EU Country Reporting on National climate change adaptation planning and strategies "Country Reporting": Recent reports by the member countries on their adaptation progress have been screened. Relevant information concerns socially vulnerable groups that may be affected disproportionately, potential positive or negative effects of policies (and possible ways to mitigate those), and the types of adaptation responses. This screening provided a bird's eye view of the prevalence of the consideration of social effects by the member countries and integration of the social aspects in adaptation planning and implementation across Europe. The country reporting is based on the Governance Regulation (GovReg) reporting (2021): EU Member States have provided information under Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action. The full range of information is published on the Climate-ADAPT Country Profiles.

5) Climate-ADAPT: The European Climate Adaptation Platform, Climate-ADAPT, the web-based knowledge platform of the European Commission and the EEA, has been screened for relevant database items, such as reports, research projects, links to tools and adaptation options. More information can be found in Box 11. The Urban Adaptation Support Tool[7] has been similarly screened and relevant sections have been extracted and included under the relevant steps of the adaptation planning, implementation and monitoring cycle, thus integrating urban and local considerations.

While the operationalisation and implementation of just resilience require more knowledge and a better understanding of what justice entails, this paper analyses and presents relevant cases that highlight the social impact of adaptation and relevant justice considerations in planned or implemented adaptation policies and projects in the European context. The paper includes 3 in-depth case studies integrated in Chapter 4 and 12 thematic examples to illustrate the concepts throughout the paper.

Limitations

In its attempt to provide an overview of conceptual and practical knowledge on just resilience, this technical paper employs multiple methods to gather data (see Box 1). Triangulation of these sources increases the reliability of the data gathered to some extent. However, this assessment does not claim to provide a comprehensive and all-inclusive overview of existing knowledge. For instance, the data officially reported by countries under the EU Governance Regulation provides comprehensive data on progress on national adaptation planning, stemming from all ministries of the national governments, but has a more general focus of which social aspects only form a small consideration. The NRC request for information, on the other hand, was created for the purpose of this paper and was therefore specifically targeted to just resilience and social vulnerability yet relies on the National Reference Centres' awareness of initiatives across government departments. The literature review has its own methodological limitations as discussed in Annex A. This technical paper does not purport to provide a comprehensive overview of *all* available literature and policy examples. Instead, it summarizes key findings and salient examples of the social effects of climate change impacts of adaptation and resilience planning and implementation.

[7] EEA, Adaptation Support Tool, https://climate-adapt.eea.europa.eu/knowledge/tools/adaptation-support-tool

2 Preparing the ground for adaptation (Step 1)

The basis for a successful adaptation process consists in, among others, obtaining and assuring high-level political support, setting up a structured process with adequate coordination mechanisms, clarifying the roles and responsibilities, estimating human and financial resources needed, identifying and collecting available information and communicating and raising awareness. Adaptation as a cross-cutting and cross-sectoral issue is of relevance and interest to a wide range of stakeholders. Therefore, it is important to understand who the key stakeholders are and what their interests, responsibilities and positions are from the beginning of the adaptation planning process to develop an appropriate stakeholder management strategy, and in turn make the most of their involvement.

Preparing the ground for adaptation requires, in relation to just resilience, firstly an understanding of what just resilience entails in the context of climate change. Section 2.1 briefly unpacks the concept of just resilience, outlining the origins and different interpretations so to help understanding the concept as a first step towards planning for action. Next, preparing the ground for adaptation in relation to just resilience requires understanding the ways in which i) climate change impacts and ii) responses to climate change may cause and aggravate social inequalities. Section 2.2 illustrates key aspects of social vulnerability to be understood, investigated and addressed so to achieve just resilience and section 2.3 finally provides an overview on the policy framework (implicitly) defining just resilience as goal for adaptation policies to be respected and achieved.

Key Messages. Step 1 – Preparing the ground for adaptation

1. Not all members of society are affected in the same way by climate change impacts. In addition, climate change impacts and responses to them may aggravate social inequalities.
2. Just resilience strategies, policies and programmes need to be inclusive of all groups in society to address underlying vulnerabilities at all steps of the adaptation policy cycle, or at least not to further widen existing gaps; they need to make sure that both benefits and burdens of adaptation responses are distributed more equitably across different societal groups; and to integrate the points of view of vulnerable groups by allowing them to influence decision making and take part in adaptation planning.
3. Just resilience requires that social vulnerability and resilience is well understood by policy advisors, planners and practitioners and taken into account when designing policies; that adaptation responses ensure all communities and individuals are effectively protected from the negative consequences of climate impacts and that positive effects of adaptation responses do not have a social bias or lead to negative effects for vulnerable groups.
4. Adaptation interventions should not introduce new or redistribute or reinforce existing risks or vulnerabilities for some people and places.

2.1 Unpacking the concept of just resilience

The concept of *just resilience* builds on the notion of *just transition*, which has its roots in the workers' rights movement in the United States in the 1970s and 1980s, where the movement called for a 'just transition' to preserve jobs, retrain workers and support communities at a time when increased environmental regulation on polluting industries had the unintended consequence of job losses (Lager et al., 2021). Since then, three key additions to the workers' rights elements have emerged, adding to workers' rights: *climate justice, energy justice and environmental justice*.

2.1.1 Social justice concept

The concept of *social justice* as used in the context of resilience and in relation to vulnerability and adaptation to climate impacts, builds upon, among others, on the concept of environmental justice, which addresses 'the fair distribution of environmental impacts, goods and services within and between generations …' (Mitchell and Normann 2012, p.44 in Davoudi and Brooks, 2012).

Justice and fairness are relevant criteria for the design and implementation of climate adaptation policies as impacts from climate change can have different consequences for different social groups, and climate change adaptation policies and measures potentially distribute burdens in unequal ways across individuals, communities, and generations.

The call for social justice and fairness in adaptation has developed in parallel to a recognition of the need for just transition with regards to climate mitigation, which responds to the concern that the necessary transformation of production and consumption patterns in society will need to be accompanied by targeted measures supporting those suffering most from the consequences of transformations, loosing for example their jobs or livelihoods (Reckien et al., 2018). As in the context of environmental justice, also in the context of climate justice. just transition and just adaptation focus on fairness in distribution and processes. While just transition related to mitigation is mainly focussing on a fair distribution of burdens of the transformation process, just adaptation considers potentially uneven outcomes of adaptation measures, but also the uneven distributions of vulnerabilities to climate impacts.

The interpretation of justice and fairness depends on a common agreement on what a society perceives as just. As not all members of society are affected in the same way by climate change impacts, socially just adaptation requires that the different degrees and forms of social vulnerability are understood, and responses are developed which ensure that communities and individuals are effectively protected from the negative consequences of climate impacts and that adaptation measures do not affect them in a disproportionate way.

2.1.2 Distributive and procedural justice concepts

The focus on distribution of benefits and burdens relates to the most common concept of justice as a criterion for how resources are distributed (e.g., resources for adaptation measures) and/or how access to resources (e.g., services) is granted and how burdens and impacts related to adaptation actions or resilience policies are distributed. *Distributive justice* in adaptation planning involves understanding and responding to the varying degrees and forms of social vulnerability, ensuring that all communities are effectively protected from the negative consequences of climate impacts and analysing the consequences of adaptation responses to different groups (Brisley et al., 2012; Reckien et al., 2017, 2018).

Box 2 Interpretations of the terms 'justice' and 'fairness'

As a criterion for the way in which resources or burdens are distributed, the terms 'justice' or 'fairness' can be interpreted in different ways with potential different outcomes for the redistribution of benefits from adaptation or the share of burdens (Davoudi and Brooks, 2012):

If "just" or "fair" means to use (limited) public resources to bring the highest benefit for society, economic assessments can help identifying the best use of (limited) public resources. Using, for instance, results from cost-benefit analysis as a criterion for optimal investments in protection measures may eventually imply that areas with low exposed values will not receive large investments in the case of small settlements or sparse urbanization (Utilitarian justice) (Ciullo et al., 2020).
If "just" or "fair" is understood as the right of all citizens of a society to receive, according to their needs, access to a fair share of the resources available in society, resources for adaptation should be invested where they provide the greatest benefits to the most vulnerable, understood as either the citizens that are most vulnerable because lack of adaptive capacity or because they are more exposed (difference principle) (Rawls, 1971).

"Justice" or "fairness" of the distribution of resources for adaptation can also be interpreted as an equal right for protection for everyone, thus generally speaking would mean, for example, that resources are distributed equally according to the level of physical risk (Davoudi and Brooks, 2012).
An elitist interpretation of "justice" which emphasises the individual responsibility for self-protection – potentially leaving those who cannot afford protection measures, as for instance insurances, without protection (Davoudi and Brooks, 2012).

Distributive justice is not independent from *procedural justice* or the way decisions are taken and who is involved in decision-making (Paavola and Adger, 2002). The decision of how justice is implemented and how access to protection and protection from disproportionate impacts from adaptation measures are decided on in social processes. Hence, being able to participate, to be heard and to have a voice in these decision-making procedures and the fairness of such processes is an essential but not always equally available condition. Procedural justice is concerned with making and implementing decisions according to fair and transparent processes, the fair distribution of political power and participation in policymaking. Fairness and inclusiveness in participation processes requires, for instance, the use of low threshold access option to information and meetings, using for instance innovative media like arts of communication and bottom-up forms of involvement as was recommended during the expert meeting. Not being recognised in adaptation planning and decision-making means not being able to inform adaptation actions and benefit from them. Also, being disadvantaged in distributive terms creates obstacles achieving recognition and participation in decision-making processes (Brisley et al., 2012). During the Expert Meeting on Just Resilience, several experts highlighted the fact that procedural justice is not automatically granted by ensuring participation. Instead, *how* participation is implemented is key: participation needs to ensure that the most vulnerable are included and helped to understand the issues at stake and can contribute with their knowledge to the identification of the best solutions. In this context, in particular the intersectional character of justice is of high relevance, as social categorisations such as gender, race and class create overlapping and interdependent systems of discrimination or disadvantage which result in lack of recognition of particular needs and representation in decision making processes (Bauriedl, 2021). While some authors propose recognitional justice as a third form of justice to be respected (Foster et al., 2019; Singh et al., 2021), to our understanding, distributive and procedural justice imply that all forms of multiple vulnerabilities are recognized and taken into account. Box 2 provides interpretations of the terms 'justice' and fairness' in the literature.

2.1.3 Further aspects to the concept of just resilience

Intergenerational justice

A valid question to pose is who is included in the consideration of just and fair distribution and procedures. Intergenerational justice is one important aspect to the notion of just resilience. Future generations for instance cannot participate in present-day decision-making processes as they are too young or not yet born. Discussion on the use of appropriate discount rates in climate assessments address this point from a purely economic point of view regarding monetary assessments (see, for instance, Nordhaus, 2019). Yet from a point of view of fairness, providing fair benefits to all generations in a society and protecting them from impacts of adaptation needs to be considered in all decisions which might potentially impact all aspects of their lives. Participants in the Expert Group on Just Resilience described the difficulties in translating the concept of intergenerational justice into policy recommendations, due to problems of identifying winners and losers to be considered among those actually represented in society or with respect to future generations.

Intrinsic value of nature and climate justice

A further aspect of justice entails thinking 'beyond human' - this aspect of fairness stems from a non-utilitarian conception of ecosystems, which recognises intrinsic values of nature and thus acknowledge the right of nature and of all species, not only humans, to be protected from climate change, independently from their usefulness for the human society.

Planetary boundaries

The views on distributive and procedural justice are shaped on models of society and solidarity at scales which are different from those involved in a past. In the Anthropocene[8], taking into account the new knowledge about global interactions, it will be necessary to adopt a global perspective and a systemic view that recognizes "planetary boundaries" (Guillaume and Neuteleers, 2015), including the consideration of justice in a global society (UN, 2015). Understanding of what is "just" or "fair" can indeed change with the geographical (or temporal) boundaries considered. As such, a strategy for just transition may appear just when considered in the local context, while measures to be implemented can create inequities outside this context in neighbouring countries and globally, or can compromise the well-being of future generations. During the meeting with the Expert Group on Just Resilience, the example of coffee farmers was presented, who risk being affected both by climate change and by the actions taken by others to adapt to climate change as for example a coffee importer changing contracts with a knock-on effect for small-holder farmers at the beginning of supply chains (Lager et al., 2021).

People-centred resilience in relation to procedural and distributive justice

An important aspect to resilience is to understand it as a response to a crisis continuum, where many crises are overlapping and succeeding each other. According to the Expert Group on Just Resilience, the understanding of conditions for just resilience has been developed much further in the context of developing countries compared to strategies aiming at the European context. In developing countries there is a large focus on people-centred resilience, which requires creating capacities at the individual and community level to respond to the combination of idiosyncratic and covariate shocks. Even if contexts are very different between developing countries and the EU, people-centred resilience is an important aspect for ensuring procedural and distributive justice.

This focus on individual and community capacities raises the question whether resilience is a useful concept or an erosion of the concept of a human rights-based approach or climate justice. From a people-centred perspective, resilience is not only about climate, but also about risks linked to other environmental impacts like noise, chemicals etc. (Hillier and Castillo, 2013), and is not only about facing physical or economic losses, but also about mental health (The Expert Group on Just Resilience).

Climate change as a stress-multiplier

Finally, climate change is considered a stress multiplier. As such, it cannot be addressed only on the biophysical level, nor isolated from existing stressors.

"Only an approach to adaptation that moves beyond a sole focus on the biophysical risks of climate change, to one that considers the larger and more complex processes that interact and produce vulnerability, can address social, environmental, and climate injustice." (O'Brien and Selboe (2015) cited by R. Wolstenholme, presentation during the Expert meeting, May 2021)

The Expert Group on Just Resilience agreed that just resilience needs to take into consideration the underlying causes of pre-existing inequalities for justice to happen, and not be limited to avoiding aggravating existing inequalities. This necessitates a holistic approach rather than a narrow focus on avoiding or reducing physical climate impacts.

2.1.4 Linking just transition in mitigation and just resilience

Adaptation and mitigation are inextricably linked. Adaptation actions may have consequences for mitigation, for instance in sectors such as agriculture, energy and infrastructure (Adaptation Committee, 2020), and vice

[8] The term "Anthropocene" has been introduced by Crutzen and Stroemer (2000) to characterize the central role of mankind in geology and ecology in the current geological epoch, where human activities have significant and long lasting impact on earth and atmosphere at all scales.

versa. At the same time, both research and policy domains have thus far been approached in separate ways and a comprehensive perspective on the nexus of adaptation and mitigation is often missing.

While resilience with respect to climate impacts depends on adaptive capacities (or a lack of such capacities due to existing socio-economic disadvantages), also in relation to mitigation policies the ability of individuals or social groups to undertake measures to mitigate climate change and benefit from such measures depends on their capacity to respond to such policy measures. “Mitigative capacity”, similar to “adaptive capacity”, depends on multiple intersecting factors, including race, gender, income, etc. (Ludden, et al., 2021).

Further to these parallelisms, there are other connections between just transition in mitigation and just resilience that need to be taken into consideration, of which some relevant ones are touched upon below. Main points of connections between mitigation and adaptation policies include first of all the significance of co-benefits between mitigation and adaptation measures. Co-benefits are important triggers for action, in particular at the local level, and can outweigh, on the medium or long term, the costs of mitigation measures, if appropriately accounted for (Chastin et al., 2021). Understanding co-benefits, as well as potentially negative effects between just resilience and mitigation and understanding their relationships and co-dependencies is key for the delivery of efficient and equitable mitigation and adaptation policies (Chastin et al., 2021). In terms of co-benefits, most measures aiming at emission reduction have significant importance in relation to adaptation to extreme temperatures, as air pollution worsens heat impacts on human health. Low income groups could receive greater relative benefits from such co-benefits, as they tend to live in more polluted areas of the territory (EEA, 2018). On the other side, green infrastructures are adaptation measures which provide co-benefits in terms of mitigation as they provide potential carbon storage. Furthermore, the cooling effect of urban green can contribute to mitigation as urban green contributes to reducing the UHI effect and thus energy demand for cooling.

Differently from the global situation, where the fact that those who have contributed less to carbon emissions are more exposed to the risks of climate change is well known (see, for instance, Islam and Winkel, 2017; Folke et al., 2021), there is less systematic evidence on uneven distribution of co-benefits from adaptation or mitigation measures at European level. An emblematic case of concentrating resources on adaptation needs of well-off households is discussed in section 3.1.3 describing a case of coastal adaptation in Sweden. In analogy, with regards to mitigation, incentives for the use of electric vehicles including subsidies for purchase and exemptions from local traffic restrictions in Norway were mainly used for the acquisition of second cars which benefit from the exemption of toll charges and traffic limitations. In this way, the goals of the public transport policies were undermined, widening inequalities and reducing tax income (Chastin et al., 2021), while policies reducing use of private cars could have generated benefits for low-income households by improving public transport.

The building sector represents an area where synergies between mitigation and adaptation strategies and potential impacts on low-income households are particularly tangible. Energy demand in the building sector actually accounts for almost 50% of the global energy consumption (Santamouris and Vasilakopoulou, 2021) Energy demand for cooling might contribute to further increases and is already putting pressure on the electricity sector in summer. Low-income households already bear a higher burden due to heating and cooling costs, due not only to increasing fossil energy prices but also to higher costs in scarcely insulated homes. Improving building insulation, using passive heating/cooling solutions, renewable energy and improving energy efficiency of heating and cooling devices can reduce drastically overall energy consumption, CO2 emissions as well as provide important adaptation and health benefits. Benefits from improved energy efficiency of buildings are particularly relevant for vulnerable populations, protecting them from extreme temperatures, if adequately combined with other passive cooling options like high-performance windows, shading and ventilation (De Cian et al., 2019). The roll-out of such measures requires dedicated policy packages, which frequently rely on incentives to the private sector. These incentives are widely recognized to bear the risk of inequities (see, for example, Scottish Government, 2020), as the necessary investments to be incentivized by public policies are generally reserved to home owners and tend to exclude tenants from these benefits. Furthermore, energy poverty is increasing among both owner occupiers and tenants creating further limits to private investments in particular among poor households (De Cian et al., 2019; Ludden, et al., 2021;

Oliveras et al., 2021). Measures as carbon taxes which aim at incentivising energy efficiency via market mechanisms – by increasing the price of energy - create disproportional burdens for low-income households and tend to further enhance energy poverty (Eurofound and EEA, 2021; Cabrita et al., 2021). From a social justice point of view, such disadvantages would need to be recognized and compensated, for instance, using part of the revenues from carbon taxes as done, for example, in Germany, Ireland, Luxembourg, the Netherlands or Poland, where low-income households, vulnerable groups, communities and companies who can benefit from tax breaks, social assistance and energy allowances financed using revenues from carbon taxes (Eurofound and EEA, 2021). In order not to jeopardize objectives of carbon neutrality, compensation which might be needed in the very short term should be replaced by subsidies to help people paying the cost of being more energy efficient, to avoid long term lock in situation in energy poverty and accelerate transition. In a similar manner, also adaptation measures focussing on urban greening and green infrastructure have a high potential to create synergies with mitigation measures: further to the benefits of biodiversity and green areas offer in terms of resilience and carbon storage, such measures create synergies with energy efficiency measures improving the overall effectiveness of building related measures (Sharifi, 2021). Again, as described in section 2.2.3, such measures have the potential of benefitting more well-off households, as market mechanisms increase housing prices - – making the area unavailable to lower income households - because of an increased attractiveness of the residential environments and would need adequate policy measures for reducing this effect.

Just transition strategies bear a high potential of inequities, and important policy measures are aimed at mitigating such impacts. In some cases, an overlap between burdens borne by the population of areas particularly interested in decarbonization transitions and a major vulnerability to climate impacts has been flagged (NRC meeting, oral communication). Disruptive impacts on regions where carbon intensive or extracting industries are predominant, affect also those members of the population who are not directly involved in carbon intense industries (Atteridge and Strambo, 2020). The consequences of closing down entire industrial sectors can be aggravated by environmental legacies left behind by extraction or industrial activities. Such environmental damages will not only heavily compromise the perspectives for transition of such regions but reduce the adaptive capacities and resilience and the quality of life in the region. Similar to adaptation, also in the case of mitigation, such burdens can be increased by delays in action or coping strategies creating carbon lock-ins, which will postpone and potentially increase the group of “carbon losers” and make the task of transition even more difficult (Atteridge and Strambo, 2020) and further reduce resilience.

2.2 Social dimensions of climate impacts and adaptation planning & actions

Climate change impacts and adaptation planning and actions do not affect all citizens in the same way. Extreme events like flooding from heavy rainfall or heatwaves already have worse impacts on vulnerable groups compared to less vulnerable groups. Discussions in the Expert Group pointed to the fact that resources include a wide spectrum of assets, including the capacity of being able to voice ones needs. Therefore, adaptation planning and actions may benefit groups of populations which are being heard than the more silent or passive groups. In line with the IPCC’s definition of vulnerability as a function of sensitivity and adaptive capacity, social vulnerability and just resilience in adaptation relates to two main aspects i) climate impacts and ii) adaptation responses:

i) **Distributive aspects in the *impacts* of climate change –** the level of exposure and vulnerability of people towards climate change hazards differs locally, nationally and regionally as well as within communities. This is for instance dependent on the location, service and quality of where people live and on the physical and mental conditions of people

ii) **Distributive and procedural aspects in the adaptation *responses* to those impacts** - the level of inclusion and influence on adaptation responses, the amount of resources and capabilities (including financial, physical, social, and other types) to effectively adapt to or cope with the impacts of climate change.

The following Section 2.2.1 provides an overview of social vulnerability; Section 2.2.2 expands on distributive aspects in the impacts of climate change and Section 2.2.3 elaborates on the distributive and procedural aspects in the adaptation responses to climate hazards.

2.2.1 Social vulnerability

The practical implications of considering social vulnerabilities in adaptation planning have been explored in an ETC/CCA technical paper in 2018 (ETC CCA, 2018). According to this work *social vulnerability* is defined, in line with recent IPCC reports, as a state resulting from interaction of socio-economic and environmental conditions, such as individual sensitivity, economic deprivation or living or working conditions, affecting how prone to harm from climate-related events people and communities are (ETC CCA, 2018; following Lindley et al., 2011).

The concept of social vulnerability, according to the analysis of ETC CCA (2018), covers several phenomena related to social components contributing to vulnerability as:

- **Sensitivity** (personal factors driving vulnerability, such as age and health);
- **Enhanced exposure**[9] (environmental factors enhancing the effect of exposure to climate hazards); and
- **Adaptive capacity** (social factors reducing the capacity to adapt, withstand or recover)

Socially vulnerable groups suffering from *enhanced exposure* can include, for instance, individuals or groups living in impact prone areas or places with low environmental qualities that exacerbate the impacts of climate change (e.g., in areas with a lack of green space and/or poor air quality, living in poorly drained areas affected by frequent flooding or living in housing of poor quality not adapted to protect from heat or withstand flooding, severe storms or increased fire risk) and the homeless. Groups with *low adaptive capacity* can include, for instance, people with low socio-economic status, low levels of education, disposing thus of fewer resources to adapt to climate hazards, or people living in areas with low level of access to essential public services (transport, health, education) which could compensate for the lack of individual resources. People subject to *enhanced sensitivity* can include, for instance, people with physical or mental conditions that present greater difficulties in preparing for, resisting to, and in recovering from climate change impacts such as elderly or people in poor health condition.

Considering both distributive and procedural justice (See Section 2.1.2), just resilience entails that both policies and actions that respond to current climate variability and that anticipate future climate change impacts are designed to ensure that neither the *impact* of climate change nor the *responses* themselves exacerbate existing or create new vulnerabilities across different groups in society.

2.2.2 Distributive aspects in the impacts of climate change

There is a good understanding of the distributional effects of climate change impacts on socially vulnerable populations. Potential inequalities resulting from climate impacts are most obvious in those cases where social groups are at risk of losing their livelihood due to the changing environmental conditions, and are at risk of losing their culture, well-being, and health, further to their economic basis for survival. This is described by Jaakkola et al. (2018) specifically in relation to the Saami (the only Indigenous People in the European Union), who state that such communities, who contributed less to climate change due to their low-emissions lifestyles, are suffering most from the consequences. Extending the livelihood concept beyond the relations between indigenous communities and the natural environment to account for access to capitals, assets and resources and relative arrangements made by communities, households, and individuals (see for instance Dijk, 2011), the loss of complex relations made of social networks, place based and cultural resources and, most importantly, of economic resources shifts other communities into the focus of potential losses of livelihoods. Furthermore, cultural resources and mental health can also potentially be affected, as indicated by research

[9] The term “enhanced” exposure as suggested by Lindley (2011) describes conditions of physical exposure which intersect with social disadvantages, regarding for instance low-income neighbourhoods being particularly exposed to flooding or urban heat waves.

from the Basque Centre for Climate Change (BC3), which investigated losses of memories and, as a consequence, of personal well-being and livelihoods due to flooding (see e.g., Foudi et al., 2017). Access to intrinsic natural values and benefits from biodiversity which might get lost in cases of disruptive events or relocation measures were also underlined during the Expert meeting.

Climate impacts can trigger losses of economic resources and entitlements which may also be place-based, as in agriculture or tourism or due to increasing flood risk along coasts and rivers, extreme precipitation events or fire risk. Furthermore, frequent, and intense heat waves and spread of pathogens will contribute to increasing existing social inequalities due to limited adaptive capacities on the side of less advantaged groups.

2.2.3 Distributive and procedural aspects in adaptation responses to those impacts

The assessment of social vulnerability and design of just adaptation policies is important to decrease poverty and social exclusion and susceptibility to climate change impacts of vulnerable groups (ETC CCA, 2018). Questions of how to share the burden of climate change impacts and the costs of adapting to these impacts are critical components of climate justice (Adger and Nicholson-Cole, 2011) but are generally much less understood (Paavola and Adger, 2006). To understand who end up being "the winners and losers of adaptation projects" and "what underlying processes may affect the inequitable distribution of adaptation costs and benefits" (Sovacool et al., 2015, p. 3), it is important to consider the following aspects of adaptation responses:

- **Costs**, or how the burdens from impacts, the realization of adaptation policies and measures and their externalities are imposed on communities unequally;
- **Benefits**, or how access to a particular adaptation intervention might be biased or whether its positive effects are unevenly distributed eventually excluding disadvantaged or benefitting only well-off groups;
- **Procedures**, or how adaptation projects might proceed with exclusionary forms of decision-making rules and procedures that lack due process for involvement and representation.

Building on this understanding and on the findings of the ETC CCA technical paper on social vulnerability (ETC CCA, 2018), the distributional aspects in adaptation and resilience can be broadly categorized into the following three types of effects:

- positive effects of adaptation responses;
- positive effects of adaptation responses with a social bias; and
- negative effects of adaptation responses.

Of these, the latter two have direct implications for just resilience in relation to the *adaptation response.*

'Positive effects' of adaptation responses with a social bias will lead to benefits for groups, but will disproportionately benefit certain groups over other socially vulnerable groups – in other words, socially vulnerable groups do not benefit in the same way from the resources invested in the adaptation response.

Negative effects of adaptation responses may also disproportionately affect socially vulnerable groups and will lead to a greater share of the potential burden of adaptation options being shared by socially vulnerable groups, including an actual increase in vulnerability. Particularly this latter phenomenon is closely related to the notion of '*maladaptation'*.

Maladaptation

The IPCC 5th Assessment Report defines maladaptation as 'actions, or inaction that may lead to increased risk of adverse climate-related outcomes, increased vulnerability to climate change, or diminished welfare, now or in the future'. Maladaptation is a cause of increasing concern to adaptation planners, where interventions in one location or sector could increase the vulnerability of another location or sector or increase the vulnerability of the target group to future climate change. Actions that may benefit a particular group, or sector, at a particular time may prove to be maladaptive to those same groups or sectors in future climates or

to other groups or sectors. In addition, some actions promote one group, often an elite, over the other groups, which may lead to conflict and actions that ignore local knowledge, traditions, and relationships.

Another aspect of maladaptation is trading off long-term vulnerability for short-term benefits, including resource depletion that later leads to vulnerability. For example, some development policies and measures deliver short-term benefits or economic gains but lead to greater vulnerability in the medium to long term, such as in cases where the construction of 'hard' infrastructure reduces the flexibility and the range of future adaptation options. Barnett and O'Neill identify five dimensions of maladaptation, including actions that, relative to alternatives: i) increase emissions of GHGs, ii) disproportionately burden the most vulnerable, iii) have high opportunity costs[10], iv) reduce incentives and capacity to adapt, and v) set paths that limit future choices.

There are valid reasons for being particularly concerned about whether and how adaptation may be introducing new risks or vulnerabilities for some people and places, since simply shifting risk and vulnerability around does not appear to be an effective strategy for building resilience collectively to climate change. Atteridge and Remling (2018) argue that if adaptation is allowed to simply redistribute risk or vulnerability, it is likely that the greatest risks and vulnerabilities will end up accumulating among people and communities who are already the most marginalized, because they are least involved in planning decisions and have a low capacity to redirect risks and vulnerabilities. Box 3 provides examples of different types of maladaptation and Box 4 illustrates one particular type of maladaptation: gentrification.

Box 3 Examples of maladaptation

- The construction of well-engineered climate-resilient roads designed to withstand current and future climate extremes may foster new settlement into areas highly exposed to the impacts of future climates.
- Increased water harvesting upstream to cope with erratic rainfall may harm and reduce the opportunities for communities downstream to manage their own risks.
- Agricultural policies that promote the growing of high-yielding crop varieties through subsidies with the objective of boosting production and increasing revenues may achieve these objectives in the short term but will also reduce agro-biodiversity and increase exposure and vulnerability of mono-crops to climate change and finally undermine the adaptive capacity of farmers in the long term.
- Insurance policies are maladaptive when they support risky behaviour, such as rebuilding in dangerous locations, or they promote replacement rather than redesign according to changing conditions; as climate threats intensify, insurance may provide a false sense of security.
- Climate adaptation resettlement projects may produce disproportionately heavier burdens on those left behind, those already displaced and the poor; it needs to be ensured that their specific needs are effectively addressed in a fair and procedurally just process of planning and implementing the resettlement process.
- Migration due to food security issues could become maladaptive over the long-term and cause aggravated welfare, labour shortage, entrap the communities into poverty and thus result in a new food security situation.
- Hard engineering measures implemented with questionable long-term effectiveness and considerable costs (See Section 3.2 for more detail).
- Regulations to increase resilience and private real estate development without incorporating provisions ensuring affordable housing will lead to gentrification and exclude low-income households.

[10] Opportunity cost measures the impact of making one economic choice instead of another.

Box 4 Example of gentrification in climate adaptation

LeHavre, France, the Netherlands, renovated the harbour front to manage flood risks while transforming the area into a prestigious part of the cityscape, attractive for new residents and commercial activities as a place for leisure and residents. However, the new regulations to manage flood risks, which made elevation of the building compulsory without including provisions for affordable housing, meant that permanent residents in underground spaces, mainly low-income groups, were excluded from the neighbourhood. The gentrification happened due to two drivers: i) recommendations of the architectural and landscape prescriptions, which aim at obtaining a coherent urban profile for the redevelopment in the presence of a multitude of private developers; ii) new municipal regulation which requires a minimum level of 4 m above mean sea level for dwellings, and specific requests for the flood safety of parking lots. Compliance with these constraints related to the prevention of flood risks leads to unavoidable budgetary surcharges, which entail high building costs. The entrance of new social groups (medium-high income households) able to bear the high costs of the new developments is triggering a gentrification process which gradually is eroding the existing community of underprivileged groups with precarious incomes (Orillard et al., 2018).

Guidance on addressing the social dimension in adaptation responses

Just resilience strategies, policies and programmes need to explicitly address the bias that may be associated with positive effects of their implementation, counteract the negative effects, and avoid maladaptation. In short, they need to make sure that both benefits and burdens are distributed in a fair way across different societal groups.

This can be achieved through increased awareness, so that all local authorities have the capacity to identify the vulnerable groups, locate them to address their needs, and know how to involve them in the planning process. Local authorities also need to monitor the impact of implemented adaptation actions to ensure that these actions and policies do not worsen or create new inequalities or unintended effects. Thus, planning of adaptation policies and interventions need to integrate the points of view of vulnerable groups by allowing them to influence decision making and take part in adaptation planning and monitoring. This would ensure procedurally just processes and can highlight who stand to gain or lose as a result of these decisions and plans (distributional justice) (ETC CCA, 2018).

There is however still scarce information about the methods for identifying and involving vulnerable groups or indicators for monitoring the social outcomes of adaptation actions, as different understandings of vulnerability and equity lead to different frameworks for assessment and can inform different approaches for identifying vulnerable people and communities (ETC CCA, 2018).

There are a number of gaps in the available knowledge and practice for developing socially just adaptation in response to climate-related impacts. While there is advanced research on climate hazards (e.g., high temperatures and flooding) and how they affect people and assets, there is less experience and knowledge about how to consider and assess the social factors (e.g., relationships and social networks, age, ethnic background, income, and human resources) that drive individual or communities' vulnerability to climate change. Urban adaptation guidance documents are available to support cities in taking them through the key steps for addressing social vulnerability (identifying, locating, and involving vulnerable groups). However, these documents are not comprehensive and, in most cases, lack specific methods for the identification of vulnerable groups and for their involvement in adaptation decision-making. They also do not provide suggestions for indicators for monitoring the social outcomes of adaptation actions over time. Detailed support for policy makers and local authorities in the development of assessments of local vulnerability and the design of socially just adaptation policies should be integrated into existing guidance tools for urban climate change adaptation. In addition, sharing knowledge and experiences between cities that wish to address social vulnerability in the future should be facilitated.

2.3 European policy context

The overarching policy framework on adaptation to climate change in the European Union is the new EU Strategy on adaptation to climate change[11], which was published in February 2021. This strategy builds on a 2018 evaluation of an earlier version of the EU adaptation strategy that was published in 2013. Background research for the earlier version already recognized the impacts of both mitigation and adaption measures and policies on social aspects and discussed the notion of social justice.

The new EU Adaptation Strategy (EC, 2021) further elaborates on this notion, pointing out that climate change impacts worsen existing social inequalities and stressing the importance of achieving resilience in a just and fair way in order for adaptation benefits to be shared equitably. It likewise emphasizes the importance of adaptation measures to be designed in a way that take social aspects into account, stating that: "The impacts of climate change are not neutral. Men and women, older people, persons with disabilities, displaced persons, or socially marginalised have different adaptive capabilities. Adaptation measures need to consider their situation." (EC, 2021) The Council of the European Union, in response, recognizes the need of adaptation policy and action "to consider the social dimensions of climate change, including the importance of integrating a gender perspective, ensuring just resilience and paying special attention to the most vulnerable groups which are disproportionately affected by climate hazards" (EC, 2021, p. 5). It furthermore stresses the importance of engaging and empowering citizens and ensuring the leadership of national and subnational authorities to achieve just and fair resilience (EC, 2021, p. 10).

In line with the European Green Deal[12], adaptation strategy actions frame just transition predominantly in terms of increased need for education, training and reskilling leading to new green jobs and economic diversification, which enable labour force mobility to green growth sectors, but also involves improved understanding of the effects of climate change on workers, working conditions, health and safety, and the related distributional effects. However, it does not explicitly address equity aspects of the transition outside of the employment and workers' rights and conditions realm, such as broader rights to a healthy and safe living environment, which is likely to deteriorate due to climate change impacts.

The new EU Adaptation strategy commits the European Union to support just transition through a range of policies and funding schemes[13], as well as via the enforcement of existing employment and social legislation. The European Social Fund plus (ESF+)[14] in particular is intended as a key financing instrument to support the most vulnerable groups in Europe[15] In broad terms, ESF finances the implementation of the principles of the European Pillar of Social Rights[16]: equal opportunities and access to the labour market; fair working conditions and social protection and inclusion. Box 5 outlines several relevant EU initiatives.

Box 5 EU initiatives that tackle social aspects in relation to climate impacts

Covenant of Mayors – Europe: Signatory cities commit to stepping up their climate ambitions for a fairer, climate-neutral Europe that leaves no one behind. The commitment document recognizes that the transition to a climate-neutral Europe will have impacts in all areas of society and local leaders are to ensure a transition that is fair, inclusive and respectful. Covenant signatories undertake to plan and implement actions to reduce greenhouse gas emissions, increase resilience and prepare for the adverse impacts of climate change, and tackle energy poverty as a key action to ensure a just transition. The

[11] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN

[12] https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1596443911913&uri=CELEX:52019DC0640#document2

[13] European Skills Agenda, the Youth Guarantee, the European Social Fund Plus (ESIF+), the Recovery and Resilience Facility

[14] https://ec.europa.eu/esf/main.jsp?catId=35&langId=en

[15] https://op.europa.eu/webpub/empl/european-pillar-of-social-rights/en/

[16] https://ec.europa.eu/info/strategy/priorities-2019-2024/economy-works-people/jobs-growth-and-investment/european-pillar-social-rights/european-pillar-social-rights-20-principles_en#documents

newly established Policy Support Facility under the Covenant initiative will support local authorities in accelerating adaptation planning and actions in a tailored way.

Mission on Adaptation to climate change: The objective of the Mission is to support at least 150 European regions and communities to become climate resilient by 2030. It focuses on solutions and preparedness for the impact of climate change to protect lives and assets, including behavioural changes and social aspects by addressing new communities beyond usual stakeholders, which help lead to a societal transformation. As per the Mission's draft Implementation Plan[17], it will include an operational framework for measuring just resilience and a set of (proxy) indicators measuring outcomes, outputs and impacts will be developed.

Union Civil Protection Mechanism: Includes a provision for the EU to work together with Member States and develop Union disaster resilience goals, which shall take into account the immediate social consequences of disasters, make sure to ensure the preservation of critical societal functions and shall give special attention to the consequences of disaster for vulnerable groups[18].

The New European Bauhaus initiative: Integrates spatial, social and environment/climate objectives, amongst others, aiming to foster living space design, which considers sustainability, quality of experience and inclusion. It seeks to develop affordable, inclusive and attractive solutions to climate challenges in the living spaces connecting to the goals of the European Green Deal[19].

Economic and Social Impact of Research (ESIR): A high-level Expert Group that provides evidence-based policy advice to the Commission on how to develop a forward-looking and transformative research and innovation policy. It has published a policy brief on transformation post-COVID recommending a 'protect-prepare-transform' design approach that focuses on applying key learnings from the pandemic and ensuring transitions that are just and that embody the European Commission's new social, green, and digital pathways for an innovative and resilient post-pandemic Europe with recommendations for a research and innovation agenda post-COVID.

There is an overall and increasing recognition of the interconnected nature of and potential negative feedback loops between climate and social realms in EU policies – from the high-level strategic European Green Deal down to the specific funding programmes. However, the policies mainly remain on a general level and do not yet entail the full range and detail of specific actions that would need to take place to ensure the just transitions called for in the high-level policy goals, especially outside the space of skills, jobs and workers' rights and the gender dimension.

Step 1 of the Adaptation Support Tool has introduced the key elements to build the basis for a successful adaptation process: unpacking the concept of just resilience in adaptation; understanding social vulnerability; distributive impacts of climate hazards; distributive and procedural aspects in adaptation responses; and the need to consider just resilience in the adaptation cycle. The next Chapter – Step 2 follows with assessing climate change risks and vulnerabilities.

[17] https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/climat_mission_implementation_plan_final_for_publication.pdf

[18] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN

[19] https://europa.eu/new-european-bauhaus/about/about-initiative_en

3 Assessing climate change risks and vulnerabilities (Step 2)

Climate change risks should be characterised from the point of view of several aspects: the climate threat (projected climatic conditions); context of the geographic location (e.g., coastal area, mountain region, etc.); and affected sectors and systems (e.g., human health, infrastructure, transport, ports, energy, water, social well-being, etc.) including the impacts on the most vulnerable groups (e.g., the elderly, the homeless, those at risk of poverty, etc.).

A typical Risk and Vulnerability Assessment addresses climate hazards, vulnerable sectors, adaptive capacity, and vulnerable population groups.

The present and projected impacts of climate change affect society as a whole, but some sectors are likely to be more affected due to their higher vulnerability or lower capacity to adapt. The ability of a given sector to adapt to and cope with climate change impacts is a function of e.g. wealth, technology, information, skills, infrastructure, institutions, equity, empowerment, and the ability to spread risk.

Identifying vulnerable sectors is important to prioritise and focus the adaptation efforts. Social effects should have a higher attention compared to what is the state in many assessments today in particular for some of the groups most vulnerable to climate changes.

Ensuring socially just adaptation responses requires a well-founded understanding at step 2 of which groups are most vulnerable to climate change impacts to design appropriate adaptation actions at step 3 (see below) to ensure that their needs are met – and a political will to implement those actions.

Step 2 in the Adaptation Support Tool, 'Assessing climate change risks and vulnerabilities' in relation to just resilience involves understanding, mapping, and assessing climate risks and vulnerabilities among those groups of society that experience inequality in exposure to climate change impacts and in the ability to deal with them. This includes taking trans-boundary issues into account. Additionally, understanding behavioural responses to risks and vulnerabilities is one central element needed in mapping and assessing social vulnerability. Citizens can have an adaptive behaviour (or not) as e.g. a response to a perceived specific risk or as a response to a government initiative on climate adaptation. Individual decision-making to e.g. adapt or not can be very complex and factors like psychological barriers (e.g. cognitive limitations, ideologies etc.), motivation, mental models, and interaction with the institutional environment (e.g. broader norms and values) can have an influence on the decision-taken (see e.g. Rendón et al., 2016). Adger et al. (2009) find that actors' preferences, risk perceptions, concerns, perception of self-efficacy and controllability of the adaptation problem have an influence on their attitude towards climate risk and their actions. Some vulnerable groups will perceive that they have a lack of self-efficacy and controllability, and the effect can be that they don't take any adaptive actions at all and neither express their demands to decision-makers. Finally, segments within vulnerable groups can potentially be heterogeneous in their responses.

Consequently, assessing the level and type of climate change risks and vulnerabilities, and as part of this, gain knowledge on adaptive behaviour for especially vulnerable groups, is a prerequisite for identifying and assessing appropriate adaptation options (Steps 3 and 4 in the Adaptation Support Tool).

Key Messages. Step 2 – Assessing climate change risks and vulnerabilities

From the research in literature, some issues emerge as particularly important for the assessment of social aspects of vulnerabilities and of impacts from adaptation measures.

1. Heatwaves, flooding, droughts, increased air pollution, cold, desertification, and erosion represent climate hazards with a particularly uneven distributive impact.

2. Elderly and the young, rural populations, low-income groups, pregnant women and children, isolated people, and indigenous people as well as residents in coastal areas are particularly vulnerable to climate impacts.
3. Just resilience requires transformative approaches to adaptation that address drivers and underlying values of systems that cause social vulnerability in the first place. These drivers can be quite complex, consisting of a mix of root causes, dynamic pressures, unsafe conditions and biophysical climate change impacts at different levels (ETC CCA, 2018; Romanovska et al., 2012 adapted from Blaikie et al. 2003).
4. Risk perception is a key mechanism in motivating adaptive behaviour. Assessing the adaptive behaviour of vulnerable groups, is a prerequisite for identifying and assessing appropriate adaptation options (Steps 3 & 4 in the Adaptation Support Tool).
5. Individuals, in general, systematically underestimate the likelihood of a hazard affecting them and tend to be overly optimistic about risks threatening them when uncertainty is high.
6. Impacts of climate change are of cross-border nature and assessing risks and vulnerabilities requires a transboundary approach taking both connectedness and justice across borders into account.

3.1 Mapping and assessing climate change impacts and social vulnerability

The ETC CCA (2018) paper, which reviewed over 30 guidance documents and tools considering social vulnerability in adaptation planning, find different understandings of vulnerability and equity, leading to different frameworks for assessment. These can inform different approaches for identifying and mapping vulnerable people and communities (e.g., data driven top-down analyses or participative bottom-up investigations).

There is some agreement in scientific literature that benefits of adaptation projects are not distributed in a just way. Sovacool et al. (2015) refer to Ford et al. (2011) who concluded based on 1,741 studies of climate change adaptation that in contrast to helping the most vulnerable, climate adaptation projects were contributing to the ones that already had large shares of adaptation funding. Sovacool et al. (2015) further refer to Remling and Persson (2015), who found in a study of 27 projects supported by the Adaptation Fund of the UNFCCC that none of them attempted to address inequalities or unequal power structures.

NRCs mention, among climate change impacts with a particularly uneven distribution, include heatwaves, flooding, droughts, increased air pollution, cold, desertification, and erosion. Socially vulnerable populations identified by NRCs include low-income populations (in relation to heat and cold, due to energy poverty); the elderly and the young; rural populations (especially in relation to drought); children and pregnant women in relation to increased air pollution; people living alone; homeless populations; outdoor workers; and indigenous populations (particularly the Sami populations in Norway and Sweden). Several countries in the Country Reporting mention that demographic changes also have consequences for the planning and implementation of climate change adaptation measures (e.g., Bulgaria, Austria).

A sector that was specifically identified as disproportionately vulnerable by several NRCs is the agricultural sector: Ireland, Italy, Spain, and Turkey highlight the disproportionate vulnerability of farmers. Energy poverty was specifically mentioned by Hungary and Spain, while in Sweden, the NRC pointed out the (perhaps counterintuitively), disproportionate exposure to flooding on wealthy coastal communities because of their ownership of property in flood-prone areas.

Several countries in the Country Reporting describe the context and identify particularly vulnerable groups in relation to climate change impacts. Box 6 provides insights on which social groups Bulgaria, Austria, Latvia and Romania consider vulnerable towards climate change impacts.

Box 6 Population groups considered socially vulnerable towards climate change – Insights from Country Reporting

Bulgaria: The vulnerability of Bulgaria's population and businesses to the impacts of climate change is due to a relatively high degree of poverty in the most affected areas, the continuing concentration of the country's population in several industrial and urban regions, and various consequences of the transition from a state-controlled economy to a free-market economy. In 2017, Bulgaria's population was 7,050,034 with people over 65 years accounting for 21 percent of the total. A recent Eurostat survey found that, in 2017, 35 percent of the population (2.5 million Bulgarians, mainly aged below 15 and over 65) is living in poverty. Thus, a serious challenge to the social development of the country is the risk of poverty and social exclusion, which is above the EU average. This unfavorable demographic situation is not only affecting economic development but is also placing a high burden on the national health system, threatening its financial stability. From a regional development perspective, large disparities still exist between urban and rural areas, and between the development regions in Bulgaria. Problems such as negative natural population growth, migration, poor age structure, low level of employment, and poor infrastructure need to be urgently addressed especially in the northwestern region and in smaller settlements. The intra-regional disparities are a major problem to achieving sustainable regional development. The development of key economic sectors like tourism, agriculture, and urban development are hindered by these disparities, and these are also designated among the most vulnerable to climate change. Overall, climate change will have a larger-scale impact in big cities. More vulnerable cities to extreme weather events will be their central urban areas with higher density, intensive traffic, reduced green and open spaces, and old infrastructure with limited capacity to absorb increasing climate impacts. Extreme weather events will also affect more significantly vulnerable groups including those living below the poverty line, in poor quality housing, the homeless, the elderly, and the sick (Source: Country Reporting Bulgaria).

Austria: In cities, poor people and those at risk of poverty often live in areas exposed to heavy traffic noise and high levels of particulate pollution, and generally have little access to green spaces or recreation areas. The effects of climate change (such as heat waves, drought, and heavy rainfall) will represent an additional burden and could affect the health of the population. Presumably most affected will be those with neither the knowledge nor the financial resources for taking precautions. The hardest hit will be those low-income households that already spend more than 10% of their income on heating. In the future, these people will be even less able to finance cooling, even if heating demand and thus heating costs will – to some extent – decline. It can be assumed that the following Austrian population groups will be particularly affected by climate change and by potential adaptation measures due to their location and/or socio-economic situation:

1. People at risk of poverty or marginalization,
2. Chronically ill people, people with poor health (among other things during hot spells or vector-transmitted sicknesses),
3. Children,
4. The elderly,
5. People living in areas threatened by natural hazards,
6. People living in areas increasingly subject to heat waves,
7. People who are occupationally exposed to extreme weather conditions,
8. People whose income may be at least temporarily threatened by the effects of climate change.

Vulnerability to heat stress is high for children, elderly people, and people with heart diseases and lower for the rest of the population. Vulnerability to increasing levels of ground-level ozone and increasing UV-radiation is high for sensible parts of the population but moderate for the general population. Socially weaker groups are generally more exposed to the effects of climate change. In most cases, various factors (low income, low education, low social capital, precarious work and housing conditions, unemployment, limited room for maneuver) combine to make underprivileged groups more vulnerable to the effects of climate change. Different social groups have different levels of ability to adapt and are

more affected by climate policy measures, such as taxes and charges on energy (APCC, 2014). People with disabilities are also faced with new challenges, which require appropriate provision in, for example, civil catastrophes. In addition, changes in population size, age distribution, number of single-person households, or other demographic characteristics have implications for handling the environment, but also for specific needs (e.g., increase in heat sensitivity with increasing age) (Source: Country Reporting Austria).

Latvia: Impacts of climate change will potentially be felt most by vulnerable groups in society (families with young children, the elderly, people with chronic diseases (including physical and mental health problems), people with disabilities, poor and low-income people, people living in remote areas far from economically active regional centers, etc.). Extreme weather events can also affect the health of people and households that are not at risk of poverty or social exclusivity. Impacts on health caused by the negative effects of climate change can affect the productivity of economically active household members, their ability to participate in the labor market. (Source: Country Reporting Latvia).
Romania: Both rural and urban populations face climate related risks and are vulnerable to certain extreme weather events such as floods, droughts, storms etc. Cities have long held a central place of importance in society as hubs of commerce, culture, and political power. Because of climate change, however, the clustering together of large numbers of people and high levels of economic activity also creates vulnerabilities. Some will be found directly within a city: people living and working in coastal areas or in river floodplains may be subject to the impacts of sea level rise or extreme rainfall events that put their lives or businesses at peril. Urban climate change can also take other forms, however, including situations where impacts occurring far outside of a city can affect systems (e.g., water or energy supply) essential to life within the city. In addition, poor individuals, farmers, and SMEs, which represent a significant percentage of the Romanian population, cannot afford to pay insurance premiums related to mandatory disaster protection policies (Source: Country Reporting Romania).

Mapping and guidance tools on social vulnerability towards climate change impacts for use by authorities in adaptation planning are important in order to operationalise the assessment of climate change risks and vulnerabilities, and indexes for mapping social vulnerability need to take into account and combine a different variables which implies complex processes of combination and weighting (see, for example, Cattino and Reckien, 2021). Box 7 provides examples from the NRC responses and Country Reporting.

Box 7: Examples of mapping tools on social vulnerability to climate change impacts

The Environmental Atlas for Berlin, Germany, specifies the current environmental quality of the metropolitan area, including the location and evaluation of environmental pressures, their causes and effects, potentials and qualities, sensitivities, and hazards, land use and building densities. Among the indicators included, several indicators specifically focus on environmental justice. They show, amongst others, that thermal stress in inner city areas tends to affect lower-income population groups (Core Indicators Bioclimate - Thermal Stress and Green Supply) (Source: NRC Germany).

The National Adaptation Geo-Information System, Hungary, has been conceived to support the development of national adaptation policy. In addition to climate change research results, an integrated database within a robust GIS framework, and vulnerability assessments of sectors and environmental elements, this system also considers social vulnerability and adaptive capacity. Groups highlighted as particularly vulnerable include elderly people and young children, as well as rural populations (especially those in the agricultural sector) (Source: NRC Hungary).

Climate-fit portal 'UVPklimafit Infoportal', Austria, was created to support project developers, consultants, and competent authorities with knowledge on the impacts of climate change on different infrastructure types and environmental issues. The portal helps to anticipate the consequences of climate change in the design and development of major infrastructure projects (often subject to EIA). By

adapting projects to the consequences of climate change, subsequent costs and negative effects on people, society and the environment can be reduced (Source: Country Reporting Austria).

The understanding of climate risks to vulnerable groups reported by the NRCs and in Country Reporting is underpinned by findings in the literature, described in Sections 3.1.2 - 3.1.5 focusing on heat waves, sea level rise and flooding, landslides and extreme weather events and agriculture. This does not include a systematic overview of which climate impacts are covered or not covered in the literature, but reflects the literature identified for this technical paper (see Annex A for literature review methodology).

Section 3.1.1 addresses one of the less considered social aspects regarding climate change adaptation - gender. Societal class, geographical location and access to services are examples of other key social aspects.

3.1.1 Gender Aspects

One of the social aspects that are still less considered in the field of climate change adaptation in the European context is the aspect of **gender equality**[20], which is equally important to achieve just resilience. Women are "more vulnerable to climate change and face higher risks and burdens for various reasons, ranging from unequal access to resources, education, job opportunities and land rights, to social and cultural norms and their diverse intersectional experiences"[21]. Although it is recognized at European level that it is important to integrate the gender perspective into considerations of the social dimension of climate change and the EU Strategy on Gender Equality[22] foresees actions to mainstream gender aspects in all key EU policies, little evidence of taking gender aspects into account is yet found at national level, neither for mitigation, nor for adaptation policies. Examples from Germany, Sweden and Spain that have given the gender topic more consideration in adaptation policies, are listed in Box 8.

Box 8 Gender and Climate considerations in EU Member State Adaptation strategies

Germany: In 2020 the German Environmental Agency has published the results of a research project on "Gender in climate politics (Mitigation and Adaptation)"[23]. The results show opportunities for improving gender equality at many levels:

1. Gender equality can be fundamentally promoted by including it in various decision-making processes and by promoting the integration of gender-relevant issues in climate policy programs.
2. Climate policies can perpetuate or reinforce gender inequalities and existing power relations. These inequalities and power relations must therefore be made visible in policy design so that efforts toward gender equity can be integrated into climate policy strategy development and policy design.
3. A consistent implementation of the Gender Impact Assessments (GIA) can help to improve gender equality.
4. Recommendations are provided for methods, data needs and research needs to improve the understanding of gender aspects in climate politics and for financing and disseminating such knowledge.

Sweden: In 2021 The Swedish Environmental Protection Agency has developed, on behalf of the Government, a proposal for a strategy to consider and integrate gender equality in Sweden's

[20] The focus is, in this report, mainly posed on socio-economic practices and conditions which make women more vulnerable than men.

[21] https://www.europarl.europa.eu/doceo/document/TA-8-2018-0005_EN.html

[22] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0152&qid=1624264733761

[23] https://www.umweltbundesamt.de/sites/default/files/medien/1410/publikationen/2020-02-06_texte_30-2020_genderaspekte-klimapolitik.pdf

implementation of the Paris Agreement [24]. The strategy states that climate action and societal transformation create an opportunity for greater gender equality. Five thematic areas are defined which are the main areas where strategic interventions are deemed to have the greatest potential to contribute to gender equality and women's rights. For each thematic area, the strategy sets out the current status and makes proposals for future work. The five thematic areas include:

a) *Capacity building, dissemination and communication* to promote a better understanding of how climate change and Sweden's climate work affects women and men,

b) *Equal representation, participation and leadership of women* with the aim to ensure that women's and men's perspectives are equally represented, which creates the conditions for equal opportunities to actively participate in, contribute to and influence important processes,

c) *Coherence* that refers to the consistent and coordinated implementation of gender mainstreaming by authorities and stakeholders at different levels and between climate-related policy areas,

d) *Gender mainstreaming in implementation and resource allocation* to promote and take into account gender equality in implementation; and

e) *Monitoring and reporting* that aims to improve monitoring of the implementation and reporting of gender mainstreaming in climate related work.

Spain: The Spanish "National Adaptation Plan (PNACC) 2021-2030" [25] has included "gender mainstreaming" among its cross-cutting issues related to just resilience. The plan recognises the fact that there is ample evidence of the different effects of climate change on women and men taking into account the multiple forms of discrimination suffered by women and girls throughout history, the differences in gender roles, the different possibilities of access to resources or the inequalities of power and participation in decision-making. The fight against climate change is seen as opportunity to include the gender perspective into the processes of change and transformation. Specific lines of action have been identified for gender mainstreaming in adaptation, which include:

1. Collect sex-disaggregated data on climate change exposure, vulnerability, and impacts, and develop specific indicators to understand gender inequalities and support gender-sensitive adaptation. On this basis, the planning, implementation, monitoring and evaluation of adaptation and specific measures and actions should integrate the gender dimension in a cross-cutting manner,
2. Gender differences in terms of access to information and training, risk perception, environmental behaviours and lifestyles shall be considered, especially when developing adaptation measures associated with education and training, information and awareness raising, and promotion of sustainable lifestyles; and
3. Women will be considered as active agents of change, by promoting their access to leadership positions, their resilience and decision-making capacities, their full, equal, and meaningful participation in key adaptation decision-making fora and the consideration of their input on solutions that take into account the different gender gaps that still exist and the roles they play in society.

One of the main problems is the lack of data to support the fact that gender indeed is a social vulnerability factor in the context of climate change in Europe. This is evident as the above listed strategies for Germany and Spain explicitly include a point on data acquisition/data needs which are necessary for improving the understanding of gender aspects. For EU Member States, the EIGE[26] collects some relevant data on women's involvement in climate change decision-making at local, national and international level

[24] https://www.naturvardsverket.se/contentassets/c9bbe319501c41648e7db68dc115efbf/nv_ru_redovisning_jamstalldhetsaspekter_parisavtalet.pdf

[25] https://www.miteco.gob.es/es/cambio-climatico/temas/impactos-vulnerabilidad-y-adaptacion/pnacc-2021-2030_tcm30-512163.pdf

[26] https://eige.europa.eu/

such as collections on representation of women in environment decision-making bodies in EU institutions[27], in environment decision-making in national governments and public administration[28], and in United Nations Framework Convention on Climate Change[29]. The EIGE data shows for instance that women are under-represented in governments and are given fewer opportunities to influence the political landscape as they are often allocated with portfolios of lower political priority. Data from 2020 shows that although women held 31.9 % of senior-ministerial positions, they accounted for a much smaller share of ministers with basic and infrastructure portfolios (26.9 % and 25.2 %,), but a significantly higher share of ministers with sociocultural portfolios (45.6 %)[30].

3.1.2 Increasing temperatures and heat waves

With respect to **heat,** the exposure of the elderly to heat has been framed as "summer energy poverty", extending the concept of energy poverty from capacity for keeping a dwelling warm in winter, to the adaptation need of keeping it cool in summer (Sánchez-Guevara et al., 2019). Mappings and assessments have been made on the spatial overlap of exposure (living in an urban area with a pronounced urban heat island effect) and adaptive capacity (income and old age) in Madrid, Spain, and London, UK, (Sánchez-Guevara et al., 2019). Also, the interaction between social deprivation and heat mortality has been mapped and assessed in Paris, France (Benmarhnia et al., 2014). They also find a potential combined modification effect of social deprivation and chronic exposure to NO2 with regards to heat-related mortality, which is also confirmed by other studies (EEA, 2018). Adaptive capacity of elderly towards heat stress depends on both tangible (physical and financial) as well as intangible (social or human) assets, as found in a study among older adults living independently in their homes in Portugal (Nunes, 2018). This includes social networks as well as targeted and personalized information about risks and adaptation options. Also access to cooling options inside the dwelling (good insulation of homes and availability/use of cooling devices) as well as outside (cooling centres, parks) are key elements in effectively adapting against extreme heat for the elderly population. The absence of this kind of assets makes adaptation more difficult and exposes (not only) elderly persons to major health risks (both cold and hot conditions) (Nunes, 2018).

3.1.3 Sea-level rise and Flooding

With regards to risks from **sea-level rise and flooding**, different groups of population are at risk, but with very varying abilities and willingness to deal with this risk. The Expert Group on Just Resilience brought out that vulnerabilities to sea-level rise may not automatically be connected to pre-existing social disadvantages. Experts reported, for instance for Sweden, that vulnerability to coastal flooding refers mainly to well-off households living in actually very attractive areas along the shoreline (see expert meeting report, Annex D). The typology of coastal population may differ significantly across Europe and with this also their vulnerability and susceptibility of suffering from disproportionate burdens from coastal adaptation measures. Rey-Valette et al. (2015), with reference to owners of small flats used as second-homes on the Languedoc-Roussilion coast in southern France, find that second home owners tend to be older than the residential population, and tend to have a low interest in investing further in their secondary dwellings, whereas Corfe (2017, cited by Buser, 2020) states that in the UK, coastal communities are among the most deprived in the country.

Flooding in particular causes severe impacts in cities due to the disrupted hydrology from paved surfaces and lack of space for excess pluvial or riverine water. One vulnerable group with regard to flooding is the growing number of old people living in cities. A proposal has been advanced to address this, suggesting that

[27] https://eige.europa.eu/gender-statistics/dgs/browse/wmidm/wmidm_env/wmidm_env_eu

[28] https://eige.europa.eu/gender-statistics/dgs/browse/wmidm/wmidm_env/wmidm_env_nat

[29] https://eige.europa.eu/gender-statistics/dgs/browse/wmidm/wmidm_env/wmidm_env_unfccc

[30] https://eige.europa.eu/publications/statistical-brief-gender-balance-politics-2020

conventional flood resilience management procedures are supported by a combination of complex social and environmental vulnerability assessments to achieve inclusive procedures, (Szewrański et al., 2018). For this, new methodologies and tools need to be developed. Szewrański et al., (2018) illustrate the approach in the city of Wrocław, Poland, by conducting a socio-environmental vulnerability mapping, based on spatial analyses using a poverty risk index calculated by the authors of the article (underlying data are not available to the public), data on the ageing population, as well as the distribution of the areas vulnerable to floods. The suggested methodology would allow city authorities to identify areas populated by social groups that are particularly vulnerable to the negative effects of flooding due to their socio-economic disadvantages.

3.1.4 Landslides

3.5 million people in Italy live in areas exposed to **landslides** or **flooding** (D'Alisa and Kallis, 2016). Climate change through increased severe precipitation may intensify the risk for landslides.

Efforts to map and quantify urban resilience and post-disaster adaptation responses in relation to landslides and earthquakes have been made in Sarno, Italy, following a catastrophic landslide in 1998. Studying the post-disaster adaptation options put in place in Sarno, Alisa and Kallis (2016) find maladaptation in the case of hard measures implemented despite questionable long-term effectiveness and considerable costs. Investments were concentrated only in areas hit by the landslides but not implemented to protect other municipalities more at risk of future landslides. Softer responses distributed more evenly to the whole territory, which is also at risk of landslides, could have reduced vulnerabilities more than the chosen post-disaster measures implemented. Yet, on the side of the inhabitants living in the risk area, the hard measures implemented suggested a feeling of security, so they refused relocation. D'Alisa and Kallis (2016) study the post-disaster adaptation options put in place in Sarno, Italy. Using an experimental framework and separately modelling the physical and the social network and overlaid with the geographical layer, Bozza et al. (2016) quantify urban resilience and proposes alternative resilience metrics for use in future planning.

3.1.5 Extreme weather events and agriculture

The **agricultural sector** in Europe experiences increasing challenges to sustain its own livelihoods and contribute to the broader sustainability of rural communities with increased variability in weather patterns and extreme events. At the same time, farmers may be asked to step up food production given rising concerns of food security, at a time when extreme weather events will expose any vulnerabilities. The agricultural sector is one of the key sectors in terms of social vulnerability, but often social vulnerability in the agricultural sector is only addressed briefly, if at all, in country reporting etc.

Studies of farmers' resilience looking at vulnerability, coping capacity, social capital and adaptive capacity indicate that more localised studies that take into account unique farming cultures are required to gain a more complete picture of farmers' resilience across Europe (Griffiths and Evans, 2015). More knowledge on social vulnerability of different 'farmer types' is also required. Like most other social groups farmers are heterogenous in their social vulnerability (Marshall et al., 2014) and the motivation that drives their decision-making at the farm (Pedersen et al., 2020). Integrated assessments at farm and landscape level can be used to guide decision-makers in spatial planning policies and climate change adaptation. There will inevitably be trade-offs between economic, social, and environmental impacts, which requires stakeholders to interact and decide upon the most important directions for policies. This implies a choice between production and income on the one hand and social and environmental services on the other hand (Reidsma et al., 2015).

In a case study of Welsh farmers, rural isolation was identified as an exacerbating factor of farming vulnerability, although this is also an apparent source of resilience as farmers are found to rely on high social capital to assist each other in emergency and challenging situations during extreme weather events (Griffiths and Evans, 2015). In the case of Dutch dairy and crop farmers, dairy farmers were found to be worse off under different policy settings (Reidsma et al., 2015).

Box 9 Reporting on vulnerability in agriculture from Country Reporting - examples

Romania: Overall the agricultural sector appears highly vulnerable to the impacts of climate change, and it is expected that the livelihoods of many rural people will be increasingly affected by the changing climatic conditions that are predicted. The risk of impact is not equally distributed. There are regional differences in the likelihood of negative impacts such as drought and extreme rainfall events, as well differences in the vulnerability, resilience and adaptive capacity of rural actors and communities to climate change. Differences which are further accentuated by the huge polarity in farm size and structure that is characteristic of the agricultural sector in Romania. Probably one of the most affected groups of producers will be subsistence farmers in the lowlands, especially in southern and south-eastern Romania. Main activities in Romanian rural areas are dominated by agriculture. As a consequence, identified risks and vulnerabilities in agriculture are reflected in the rural development sector.
Key vulnerabilities in Romanian agricultural systems include:

1. Reduced agricultural productivity due to crop damages from heat stress and storms
2. Small farm size in mountain areas
3. Water supply for rural consumers
4. Other social (e.g., human health) and economic hazards for rural communities and households, and
5. Environment and the 'health' of natural ecosystems.

Latvia: The social impact arises indirectly from the economic risks: as the yield of certain crops decreases, the well-being of farm owners decreases, as does the farm's ability to employ workers, thus leaving a socio-economic impact on the region in which the farm is located. The impact of these risks is particularly significant in cases where several farms in the same region are affected (for example, herds affected by animal diseases).

3.2 Perception of Climate Risks in relation to Vulnerability Assessments

As part of assessing risks and vulnerabilities, it is important to understand how different groups of society perceive climate risks and their own vulnerability to adverse effects and the degree to which they can participate in planning adaptation (procedural justice). Studies of people's behaviour under conditions of uncertainty indicate that individuals, in general, systematically underestimate the likelihood of a hazard affecting them (Grothmann and Patt, 2005; Woods et al., 2017). Furthermore, cognitive studies of decision-making demonstrate that a number of decision biases are activated when uncertainty is high. For instance, individuals can be overly optimistic about risks threatening them or they can be influenced by salient memories (Grothmann and Patt, 2005; Simón Pérez, 1998; Patt and Zeckhauser, 2002; Tversky and Kahnemann, 1974; Woods et al., 2017). Additionally, decision-makers may exhibit temporal bias by perceiving immediate risks as being greater than risks with a long-time horizon (OECD, 2012) like e.g., climate change. Consequently, these biases can skew perceptions of risk, which is an important observation since risk perception is a key mechanism in motivating adaptive behaviour (Woods et al., 2017). In other words, the implication is that vulnerable groups are in danger of not reacting to climate risks threatening them – either by not changing their behaviour in an adaptive direction and/or by not demanding that, e.g., authorities implement adaptive actions. Finally, authorities/politicians can have biases in their perceptions of risks and adaptive behaviour too. Both were exemplified by the deadly floods striking several European countries in July 2021. Finally, authorities/politicians can have biases in their perceptions of risks and adaptive behaviour too. At the national level, public support is a key determinant of institutional response to climate change (Akter and Khanal, 2020). Providing information on risks and raising awareness on how to interpret these risks should be a key priority across Europe. Designing this kind of information is not a trivial task though, since risk perceptions and behavioural responses to these risks are developed in complex processes where large variation between and within different target groups are common. A precondition is that politicians also get a better understanding of risks.

As mentioned above, there can be variation in the perceptions between and within target groups. Farmers are often pointed out as being particularly vulnerable to climate change, but evidence from studies looking into perception of risks point towards highly heterogeneous perceptions of risk among farmers and the complexity of how perceptions of risks are formed (Arbuckle et al., 2013; Woods et al., 2017; Duinen et al., 2015). The link between farmers' beliefs and attitudes towards adaptive and mitigative action has been found to differ in systematic ways – farmers who believe that climate change is occurring due to human activity are significantly more likely to support adaptive actions, whereas farmers who attribute climate change to natural causes, are uncertain or do not believe that climate change is occurring are less likely to support adaptation and mitigation strategies (Arbuckle et al., 2013). A quantitative study of more than 1000 Danish farmers' risk perceptions finds signs of temporal and optimism biases. Danish farmers tend to believe climate change is happening and are more likely to take advantage of opportunities, but they are on average not very concerned about its impacts and are less likely to protect against adverse effects (Woods et al., 2017, p. 117). In the Netherlands, farmers' risk perceptions towards drought induced water shortage and their adaptive capacity are shaped by both rational (economic) and emotional factors (owning fields with salinization issues, cultivating drought-/salt-sensitive crops, farm revenue, drought risk experience, and perceived control) (Duinen et al., 2015).

In Portugal, social groups most directly experiencing impacts (e.g., farmers, coastal areas' inhabitants and the elderly) most commonly perceive climate change as a threat, but farmers are also the social group where some feel threatened by climate change, while other farmers see new opportunities for economic revival and local resilience in, e.g., wine production (Schmidt et al., 2018). Similar findings have been observed among Danish farmers (Woods et al., 2017).

In relation to residents in coastal areas, studies from across Europe indicate the importance of social aspects and attitudes on the involvement of local communities in coastal management (Jones et al., 2014; Karrasch et al., 2014; Schmidt et al., 2014). In Greece, for instance, Jones et al. (2014) point to the importance of trust in the authorities and community, where institutional and social trust influence citizen support for the policy positively. In France, coastal second-home owners in Southern France appear to have lower sensitivity to risk and hence a lower acceptance of retreat policies and a preference for dike construction compared to local residents (Rey-Valette et al., 2015).

The importance of risk awareness of and perceptions of vulnerability is also captured in the Country Reporting (See Box 10).

Box 10 Importance of risk awareness and risk perception – findings from Country Reporting

Austria: The research project - CCCapMig: Risk awareness and personal provision of migrants in Austria – conducted surveys of experts and citizens in Triestingtal (Lower Austria) and in Steyr-Kirchdorf (Upper Austria). The focus was on how migrants deal with natural hazards and climate change in rural areas. The central result was that the risk awareness of new citizens who still have few local contacts is particularly low. In places where floods occur repeatedly and the community is regularly informed, there is a higher level of risk awareness. In terms of personal provision, there were hardly any differences between the long-term resident population, newcomers, and migrants. In most cases, the motivation to take measures increased only after extreme events and personal concern (Source: Country Reporting Austria).

Bulgaria: Under the conditions of climate change, the urban environment in Bulgaria is vulnerable and at considerable risk. The data supporting such a conclusion include the obsolete and often inadequate infrastructure in the big and small settlements alike and the large proportion of aging population, predominantly with low income and below the poverty line. These could be considered 'objective' factors, reflecting the demography and the relatively low level of economic development, and living standards in the country, which is the poorest in the EU. In addition, there is a very important 'subjective' factor, namely the poor level of awareness of the problems under consideration, of their causes, possible prevention, and management, among both the decision makers and the general public (Source: Country Reporting Bulgaria).

3.3 Just resilience across borders in relation to vulnerability assessments

The EU Adaptation Strategy (EC, 2021) strongly acknowledges the cross-border (e.g., arctic region, river basins) and international dimension of just resilience (e.g., shared societies, ecosytems, and economies) at EU and global level) and the need to step up international action for global climate resilience.

Most direct and indirect impacts of climate change are of cross-border or international nature. Transboundary issues create interdependencies between countries (e.g., hydrological, social, and economic ones in the case of water). Countries' economies, and resources that they depend on, are closely connected through trade, finance flows, travel, and migration and through shared biophysical systems such as water catchments. Climate change is a global challenge with impacts occurring in a globalised and hyperconnected world (Lager et al., 2021). This creates pathways through which people and systems are exposed to new challenges and risks:

- climate impacts in one country may spill over to other countries,
- adaptation in one country may redistribute or increase risk in other countries, and
- adaptation in one country may provide benefits to other countries.

Climate change may exacerbate vulnerabilities in a complex global system such as food prices, energy, trade and ultimately livelihoods. In countries with poor governance and safety-net programmes, cascading effects of climate change impacts may dangerously escalate tensions and increase vulnerabilities. In order to avoid that adaptation policies and measures in one country or region lead to reinforced or redistributed risks and vulnerabilities in other countries (i.e., maladaptation), adaptation measures need to take into account systemic and cascading cross-border effects.

When thinking about just resilience, the global perspective needs to be included. Lager et al. (2021) argue that it is not enough to avoid maladaptation, i.e., adaptation that shifts vulnerability to other sectors, locations or communities (Juhola et al., 2016). It is necessary to actively pursue a just approach to adaptation. Actively pursuing just adaptation entails more transformational approaches to adaptation that address drivers and underlying values of systems that cause vulnerability as opposed to treating adaptation as a separate 'technical' problem (Malloy and Ashcraft, 2020). Lager et al. (2021) propose to consider both *justice* and *connectedness* as two core dimensions in a new analytical framework for addressing transboundary effects of climate change for just adaptation – only by addressing both together can we obtain globally just resilience.

A recent Adaptation Without Borders Policy Brief presents a framework for a just transition for adaptation in a global perspective, with the objective of achieving globally just resilience (Lager et al., 2021). It addresses what it means to pursue just resilience at the global level keeping in mind that action in one place may affect livelihoods and systems in other places. The framework is defined by justice and interconnectedness (see figure 2).

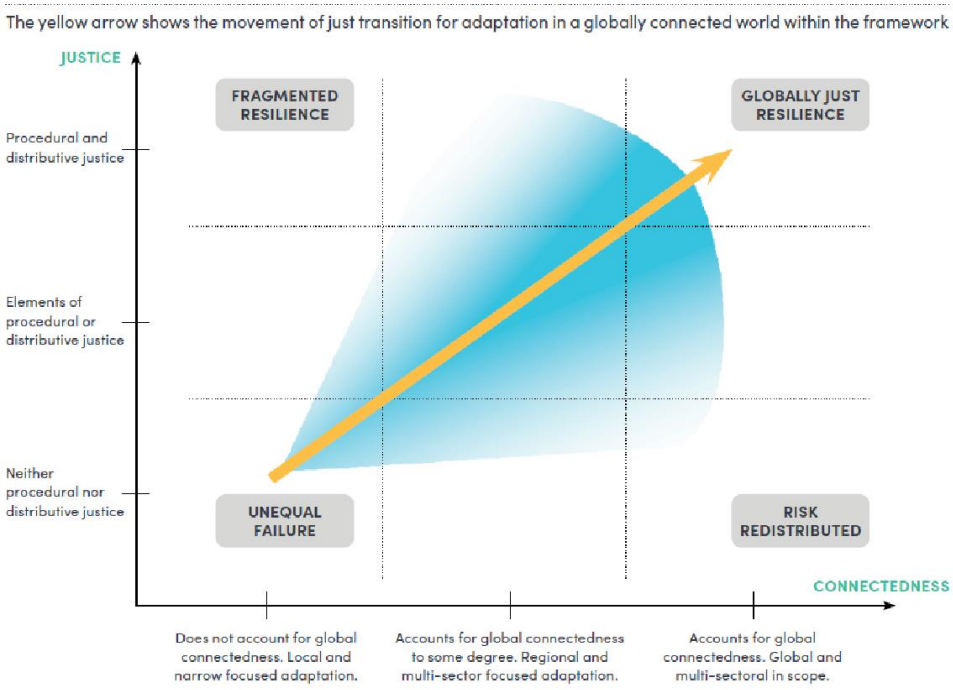


Figure 2 Framework for globally just resilience (Lager et al., 2021)

Along the justice axis, conditions may show neither procedural nor distributive justice; elements of procedural or distributive justice; or both procedural and distributive justice. Increasing resilience requires an increase in justice. Along the interconnected axis adaptation may indicate a local and narrow adaptation focus; regional and multi-sector focused adaptation; or adaptation that is global and multi-sector in scope. This axis illustrates the degrees to which adaptation plans/action take account unintended effects elsewhere and avoid creating losers. If we do not address justice nor interconnectedness our adaptation strategy will not be working, leading to non-equal failure. Moving towards globally just resilience means moving up the axes on both justice and interconnectedness. If we do not move up the justice axis, but only on the interconnectivity, then we are actually redistributing risks. If our global system only moves towards justice but not on the interconnectedness, then we may end up with fragmented resilience.

The EU is increasingly affected by climate impacts outside Europe through cascading and spill over effects on trade or migration (EC, 2021). Projections from the World Bank indicate that climate change may trigger the migration of up to 70 million people in Sub-Saharan Africa by 2050. The EU is therefore committed to help countries in Africa adapt to the negative impacts of climate change, including the Great Green Wall initiative, and has mobilised around 3.4 billion EUR between 2014-2019 for climate adaptation and support for, among others, the African Adaptation Initiative and the African Risk Capacity, and has launched the Africa Research and Innovation Partnership (EC, 2021). In addition, the EEA EIONET 2021-2030 Strategy (EEA, 2021) aims to reach out to the Western Balkans i.e., by mobilising resources, supporting knowledge expertise and working on requirements linked to full implementation of EU environment and climate policies and legislation. Also, other neighbouring countries are targeted by the Strategy, recognising that social environmental justice and migration are of particular concern for the EU in relation to these countries.

3.4 Assessing climate change risks in relation to socially vulnerable groups

While there is advanced research on assessing climate risks (e.g., high temperatures and flooding) and how they affect people and assets, there is still less experience and knowledge about the social factors (e.g., network, age, and resources) that drive individual or communities' vulnerability to climate change (EEA/ETC, 2018).

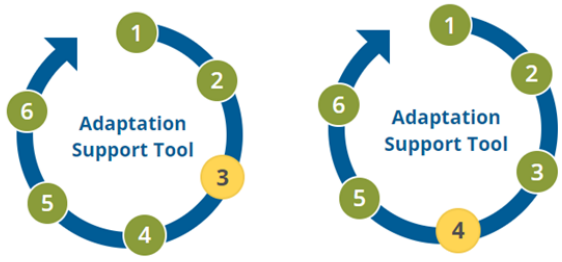
There is a general need for authorities responsible for adaptation to acknowledge and take into account the importance of assessment of social vulnerability and design of just adaptation policies, in order to decrease poverty, social exclusion and the susceptibility to climate change impacts of vulnerable groups at all relevant governance levels (national, regional and local). In particular, there is a strong need to for proper guidance at national levels (legislation, funding, knowledge provision). Such action can aim at increased awareness, so that all authorities involved in adaptation have the capacity to identify the vulnerable groups, locate them to address their needs, and know how to involve them in the planning process. Thus, planning of adaptation policies and interventions needs to integrate the points of view of vulnerable groups by allowing them to influence decision making and take part in adaptation planning. This would ensure procedural justice and will highlight who will gain or lose as a result of these decisions and plans (distributional justice).

This also includes taking into account spill over effects between borders and how policies and implementation may impact populations and sectors in other countries, or even across administrative borders within countries. There is a need to strengthen the multi-governance approach of adaptation in the EU, e.g., via strengthening the collaboration in transnational regions (which is not very strongly developed at the moment). EEA supports this by providing information on all transnational regions, by supporting the capacity building on transnational adaptation platforms and by providing tools for knowledge sharing (newsletter and a dedicated section on the Climate Adapt platform[31]).

There is also a need to develop a 'best practice' for the assessment and mapping of social vulnerability to climate-related events. ETC/CCA (2018) reviewed more than 30 guidance documents and tools which consider social vulnerability in urban adaptation planning, revealing a wide range of approaches. However, none of these provide sufficient information about the methods for identifying and involving vulnerable groups or indicators for monitoring the outcomes of adaptation actions in relation to social justice. Also, different understandings of vulnerability and equity lead to different frameworks for assessment and can inform different approaches for identifying vulnerable people and communities. The two examples of mapping tools from Berlin and Hungary (See Box 7) are promising first steps in operationalising mapping of social vulnerability for authorities. Reckien (2018) presents a further example for an index to be used for mapping social vulnerability indices for New York, which relies on a rich and basis of socio-economic data with high spatial detail, which is not always available in European cities, partly due to privacy rules. Detailed support for policy makers and local authorities in the development of assessments of local vulnerability and the design of socially just adaptation policies should therefore be integrated into existing guidance tools for climate change adaptation. In addition, sharing knowledge and experiences between cities and sector authorities that wish to address social vulnerability in the future should be facilitated.

[31] https://climate-adapt.eea.europa.eu/countries-regions/transnational-regions

4 Identifying adaptation options (step 3) and assessing and selecting adaptation options (step 4)



Decision makers should aim for "win-win" (adaptation actions that deliver the desired result in terms of minimising the climate risks or exploiting potential opportunities but also have significant contribution to another social, environmental, or economic goal) or at least "no-regret" adaptation options (worthwhile whatever the extent of future climate change will be). Each option needs to be assessed in two ways: a) to which extent will the option help to achieve the adaptation target; and b) what are the impacts on broader social and environmental aspects.

The assessment should, among others, include social considerations, i.e., the equality of protection against climate hazards as a result of a given adaptation option and its impacts on social inclusion and cohesion. Unequal adaptation options distribute the benefits of adaptation un-equally across society and exacerbate existing social inequalities. For example, increasing the price of water to promote efficiency as a solution for drought, has the potential to disproportionately impact low-income housing, exacerbating inequality within the region. Where possible, remedial action should be built in to lessen negative social impacts. Options that provide ancillary social benefits (as is the case often for green spaces) should be appraised favourably[32].

Furthermore, assessing the costs and benefits of adaptation options can be undertaken more narrowly considering financial budgetary costs and benefits only, or more comprehensively considering the wider costs and benefits to the local economy. In addition, social and environmental costs and benefits may also be included in cost-benefit assessments. It is especially important to include non-market costs and benefits, in the assessments of adaptation options to realistically account for the full range of benefits and costs, even though they are more difficult to express in monetary terms. Different environmental and social indicators may be developed side by side with economic costs and benefits[33].

Step 3 in the Adaptation Support Tool, 'Identifying adaptation options' in relation to just resilience involves creating catalogues of relevant adaptation options that take into account social considerations; finding examples of good adaptation practices from elsewhere for inspiration; describing adaptation options in detail and performing a self-check on identifying adaptation options[34]. Step 4, 'Assessing adaptation options' in relation to just resilience, involves including wider social aspects in the assessment of the options (effects, time, costs, benefits, and efforts); prioritising and selecting options; preparing a strategy document and obtaining political approval and a self-check of the assessed and selected adaptation options.

Key Messages. Step 3 & 4 – Identifying adaptation options and assessing and selecting adaptation options

1. Early warning systems are among the most cost-effective and efficient adaptation measures. In particular, they may be relevant for vulnerable individuals without good social networks and resources to prepare and cope with extreme events like heat waves and flooding. Yet, accessibility of messages (e.g. language wise) needs to be verified. Consequently, when relevant they should be considered carefully at Step 3 (EEA, 2020).
2. No-regrets options and win-win solutions have the advantage that despite climate change uncertainties, these options are potentially beneficial to implement, because they can provide

[32] https://climate-adapt.eea.europa.eu/knowledge/tools/adaptation-support-tool/step-4-1

[33] https://climate-adapt.eea.europa.eu/knowledge/tools/adaptation-support-tool/step-4-2

[34] https://climate-adapt.eea.europa.eu/knowledge/tools/adaptation-support-tool/step-3-0

further social, environmental or economic benefits regardless of the extent to which climate change is accelerating (Country Reporting Austria).

3. There is a risk that adaptation options primarily benefitting the more silent groups in societies are not reaching the agenda and therefore not discussed and assessed, because more vocal and powerful groups are promoting other options. Policy-makers should be aware of this imbalance.
4. Assessing and selecting adaptation options can be a process involving substantial conflict between social groups.

4.1 Identifying Adaptation Options & Assessments Incorporating Social Vulnerability

Adaptation options can potentially have different impacts on different parts of society. It's therefore important to choose the right options and to consider the impacts of the different adaptation options in the local context.

The Climate-ADAPT Platform contains potential adaptation options and case studies implementing and illustrating some options and approaches. A screening of the adaptation case studies reveals adaptation cases that deal indirectly and directly with social vulnerability in climate adaptation. Box 11 provides an overview of findings from the screening.

Box 11 Examples of good adaptation practices in relation to social vulnerability – insights from Climate-ADAPT screening

The Climate-ADAPT Platform was screened for resources on social vulnerability and just resilience, in an attempt to identify potential cases for further analysis.

The case studies included in Climate-ADAPT cover several areas of intervention.

Heat waves

With regard to risks from heat waves, both national and local approaches to the management of heat waves are showcased: both national plans (Portugal, Austria, UK) and local approaches (Kassel (Germany), Botkyrka (Sweden) and Košice and Trnava (Slovakia) include approaches to targeting the most vulnerable groups in the population, including specific programmes for training and information of health personnel. The identification of targeted persons in national plans mainly follows those indicated by the WHO, while the heat wave plan for England lays particular emphasis on safeguarding equality during prevention and aid, i.e., screening for groups who might be at particular risk for e.g., socio-economic reasons (Heatwave plan for England, UK).

At the local level, specific measures are proposed for contacting potentially vulnerable persons, in particular elderly living alone. In the case of Botkyrka in Sweden, a particular barrier for such direct targeting has been identified in data protection rules as some information used for identifying the particularly vulnerable comes from privacy protected registers (Adapting to the impacts of heatwaves in a changing climate in Botkyrka, Sweden). In the case of Košice and Trnava (Slovakia), specific vulnerability analysis based on exposure to heat and social disadvantages informed the planning of specific measures for mitigating heat risk for vulnerable populations (Social vulnerability to heatwaves – from assessment to implementation of adaptation measures in Košice and Trnava, Slovakia).

Adaptation cases with focus on social inequalities

A second group of case studies describing action with the specific aim of addressing social inequalities in a holistic approach is represented by interventions in social housing estates, targeting disadvantaged groups and their livelihoods.

In the example of Augustenborg (Malmö) the interventions targeting the re-design of the outdoor spaces of the estate were based on participative activities involving the inhabitants. Also, in the case of Groundworks (London, UK), the adaptation measures set in place were used for directly involving inhabitants, creating, inter alia, apprenticeship and employment programmes for residents (Climate-Proofing Social Housing Landscapes – Groundwork London and Hammersmith & Fulham Council).

Adaptation cases with focus on citizen participation

Two case studies finally focus on citizen participation for the choice of adaptation options. In the case of Ghent (Belgium), a dedicated budget for small scale urban greening measures is dedicated to interventions chosen by citizens (Ghent crowdfunding platform realising climate change adaptation through urban greening), while in the case of Timmendorfer Strand (Germany), stakeholder participation led to a re-design of a coastal protection measure initially planned in a top-down approach, which aimed at reconciling protection from storm surges with touristic fruition of the shoreline (Timmendorfer Strand coastal flood defence strategy, Germany).

Source: Climate-ADAPT (https://climate-adapt.eea.europa.eu)

A number of studies from the literature review have identified adaptation options with effects on social vulnerability and in some cases also assessed these effects ex ante. As the literature review is a rapid review of relevant papers (see Annex A), the identified adaptation options presented can only be understood as examples of adaption options that recognise/consider social vulnerability. Needless to say, options will differ between sectors. Sectors covered in Section 4.1.1 to 4.1.3 include urban transformation, managed coastal realignment and the agriculture and water utility sector. This is addressed in the following sections below.

4.1.1 Incorporating social vulnerability in adaptation options in urban transformation

Public open spaces and squares in cities are important both for their regulating effects on the urban climate and for their social aspects, diversity of users and multifunctionality, but they will become increasingly unusable in the future without successful adaptation measures to changing climatic conditions (Keeler et al., 2019). Nature-based solutions are offered as examples of good adaptation practices in ex ante studies in Germany and Portugal, providing regenerative adaptation measures in urban transformation.

In the case of a pilot case in Heidelberg, Germany, increasing tree canopy cover to enhance shading and reduce solar irradiation and thus mitigate heat stress was found to generate synergy effects by improving both climatic and social conditions (Foshag et al., 2020). The study combined measurements of air temperatures, modelling of climate impacts with detailed spatial modelling of solar radiation shading measures, and the involvement of relevant stakeholders. A survey of city dwellers on their perceptions of current and potential quality of stay on the open spaces found that an increase in the proportion of green areas and the integration of natural elements were among the most important factors that would increase the quality of stay on squares during the hot summer season. The methods applied in the case in Heidelberg are transferable to comparable cities and can be the basis for a sustainable (ecological, social and economic) adaptation of public areas to current and future climate change and the needs of city dwellers.

Social aspects of adaptation responses in the case of the city of Albufeira in Southern Portugal, a study looked at an urban recovery inspired by nature-based solutions and biophilic design that would recover the buried river and restore the natural river flow, combined with designs that reconnect people with nature and the history of the place. The adaptation option would generate multiple benefits of adapting to climate hazards (reduce flash floods and urban heat island effects) while creating high quality city-cooling places for citizens' health and wellbeing, enhancing social cohesion and offering wider opportunities for tourism. The adaptation measure is contrasted with a conventional grey engineering approach with no further added benefits and illustrates how selecting a nature-based solution offer a 'win-win' option that minimise climate risks while providing wider significant benefits (Blau et al., 2018).

4.1.2 Incorporating social vulnerability in adaptation options in coastal adaptation

Sea level rise, more frequent, and increasingly, coastal storms severely degrade coastal ecosystems and increasingly place people and assets at risk. With the growing recognition and understanding of future climate risks, policies are faced with choices of continuing to protect and armour shoreline infrastructures or adopting coastal retreat strategies. Despite the medium- and long-term benefits, managed realignment policies may face significant friction due to social acceptability in the communities where they are implemented.

In those coastal areas where there is a dominance of wealthy people, shoreline protection policies can potentially create conflicts on the use of public resources as mainly wealthy persons would benefit from public investments. Here, the risk is that those owning most of the vulnerable assets (the wealthier groups) will be the most vocal in the resilience policymaking and will potentially skew discussions and decisions towards options in their interests, seeking to reduce the expenses and losses they would incur. As discussed in the expert meeting (See Annex D), there is therefore a need to recognize the more (or completely) silent groups and the fact that their vulnerabilities and connected adaptation options might be more urgent. This includes also unknown or tacit vulnerabilities (and coping skills). There is a risk that the adaptation options that would primarily benefit the more silent groups are not included in adaptation strategies and are therefore not discussed and assessed.

Social aspects in adaptation responses in coastal areas also involve addressing livelihoods such as coastal and marine tourism, which depends on a high quality, healthy environment while also impacting the local environment negatively, i.e., through expansion of the built environment in ecologically vulnerable areas and consumption of scarce resources as freshwater. With climate change, coastal tourism is facing increasing risks from wildfires, drought, sea level rise and coastal storms. Investing in climate adaptation measures for the long term at local level in Croatia, a proposal is to focus on nature-based solutions (afforestation, careful land use, less impermeable surfaces) and long-term coastal zone management combined with new insurance products such as obligatory climate insurance policy for businesses and tourism industry (Luttenberger and Luttenberger, 2018). Also, a number of environmental performance indicators that would allow disclosure of non-financial information would enable a monitoring of effects of the adaptation options.

Managed Realignment

Also, transitional adaptation strategies for coastal areas as, for instance, managed retreat or realignment, can potentially create uneven impacts depending on the way such policies are implemented. In the UK, where coastal communities are among the most deprived in the country (Buser, 2020, citing Corfe, 2017) a case of “decommissioning” of the village of Fairbourne represents “one of the first (and currently the largest) UK residential communities to initiate processes of decommissioning directly as a result of climate change and sea level rise” (Buser, 2020). Situated along the Welsh coast, a change from a hold-the-line to a managed retreat strategy will require relocation of the settlement, foreseen for around 2050. Since the decision to stop maintenance of existing flood protection measures and to relocate the settlement but without proper compensation, local residents, of which a high percentage is elderly, struggle with a decline in property values, an economic blight of the community, and a decline in health and welfare (Buser, 2020).

While compensation in such a relatively comprehensive case is not available in the case of Fairbourne, UK, small-scale expropriations in support of managed retreat policies are taking place elsewhere, for instance in the Ebro-delta in Spain. Here, the state is proactively proceeding with expropriations of farmland prone to salinization and erosion protecting the economic assets of farmers (Zografos, 2017). On a hypothetical basis, also Greek citizens declared in a study that they would prefer managed realignment strategies, provided adequate compensation would protect from the loss of economic assets. The agreement for this type of policies by Greek citizens was particularly high among those having a high level of confidence in institutions (Jones et al., 2014). In addition to expropriation as a means of managing coastal realignment without causing economic stress to residents like in the case of Ebro, Spain, another option could be rolling easements as a means for preparing retreat of productive activities (Garmestani et al., 2019). New developments can be steered away from the coast to reduce future hardening of the coastal zone. For existing settlements and for

those who cannot move away from the coastal zone, relocation or an option for hard protection measures will be the only options available.

Several studies have investigated attitudes of different population groups towards potential policies of managed coastal realignment in France (Rulleau et al., 2017; Rey-Valette et al., 2015) and find, i.e., support of a relatively fast launch of managed realignment policies (within 15 years), but in stages and through a process of dialogue with local communities, where national solidarity funding would be set up and compensation paid out based on market prices.

Relocation impacts on mental health are not yet well known. BC3 has conducted studies on losses of memories due to flooding (see e.g. Foudi et al., 2017). Refusing relocation is not only about the fear of change, but also about the impact on mental well-being and livelihoods. As part of place-based approaches, it is also important to think about immaterial values as memories or access to intrinsic natural values and benefits from biodiversity (further to, see above, immaterial elements of livelihood social relationships etc.) which might get lost in cases of disruptive events or relocation strategies.

4.1.3 Incorporating social vulnerability in adaptation options in agriculture and water management

The agricultural sector contributes to climate change, while it also experiences the need to adapt farming to the effects of climate change. However, the effects are unevenly distributed over regions and groups, thereby having a potential to widen the gap in pre-existing inequalities and vulnerabilities. This cocktail has the potential to make the agricultural sector a battlefield for a range of different interests in climate policies. Besides conflicts within the agricultural sector, conflicts with other sectors over water resources are also frequent and might increase in the future. There are winners and losers among different groups of farmers and water users making it necessary to assess social justice impacts of adaptation options to achieve resilience in a just and fair way.

In agriculture, ex-ante assessments relying on carefully designed modelling approaches of economic outcomes of transformative adaptation options can help anticipate future socio-economic impacts and thereby inform decision making. An example is the economic loss index to assess the economic equity of adaptation strategies in the Jucar river basin in Eastern Spain that uses a hydro-economic model (Escriva-Bou et al., 2017). This index allows for detecting types of water demand sectors which would experience economic losses under future climate and management scenarios allowing for an assessment of economic equity across the system.

Climate change effects will often vary over crops and regions, and perceptions of the best and most fair options will often differ. In some cases, information can contribute to better solutions. An example is a study analysing adaptation options for rice farming under changing water availability in the Doñana area, a coastal wetland in Southern Spain that analysed how informed stakeholders can contribute to better adaptation (Iglesias et al., 2017). Rice farmers on the Iberian Peninsula produce about one quarter of the total rice production in the European Union, and climate change is already now affecting the rice production and the natural ecosystem in the Doñana wetland. Scarcity of water and related water quality deterioration affect livelihoods of farmers in the region and is the source of conflicts on adaptation options under water availability reduction between farmers, environmentalists, and administrations. Environmentalists and administration actors favour a reduction of rice cultivated areas as an effective adaptation option, while farmers favour a new water infrastructure and farming subsidies. The study by Iglesias et al. combined quantitative models and tools with qualitative input from informed stakeholders in a participatory research setting to assess and identify climate change risk and adaptation options that fed into the local adaptation strategy.

In the semi-arid region of Campo de Cartagena – Mar Menor, which suffers from structural drought and where water shortage has been constant through history, Bernabé-Crespo et al. (2021) find that advancing social awareness is one important element to create a resilient territory in addition to water utility companies improving water use efficiency through new technologies and improved distribution.

The agricultural sector is often characterized by consisting of powerful business interests. Adaptation planning in agriculture has come under scrutiny for favouring the preservation of status-quo over more transformational changes that involve a significant re-structuring of the agricultural system. Zagaria et al. (2021) use agent models under different climate impact scenarios on a case on crop farming in the drought-prone Emilia-Romagna region in Italy to explore how climate change, farmer behaviour and water policies may influence strategic adaptation decision-making at farm level, the extent to which implemented adaptation measures represent transformations and the impact that these have on farm structure and wider socio-ecological change. The findings indicate that when farmers perceive drought to be a higher risk, farmers are more motivated to explore also transformative adaptation options that would require important social and financial investments from farmers.

4.2 What is needed in relation to identifying, assessing, and selecting adaptation options (Steps 3&4)

In general, identification of relevant available options and thorough analysis of their effects ex ante, not least their social effects, clear the way for implemented adaptation options with substantial effects.

As described above, early warning systems are among the most cost-effective and efficient adaptation measures. Consequently, when relevant they should be considered carefully at Step 3. Effective early warning systems are very valuable for the most vulnerable groups but need to be designed carefully so that messages can be easily understood by all, taking into account inter alia, eventually existing language barriers.

No-regrets options and win-win solutions can be attractive options and should be considered at these stages. They possess the advantage that despite climate change uncertainties, these options are potentially beneficial to implement, because they can provide further social, environmental, or economic benefits regardless of the extent to which climate change is accelerating. These types of options are therefore worthwhile to consider. Still, however, the expected cost-effectiveness of these options should be part of the decision-making process too.

Assessing and selecting adaptation options can be a process involving substantial conflicts between social groups. There is a risk that adaptation options primarily benefitting the more silent and less powerful groups in societies are not reaching the agenda and therefore not discussed and assessed, because more vocal and powerful groups are keeping other groups solutions of the agenda and promote their own preferred solutions. In fact, adaptation projects can intensify inequities by concentrating wealth in certain communities and/or by hurting vulnerable members of a society – social and political conflicts are inseparable from the process of climate adaptation (Sovacool et al., 2015). Policy-makers should be aware on this imbalance and act on it, by giving weaker groups a chance to have a voice and importance too.

5 Implementing adaptation (Step 5)

Implementing adaptation plans and measures in a way that addresses existing social vulnerabilities and avoids creating new disproportionate burdens among disadvantaged groups requires a proper framework or action plan which defines responsibilities and forms of collaboration between different sectoral groups of public administrations, governance levels and eventually different levels of implementation (Reckien and Petkova, 2019). Given the complexity of interactions between physical measures for adaptation and their social consequences, such collaboration requires coordination and agreements on how responsibilities for implementation are shared, timeframes for action and use and availability of resources.

Mainstreaming social justice into existing adaptation frameworks can raise the profile of adaptation. Independently from the form such a framework plan takes, its success depends on transparencies, mutual trust, and agreement between different actors to cooperate and its legitimacy will be provided by public consultation and a formal recognition by all participating authorities.

Key Messages. Step 5 – Implementing adaptation

1. Social justice and equity are together increasingly recognized as a policy challenge in national planning for adaptation and resilience, as well as in some local and sectoral contexts,
2. Implementation of measures actively addressing social inequalities in vulnerability and opportunities to benefit from adaptation measures or a comprehensive integration of equity and social justice consideration into adaptation planning and practice are less progressed.
3. Participation and involvement are key for recognizing inequalities and ensuring equity throughout the planning and implementation of adaptation and resilience options. Involvement of disadvantaged groups needs to be prepared and implemented carefully to result in the chance for all groups to provide meaningful contributions and influence the way measures are designed and implemented. During the Expert meeting, this recommendation was confirmed, to be essential for just resilience, but in terms of implementation, participants agreed that this is still not reached very often.
4. Creating synergies and integrations between policy areas and cross-sectoral action have the potential to substantially improve the possibility for just resilience to happen.
5. Strong political leadership and inter-departmental coordination can contribute to engaging local-level participation, increase awareness of hazard risks and improve community and government capacity to identify and implement risk reduction strategies.
6. The need for specific resources is key for implementation and will become a bigger challenge once implications of just resilience become visible.

5.1 Just Resilience in national policies and adaptation plans in a multi-governance framework

5.1.1 National plans and strategies

Several EU Member States (e.g. Germany, Italy, Spain, Czech Republic, Latvia and Hungary) have integrated considerations calling for the respect of principles of justice or consideration of specific social vulnerability aspects in their national adaptation plans or strategies as cross-cutting, strategic goals. Providing such generic

indications has the potential of amplifying the respect of such action in a multi-level framework where implementation at the level closest to the potential end-users and beneficiaries is supported and coordinated by higher administrative levels.

This relatively widespread recognition of the need for addressing social justice in adaptation actions registered in 2021 represents a progress with respect to the situation in 2014, when only six out of 21 national strategies in the EU (Austria, England, Sweden, Finland, Greece and Wales) received a positive score in an assessment of national adaptation plans against a social justice framework, while the remaining 15 countries scored zero (Boeckmann and Zeeb, 2014).

Still, such policy goals for the involvement of vulnerable groups are often identified without indication of specific actions to reach them. Examples include the mention of gender and social vulnerability as a cross cutting issue mentioned in the Spanish national adaptation plan; vulnerable groups in human settlements in the Czech Republic; human life, health, and well-being regardless of gender, age and social background set out as a strategic goal of the national adaptation plan in Latvia; or social adaptation indicated as a priority in the Hungarian National Adaptation Strategy. In order to be transformed into action, the achievements of such goals would need to be connected to measurable dimensions and timeframes. One step towards such operationalization of action could consist, as envisaged in the Hungarian plan, in the collection of relevant data. Box 12 gives an overview of the inclusion of just resilience in adaptation in National Adaptation Plans and Strategies.

Box 12 Just transition in National Adaptation Plans and Strategies

Austria: The effects of climate change are still subject to uncertainty. Consequently, when designing the national adaptation strategy, Austria has a focus on flexible and robust recommendations for actions that can easily be adjusted and/or bring secondary benefits. No-regrets options and win-win solutions have the advantage that despite climate change uncertainties, these options are worthwhile to implement, because they can provide further social, environmental, or economic benefits regardless of the extent to which climate change is accelerating. Austria's adaptation strategy "... aims at strengthening the natural, social and technical capacity to adaptation. Adaptation measures should thus involve no social downsides; rather, they should minimize risks to democracy, health, security, and social justice". It is further stated in the plan that: "Adaptation activities that conflict with other key objectives – such as environmental protection or climate change mitigation – or that disadvantage social groups should also be precluded" (Source: Country Reporting Austria).

Germany: The second Progress Report on the German Adaptation Strategy (DAS), recognizes the concept of just transition in adaptation. It stresses that the national adaptation policy will increasingly address adaptation capacities in different societal groups (low-income and high-income households, gender, age, etc.) and strategically target DAS instruments and measures more specifically to the concrete adaptation needs of the affected groups, thus aiming to contribute to social and environmental justice. (Source: Country Reporting Germany)

Italy: The Climate Change Adaptation Strategy has as one of its general principles to guarantee sustainability and inter-generational equity. In particular, the strategy recommends adaptation measures which do not damage any social group, which have positive effects on health and human well-being, and which promote social cohesion. (Source: Country Reporting, Italy)

Spain: The National Adaptation Plan (PNACC) 2021-2030 defines seven cross cutting issues, of which one is social vulnerability. Two main lines of work are proposed: the assessment of social vulnerability, including the identification of knowledge gaps, and the development of adaptive responses that are appropriate to the levels of vulnerability and socially just, defined as those policies and measures that do not disadvantage certain social groups or increase existing social disparities. The Spanish PNACC furthermore stresses the need to identify and consider so-called 'territorial vulnerability'. This refers to the actual and potential impacts of climate change which are unevenly distributed across the territory as a result of geographical, economic, social, demographic factors, and which must be identified in risk

studies and taken into account in the definition of adaptation measures. The plan also stresses the need to prevent maladaptation, to consider the costs and benefits of adaptive responses – not only economic, but also social and environmental – and to mainstream gender considerations. (Source: Country Reporting Spain)

Latvia: Disaster risk management and civil protection is one of the five strategic goals of the Latvian National Adaptation Plan: 'Human life, health and well-being, regardless of gender, age and social background, are protected from the adverse effects of climate change'. To achieve the goal, there are specific measures planned to address both – human health and well-being, and civil protection. (Source: Country Reporting Latvia)

Kosovo[35]**:** The Climate Change Strategy 2019- 2028 as well as the Action Plan on Climate Change 2019-2021, explicitly call for the improvement of participatory planning approaches to allow for an inclusion of the public and stakeholder input in decision-making. (Source: Country Reporting Kosovo)

In terms of resources available, the growing number of groups vulnerable to climate change is widening the gap between public resources available and those needed. This was noted, e.g., by Slovenia in relation to raising costs of climate related disaster events.

Some EEA member states described more operative adaptation actions addressing social vulnerability, for instance specific support measures for vulnerable persons during and after hazardous events. The most common examples of such programs are related to heat emergency plans, addressed by most EEA member states, or post disaster relief as in Luxembourg. Some further examples for preventive action for social justice are related to programs for urban greening or social housing.

5.1.2 Illustration of interaction between different governance levels - Heat protection plans

Recognition of the importance of addressing equity and justice has not yet translated in widespread action at local level, as made evident by a recent screening of almost 60 local adaptation plans in coastal areas across the globe. Less than a third of these addressed equity and justice in one way or the other (Olazabal and Ruiz De Gopegui, 2021). While local plans for now rarely have addressed just resilience, plans related to the specific health related impacts generated by heat waves provide a good example for interaction between different governance levels and sectors to address social forms of vulnerability in case of heat in cities.

Heat protection plans are examples of early warning systems, which are among the most cost-effective and efficient adaptation measures according to EEA (2020). Several national heat protection plans create a multi-level action plan, which consists of generic guidelines or a framework for action created at national level to be implemented at local level, with local heat management plans defined by local health administrations, and frequently also informed by a national level system for forecasting and early warning. Box 13 provides insights in special efforts made to reach out to vulnerable groups. The European Climate and Health Observatory provides further insights in such action[36].

Box 13 Social aspects of responses to heatwaves

Heatwaves are becoming an increasing threat in Europe, especially in urban areas. Many European countries have implemented heatwave action plans to tackle this problem that include early warning systems to ensure timely alerts which trigger national, regional or city actions; definitions of institutional responsibilities and coordination mechanisms and lists of measures to be deployed (EEA, 2020). The measures usually include providing vulnerable individuals with information about risk and preventive

[35] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence

[36] https://climate-adapt.eea.europa.eu/observatory/evidence/health-effects/heat-and-health/heat-and-health

measures. The most vulnerable groups affected by heatwaves are older people, babies, people in poor health and people with poor social networks (e.g. homeless, people who are substance abusers, ethnic minorities, etc.) (ETC CCA, 2018). In some countries/cities, special efforts are made to reach out and care for these groups that can be seen as best practice examples:

1. The city of Paris in France has created a register of people vulnerable to heat waves, where inhabitants can self-register online or with a free phone call. In addition, pharmacists, medical practitioners, and health care professionals are encouraged to identify people who are particularly vulnerable to high temperatures to make sure they are included in the local registers. People who are on the register receive regular phone check-ups and cooling advice during a heatwave, with a medical professional dispatched to their home if necessary. They may on request also be transported to "cool rooms" which are part of the physical structures offered by local authorities for all inhabitants during extreme heat (ETC CCA, 2018; EEA, 2020). In case registered people cannot be reached after 4 attempts in 48 hours, a special unit takes care of the case and sends a team to the person's home in case of necessity. Furthermore, Paris encourages solidarity networks in neighbourhoods to make sure that neighbours to look after each other during heatwaves.2
2. In the city of Bologna in Italy volunteers and non-governmental organisations provide physical assistance to vulnerable individuals during heatwaves. The services include a toll-free call centre that provides information for citizens, checking up on people at risk and keeping them company, bringing them food and medicines, and accompanying them to cooling centres or hospitals (ETC CCA, 2018).
3. The city of Kassel in Germany has installed a 'heatwave telephone' for volunteers to call elderly people to tell them about health risks during a heatwave and possible ways to avoid the dangers.3
4. The Greek National Adaptation Strategy includes an action to reduce the health-related risks of climate change on vulnerable groups by mapping those groups and by strengthening existing policies providing shelter to the homeless or those on low incomes during extreme weather events (e.g. operation of cooling centres) (ETC CCA, 2018).

The identification of vulnerable groups is of particular importance for the implementation of such measures.

On the wake of the 2003 heat wave with 70,000 fatalities reported throughout Europe, the impact of heat waves on elderly created a focus on specific social determinants of vulnerability to climate impacts and the issue received increasing attention in national and local level health policies (Robine et al., 2008). Subsequent epidemiologic research has produced evidence for socio-demographic aspects influencing excess mortality during heat waves and in several countries, national and local policies have been put in place to prevent heat related deaths among elderly (see, for instance for France, Hémon and Jougla, 2003; Vandentorren et al., 2004; Salagnac, 2007; and outcomes of the EuroHEATproject, e.g. Michelozzi et al., 2009; or Morabito et al., 2017). This increased attention is also reflected in the responses received from NRCs, which in almost all cases report on specific attention and measures put in place to address heat related vulnerabilities among elderly, young children, and triggering the definition of an easy to map vulnerability indicator. Box 14 provides an overview of NRC responses and Country Reporting in relation to national heat plans.

Box 14 National Heat Wave Plans

France: National heat wave plans incorporate specific measures for socially vulnerable groups including detailed divisions of responsibilities across different levels where a national monitoring system triggers alarm levels and coordinated actions by different actors at local level. An example is in Paris where a municipal registry of vulnerable people is used to target particularly vulnerable persons with tailored action. (Source: NRC response)

Italy: A national heat monitoring system triggers, at different alarm levels, predefined action for the major urban areas which include local social and health services as well as the non-profit sector. In some regions, this system is integrated by further monitoring which aims to provide more detailed heat warnings also for smaller urban centres of the region as in the case of the Emilia-Romagna regional

agency for environment protection (ARPAE), which has developed, together with the Regional Health Services (ASL), a proper early warning system for heatwave impact on human health. The warning system is based on high resolution weather forecasts and the evaluation of the human thermal discomfort. Operational tasks are carried out involving health services and non-profit sector (e.g. identification of the most vulnerable individuals, communication and information spreading, emergency room monitoring). (Source: NRC response and urban adaptation report 2020)

Germany: The 3rd German Adaptation Action Plan (2020) aims to protect particularly vulnerable population groups, such as those in need of care or the chronically ill, children and young people, or the elderly, providing funding for the implementation of measures. The Federal Urban Nature Masterplan from 2019 proposes to increase the supply of high-quality green spaces in socially disadvantaged residential areas and to enable residents to actively participate in "their" green and open spaces. Although the Masterplan does not explicitly target climate change adaptation, the measures will contribute to the reduction of heat stress. (Source: NRC response)

Sweden: The Swedish Building and Housing Authority is tasked with granting the funding projects that strengthen urban greenery or ecosystem services in or in connection to neighbourhoods that are socially and economically disadvantaged. The aim is to develop improved and equitable access to urban green. (Source: NRC response)

Austria: A guideline for Heat Action Plans has been created helping medical and care facilities to create their own heat action plans: The guideline is aimed at institutionalised care areas of the most vulnerable population groups and those responsible for hospitals, nursing and care facilities. With recommendations for short- to medium-term and acute measures, it supports organisations in developing and establishing their own heat plans. (Source: Country Reporting Austria)

Such measures related to emergency situations as heat waves entail a prevailing focus on social dimensions of climate adaptation related to physical impacts. This implies that lesser-known social dimensions related to other situations, for instance slow onset climate risks, receive less attention or may even remain unknown or overlooked.

5.2 Just resilience in local implementation

While national plans are important for preparing the ground for local action, implementation of measures takes place at local levels, as for instance in national adaptation plans which indicate precise measures to be implemented for the achievements of strategic goals. For example, Latvia's NAP indicates, under the strategic goal 'Human life, health and well-being', regardless of gender, age and social background, are protected from the adverse effects of climate change' measures like improvement of early warning systems (especially on weather extremes), access to free drinking water in public places, awareness rising among educational and social care institutions, development of recommendations for social care institutions and social workers on health prevention measures during heat waves etc. (Source: country Reporting Latvia). The Romania NAP contains structural and non-structural measures in 5 areas of action: prevention, precaution, preparedness, public awareness, recovery/reconstruction, and 3 categories depending on the level of application: national measures, basin level measures and area level measures which aim at reducing the negative consequences of floods for the safety of citizens, human health, economic activity, environment, and cultural heritage. The same plan provides economic resources for addressing the key social vulnerability of risk of poverty in agriculture by providing compensations for the damages generated by droughts (initial allocation 24.7 million euro). From the data reported by the insurance companies to the Financial Supervision Authority, the value of the gross premiums written in the agricultural sector in Romania was 21.4 million euros in 2017 and 18.9 million euros in 2018. Of the value of these premiums, approximately 12% represented insurance for animals, the difference being insurance for agricultural crops (Source: Country Reporting Romania).

From a sectoral point of view, the social housing sector, which in most countries targets socially disadvantaged parts of the population, represents a specific sector where some form of social vulnerability would need to be addressed. Yet, action in this sector seems to proceed slowly. In the Dutch social housing sector, housing associations rarely have undertaken anticipatory and deliberate adaptation actions, due to limited awareness, financial and regulatory constraints, including the lack of regulatory and procedural agreements regarding obligations for adaptation (Boezeman and de Vries, 2019). Such delays can create future problems for a just resilience development if these types of actors which focus on providing housing for low-income groups do not address climate adaptation. Among the financial barriers, there is also the fact that investments in adaptation would increase costs for social housing, making it less affordable to low-income groups[37].

Local level initiatives have created, in some cases, new mixes of measures which aim at making transformative actions socially just, as shown in three case studies illustrated. In the case of Malmoe, action in a social housing estate implicitly targeted less advantaged groups living in the area, but the strong participative approach used allowed for the extension of the action, originally focusing on outdoor spaces of the housing estate, giving space and promoting bottom-up initiatives by residents which aimed at improving integration and social cohesion. In the case of Paris, the identification of school yards as potential green areas in an extremely dense urban fabric represented a measure which is able to provide benefits both on the physical side, as schoolyards are potential green spaces distributed evenly across the city, and on the social side, as the measure provides benefits to children and their families and can be steered into those areas where vulnerabilities are highest.

In Barcelona, green measures and transformation of public spaces have been accompanied by policy and regulatory measures which actively aim at counteracting some of the side-effects of urban greening measures which increase the attractiveness. Such effects are related to rise in real estate prices which could oblige residents to search for lower rents in less attractive areas of the city, thereby preventing them from benefitting from the improvements and adaptation measures set in place, including regulatory measures, taxes and increases in the share of public housing that would not be subject to such market driven negative side effects of urban greening. The mix of measures set in place in the case of Barcelona is a good example of a holistic intervention which involves different areas of urban policies aiming at achieving the goal of making transformative action more socially just (See Box 17).

Boxes 15-17 provide details of three cases of implementing just resilience in adaptation planning: Malmö, Sweden - greening of the neighbourhood Augustenborg; Paris, France - greening of school yards in socially disadvantaged neighbourhoods to provide more options during heat waves; and Barcelona, Spain – working to counter gentrification effects of greening neighbourhoods.

Box 15 Greening Malmö Augustenborg – a case on procedural justice

The transformation of Augustenborg, a social housing estate, started in 1998. Triggering from a project for an innovation hub in the area, a more comprehensive transformation of the outdoor spaces of the area has been planned in collaboration between the city, the housing agency owning the areas and inhabitants. It has led to the greening of outdoor spaces according to SUDS, principles redesign of traffic areas, courtyards and renovation of facades, while building structures have been transformed only regarding some minor energy efficiency measures. The transformation process was based on intense participative work, vision building, engagement and co-design with inhabitants, and on intense cross-sectoral collaboration from the side of the local administration. Social services were organized on initiative of residents, and implementation of all actions was based on intense participation actions. The character of social housing of the neighbourhood prevented rents from rising, and the neighbourhood has actually still one of the lowest rent levels in the city. The strong participative element has allowed residents to steer transformations and to co-create (in collaboration with municipal services) specific community services (spaces for community activities, spaces for children and day care) as well as services

[37] See also the project HeatResilientCity II (http://heatresilientcity.de, in German)

promoting the inclusion of immigrants, who represented a high share among the inhabitants(Graham, 2021).

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Box 16 Greening school yards in Paris to counter heat wave impacts in socially vulnerable communities – a case of distributive justice

After the devastating heatwaves in the last decades and considering projections that predict the increasing frequency and duration of heatwaves in the future, the city of Paris embarked on developing a range of initiatives to address this threat recognising that different social groups and different areas of the city have unequal vulnerabilities. One of these initiatives is the "OASIS- Openness, Adaptation, Sensitisation, Innovation and Social Ties" schoolyard greening programme that transforms schoolyards in Paris into green oases accessible to both the school pupils and local communities. This way, a cool place for most of the vulnerable groups to heatwaves is provided namely the children, but also the elderly, people in poor health or mothers with babies.

The objectives of the OASIS schoolyard project were to: (a) reduce the local heat island effect; (b) provide pupils with a healthy and stimulating learning environment; (c) educate residents to risk culture on climate change; (d) provide "cool islands" available to the most vulnerable populations and (e) create numerous meeting spaces to encourage conviviality and solidarity. The City of Paris applied to receive funding from the ERDF – Urban Innovative Actions Initiative (UIA) to form an interdisciplinary consortium and thus ensure the feasibility, applicability and effectiveness of the envisioned OASIS approach. Within the frame of the UIA-OASIS project a few pilot schoolyards (four kindergartens, four elementary schools and two middle schools) were selected and transformed into green schoolyards through innovative techniques including nature-based solutions. The initial selection of these schoolyards was based on multiple factors including social, environmental and the schoolyards' technical conditions. More specifically, certain social criteria were prioritized to make sure that schools are also located in areas with e.g. low income or high percentage of refugees. One of the most important factors for the selection was that schoolyards must be directly accessible from the street to allow for an opening to the vulnerable public as "cool island" in a later stage.

The pilot schoolyards were transformed in greener spaces through a co-design process with extensive stakeholder engagement. Six tailored "Awareness raising and co-design workshops with students" were conducted in each school allowing children to work on suggestions for their schoolyards. Based on the children's work, workshops with teachers, school and after-school staff were performed with the scope of further developing the transformation project and defining a work plan. The departments of the City of Paris in charge of the OASIS programme were then invited to each school for at least three working sessions with the aim to finalise the project seeking a compromise between the schools wishes and the technical constraints. Following these working sessions, detailed project plans were developed in close collaboration with the UIA-OASIS project's local partner, responsible for the design phase. For the purposes of the transformation of the schoolyards, the City of Paris achieved a cross-department

collaboration were the Department of Environment, The Department of Health and sanitation as well as the Department of Education worked together to feed the project throughout the procedure. This engagement process gives ownership to those that know and use these places the most, while educating them and spreading awareness on matters of sustainability and environmental mindfulness. Local residents were invited to contribute to the coordination of after-school activities and to the maintenance of the new, communal spaces.

Thanks to the innovative approach and initial success with the pilot projects, a set of recommendations and plans have been produced for other schoolyards. The city of Paris is committed to develop a standardised adaptable methodology for transforming asphalt-covered schoolyards into green spaces for everyone with the aim to expand the OASIS schoolyard programme across the city. In the future, the OASIS schoolyards are planned to be opened as "cool islands" to the public that can be accessed by vulnerable groups. Such places are especially important during the summer heatwaves. Today, the City of Paris has combined the UIA-OASIS project with another innovative initiative, the "15 minutes City", a new concept that foresees that most daily necessities should be reachable in a 15 min walking or cycling distance from residents' homes. Currently, this joint effort has led to the opening access to almost 50 schoolyards after-school hours and local families and residents of all ages are welcome to participate in the activities or simply enjoy the newly transformed green schoolyard.

Sources of Information:

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Box 17 Overcoming Gentrification triggered by urban greening in Barcelona

Urban greening has many benefits: clean air, more social interaction with neighbours, more biodiversity. Cities that are investing in urban greening are generally considered to be more attractive. However, green gentrification is a potential risk that may lead to lower-income households being evicted from their neighbourhoods. This phenomenon is taking place in Barcelona, as for instance in the Sant Marti district. There, the Barcelona lab for Urban Environmental Justice and Sustainability found that around a new local park, the number of high educated people has increased with 28%. Gentrification as a consequence of new parks is also taking place in other parts of the city. Furthermore, the sustainable mobility projects like Superblock and Superilles also risk to affect housing affordability of low-income classes.

In an effort to counteract gentrification in general and more specifically due to the introduction of urban green, the mayor of Barcelona has implemented several measures. Barcelona has signed the declaration for adequate housing and the mayor is campaigning at the EU level for a three-pronged approach to fight gentrification:

1. To make it less lucrative to buy property, for instance by new taxes, in combination with a ban on the EU countries' 'golden visas programmes' and a fund for urban regeneration, or other measures to halt rising property
2. A coordinated strategy to lower rental prices to avoid social exclusion
3. Changing the rules of politics for more gender equality

Furthermore, the City of Barcelona has introduced the mechanism to allocate 30% of new housing or renovations to social housing, meaning between 300 and 400 affordable homes each year. In addition, there is the extension of the right of withdrawal and appraisal to the entire city to give preference to all transactions of sale and purchase to the City Council. Furthermore, the City has the possibility to adjust property taxes for low-income households in areas where prices are increasing, to reduce the financial pressure and to prevent gentrification. Another measure is the rent index that is implemented by the regional government to avoid unfair rent increases. The city council is also preventing gentrification by regulating tourist accommodation licenses to avoid illegal activities that affect neighbourhood rent prices, which is part of the Special Tourist Accommodation Plan (PEAUT). In the Superblocks, like St Antonio, the city government regulated the licences of the new shops to avoid monoculture.

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Interviews with Irma Ventayol i Ceferino, (Ajuntament de Barcelona), Amalia Calderón-Argelich and Ana Terra Amorim Maia (Universitat Autònoma de Barcelona)

5.3 Participation and social inclusion

Addressing equity and social vulnerability requires widening the focus from biophysical aspects of exposure and sensitivity and addressing sensitivity and adaptive capacity of the population. Lioubimtseva and da Cunha (2020) find from a comparison between climate plans in the US and in France, that the plans with the best overall scores were developed with active participation and engagement of stakeholders, but they observe also that the majority of plans fails to consciously include "social and environmental justice and equity considerations in assessments of human vulnerability" in the planning process (Lioubimtseva and da Cunha, 2020, p. 15), while from an analysis of comprehensive plans in Michigan (US), Loh and Kim (Loh and Kim, 2021) find that, from a quantitative point of view, plans with strong participation processes had stronger equity orientation. While participation help conveying contextual knowledge, inter alia on specific local vulnerabilities, into the planning process and can increase the public consensus and thus improve possibilities of implementation (Shi et al., 2016; Brunner, 2008; Innes and Booher, 2004).

Participation of disadvantaged groups in planning and in the implementation of adaptation actions is crucial and should lead to better output and can, if well managed, increase the degree of transformation (Cattino and Reckien, 2021) Creating agreements among all stakeholders on the action creates legitimacy for the actions undertaken, ensuring engagement of all. Yet, there is also a risk that despite engagement processes, vulnerable groups can be worse off, due to the adaptation measures, as in the context of greening policies (as for instance in Amsterdam, see Planas Carbonell, 2021). This fact was also underlined during the expert meeting. There is also some evidence that participation may prevent the implementation of transformative approaches (Cattino and Reckien, 2021). D'Alisa and Kallis (2016) for example describe a case in Italy where participation has enforced a techno-managerial approach to post-disaster rebuilding to reconstruction using

heavy grey protection measures for one settlement rather than a wider approach based on relocation and holistic risk prevention approaches.

Regarding procedural aspects of just resilience, local level engagement/participation in planning and managing climate hazards is important in ensuring that no one is left behind and deserves particular attention and capacities, as stakeholder engagement does not automatically guarantee effective and fair adaption outcomes. As those most affected by climate change are likely to be the already disadvantaged groups, the explicit recognition of climate change as matter of social justice could help address power inequalities in communities.

Yet, participation and stakeholder engagement are often treated in a relatively unproblematic way, without ascertaining how participation processes are entrenched in existing relationships or exploring the potential for transformative change which would address climate vulnerability and equality (Archer and Dodman, 2015). Stakeholder involvement processes often fail to consider diversity and power issues within communities, nor do they investigate how these diversities affect the possibility of people to engage in participatory spaces in egalitarian forms (Fernandes-Jesus et al., 2017, p. 1557). The challenges connected with the need for specifically addressing diversity and national representatives in the dedicated NRC meeting in 2021 have acknowledged asymmetry of power.

Kosovo's[38] Action Plan on Climate Change 2019-2021 explicitly points out the challenges that need to be addressed for increasing procedural justice in the context of community participation, for instance, finding ways to include and empower disadvantaged groups:

"There is a risk that participatory approaches may reflect existing inequalities. The more powerful stakeholders may either dominate participatory deliberations or not participate at all"

Such boycotting would indeed delegitimize the whole participation process. A further risk deriving from existing asymmetries of power indicated in the Kosovo Action plan is that most people do not 'own' any land and/or water. An interpretation of the role of stakeholders limited to those who are able to contribute to adaptation by managing differently their properties would exclude those who have a "stake" in the adaptation process because they are at risk of suffering disproportionally from adaptation actions or are particularly vulnerable.

The National Adaptation Strategy of Kosovo states that ways to include and empower these people are often hard to negotiate, especially when there are social or cultural barriers. An equal challenge is how to get the participation of those who are not directly benefitting from the measures but who may be vulnerable to the impacts of climate change. Hence, the NAS recommends involving a wide representation of stakeholders during implementation of the strategy, including those directly, but also indirectly, benefiting from the proposed strategy" (NAS Kosovo, 2018, p. 42).

Power struggles between stakeholders, combined with path dependencies created by previous decisions and a lack of efficient coordination rules may, for instance, lead to the weaker stakeholders losing out in the implementation of adaptation options, as was found in a case on adaptation implementation in the Languedoc coastline in France (Therville et al., 2019). Similarly, transition initiatives in Portugal, which focus on community level engagement as a solution to addressing climate impacts, seem to neither actively consider diversity and power issues within communities nor affect the possibility of people to engage in participatory spaces in egalitarian forms (Fernandes-Jesus et al., 2017).

If well planned, for example, with focused campaigns towards populations with a low potential for self-organised neighbourhood assistance, participation can be more effective compared to participation targeting the entire population, as has been shown in an analysis from the Northern Hessen region, Germany (Krebs et al., 2013) and underlined by several national representatives during a dedicated NRC meeting held in 2021. Experiences from Portugal show that strong political leadership and inter-departmental coordination can

[38] This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence

contribute to engaging local-level participation in disaster risk reduction, further to increasing awareness of hazard risks amongst specific demographic groups and improved community and government capacity to identify and implement risk reduction strategies (Burnside-Lawry & Carvalho (2016). On the other side, also good participation in plans does not automatically ensure a high capacity of the plan to address also social aspects of vulnerability (Lioubimtseva and da Cunha, 2020).

The expert workshop with representatives from European local authorities and research institutions, organised to inform the EEA/ETC (2018) paper, resulted in **recommendations for action to support local policies** in addressing social vulnerability and just adaptation processes. Similar recommendations have been formulated also by Cattino and Reckien (2021). The needs for future actions identified during the workshop focused generally on enabling activities that could be implemented at various levels to support and promote local action. For example, at the local level, these include increasing the capacity of staff to enable potential champions to promote innovative and ambitious action and encouraging integrated and holistic approaches that involve different departments, agencies, and vulnerable groups to participate in the design of adaptation policies and actions; and consideration of innovative funding mechanisms for socially just adaptation actions such as through local taxes and crowdfunding.

6 Monitoring and evaluating adaptation (Step 6)

Setting up a monitoring and evaluation (M&E) method requires a combination of robust indicators, knowledge management and active and sustained engagement of stakeholders, such as the public and private sectors and civil society. All stakeholders with a role and responsibility for implementation need to be part of the M&E process. Involvement of concerned stakeholders early on in the process will ensure continuous monitoring of the adaptation activities throughout the implementation phase. Among the key factors to consider when preparing for monitoring and evaluation is communicating and agreeing on the purpose for monitoring and evaluating. It is important to take the motives for M&E efforts into account and to communicate them to all involved, e.g., to account for public funds, to learn what works (or not) and why; to track progress; to ensure equity and social justice, etc.

Key Messages. Step 6 – Monitoring and evaluating adaptation

1. There is a need to monitor the social impact of adaptation actions and its distribution over different population groups to ensure that these actions do not worsen or create new inequalities or unintended effects.
2. Adjustment of existing indicators and datasets from different policy contexts is challenging due to the difficulty of defining what is socially just and fair considering all social settings.
3. For a just resilience monitoring framework, it is important to clarify the policy goals for which progress should be monitored, to track progress over time, to ensure the involvement of target groups and identify indicators in a participatory way.

6.1 Towards a monitoring framework for just resilience

There is a need to monitor the social impact of adaptation actions and its distribution over different population groups to ensure that adaptation actions and policies do not worsen or create new inequalities or unintended effects. This includes monitoring social outcomes of adaptation actions over time (ETC CCA, 2018). The main approaches use either data driven (top-down) analysis of socio-economic and spatial information, or participative (bottom–up) investigations of local specific contexts, or a combination of the two. However, no methodological 'best practice' has been established for the assessment and mapping of social vulnerability to climate-related events (ETC CCA, 2018).

Just resilience is a key policy goal as part of the EU Adaptation Strategy and will therefore require an appropriate set of indicators to monitor progress in achieving this policy goal. Indicators form a helpful tool to evaluate policy and measures and may be used as a basis for decision-making to adjust policy and measures when needed. So far, there is not yet a comprehensive monitoring framework for just resilience. To build a just resilience monitoring framework over the next years, existing indices and databases may be used as a starting point and adjusted to measure just resilience to enable the interpretation of existing data and indicators according to the needs of monitoring both how climate change impacts affect different population groups and ii) whether adaptation responses planned or implemented either cause social bias or even lead to negative effects for vulnerable groups. This comes with some challenges that are specifically related to the concept of justice, as mentioned by Heyen et al. (2020):

- Justice is a general term that must be made specific to be measured.
- Justice is hard to define as different people consider different things as just and fair; this makes it hard to agree a set of indicators to monitor just resilience.

In addition, there are several practical challenges in the development and application of just resilience indicators:

- Climate impacts and adaptation measures each have diverse distributional effects on the population and it will be rather difficult to build one monitoring framework that will work for all hazards and all types of adaptation measures, as is also highlighted by Heyen et al. (2020). Their suggestion is to monitor just resilience by combining indicators from different issue domains, and analyse in-depth the separate indicators as well. A related challenge is that Regional Climate Models (RCMs) can have diverse climate change effects for the same geographical area, which means that the full range of impacts should be considered when monitoring just resilience, rather than relying on the mean (Mysiak et al., 2018). In other words, distributional effects may differ among the used RCMs, resulting in different monitoring results as well.
- Challenges related to existing indicators and databases include the lack of disaggregation on the level of socio-economic/demographic groups. Many indicators measure social effects on the population as a whole, but just resilience aims to measure the effect among groups within the population. Disaggregated indicators and datasets are needed.
- When indices compare the evolution over time, there is also the limitation that the datasets have changed over time and the results are not comparable. Furthermore, given that Europe might aim to compare between different countries, there will be challenges to foster the comparison between country results (Kaufmann et al., 2016)
- The selection of indicators and related aggregation methods has an impact on the outcome of the process, as many articles have shown that a slightly different selection of indicators or different aggregation methods may result in different monitoring and ranking results (Marzi et al., 2019; Mysiak et al., 2018).

6.1.1 Potential indicators

When designing indicators, different approaches can be pursued depending on the main driver - policy, science, data, and process. Oftentimes, we look into existing indicators and datasets that serve as a basis of modification and adjustment towards the specific policy context. Reviewed literature points out to several indices related to climate or weather impacts that have been developed by the disaster resilience community, which may provide a useful basis for designing just resilience indicators:

- **Disaster resilience indices** can be constructed in many ways. In the scope of just resilience, we mainly rely on place-based disaster resilience indices that include indicators on social vulnerability and on coping capacity, preferably at the local level, as for instance prepared by Marzi et al. (2019) to analyse disaster resilience in Italy; or Rosendo et al. (2015) for semi-arid regions of Brazil. These indices are able to capture different characteristics of individuals and social groups with respect to resilience.
- **Heat and energy poverty indices** assess the population exposure and vulnerability to high summer temperatures by exploring the geospatial connection between the urban heat island intensity, housing energy efficiency and overheating risk, and social vulnerability indicators (Sánchez-Guevara et al., 2019). Their relevance in this context lies in their capacity to reveal equity and unequal burdens from impacts from high and low temperatures. The index also includes ‘energy poverty’, which indicates social inequality. Energy poverty refers to lower-income households in a home which cannot be kept warm at reasonable cost (Sánchez-Guevara et al., 2019).
- More generic indices like the **socio-economic climate vulnerability index** developed by Zsolt Farkas et al. (2017) combine the economic and social sensitivity, adaptation and exposure indices and relate to different climate impacts.
- In the agricultural sector, **Economic losses indices** assess the potential economic loss related to water scarcity under different patterns of allocation of water within a river basin and provides a monetary measure of equity between farmers. They measure the relation between losses in the demand over the potential maximum loss. This benchmarking of actual loss against maximum potential loss can be

an inspiration to add to the just resilience indicator set, since it may assess the justice at the system level.

While these indices relate to exposure and sensitivity of individuals or groups, indices on societal processes related to or addressing social inequalities may also provide a useful starting point. These include:

- The "Transitions Performance **Index**" (TPI) is a composite indicator to measure sustainability transitions in countries. It is a scoreboard that ranks 72 countries on their transition(s) to sustainability, based on indicators (mainly SDG indicators) in four dimensions: a) economic (education, wealth, labour productivity, R&D intensity, industrial base), b) social (health life, work & inclusion, free or non-remunerated time, equality), c) environmental (greenhouse gas emissions reductions, biodiversity, resource productivity, energy productivity), and d) governance (fundamental rights, security, transparency, sound public finances).
- The "**Leave-No-One-Behind** (LNOB) Index" targets inclusiveness and social equity within larger societies, summarising indicators related to four dimensions: a) extreme poverty and material deprivation; b) income inequality; c) access to and quality of services; d) gender inequality.
- The **quality of life** indices examine the status of human well-being at different spatial scales. They use the ''human wellbeing'' framework to analyse vulnerability. The socio-economic and ecological impacts of urban growth indeed have the potential to influence the quality of life of social groups and specific communities making them more vulnerable (unable to anticipate and to respond) to climate disturbances in the future. The quality of life indicator includes parameters for spatial and urban qualities as land-use and natural environment conditions, job opportunities across economic sectors, urban socio-economic environment, structure of households and lifestyles and availability and accessibility of services (Kuentz-Simonet et al., 2017).

Reflecting on this initial scan of potential indicators for the development of a monitoring framework on just resilience, the following observations can be made. First, the focus of the indicators spans from the level of individuals (in particular related to their adaptive capacities with respect to climate impacts) to societies and their capacities to create equal conditions and well-being for all citizens. Furthermore, many of them are developed for the context and goal of specific research (e.g. Mysiak et al., 2018; Marzi et al., 2019; Escriva-Bou et al., 2017). That means that for a just resilience monitoring framework, it is important to clarify the policy goals (at the respective policy level) for which progress should be monitored (Heyen et al., 2020). To track progress over time, a fixed set of data should be updated on a regular basis. In addition, target groups of just resilience should be represented in the development of the indicators to be relevant and appropriate and to adjust adaptation strategies according to the results. Finally, many of these indicators seem to be designed 'behind the desk', while Heyen et al. (2020) recommend identifying indicators in a participatory way, via discussions and preparations.

In order to address many of the challenges related to measuring and monitoring just resilience and advance the discussion and practical implementation, in 2022, the EEA's European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA) will develop a technical paper on measuring progress towards just resilience. It will include a collection and review of literature on potential indicators for just resilience, including similar work on indicators for the just transition in mitigation, collect good practices and conduct interviews with practitioners at the forefront of this field. Furthermore, according to the draft Implementation Plan of the EU Mission on Adaptation to Climate Change[39], the MRE mechanism of the Mission will include an observatory embedded in the Climate ADAPT as an operational framework for measuring just resilience and a set of (proxy) indicators measuring outcomes, outputs and impacts will be developed.

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https://ec.europa.eu/info/sites/default/files/research_and_innovation/funding/documents/climat_mission_implementation_plan_final_for_publication.pdf

7 What is needed to make just resilience happen?

7.1 Key findings from literature and practical analysis

There is an emerging awareness at policy level that vulnerabilities and capacities to benefit from adaptation measures are not distributed in an equal manner in society. The need for specific action to increase capacities is mentioned in several national policy documents as well as several national adaptation plans and strategies; this can be taken as a positive sign. Yet the path from this generic understanding towards comprehensive integration of equity and social justice considerations into the practice of adaptation appears, according to our findings, to still be quite long as very few projects that aim at actively addressing social justice have been encountered as part of this study.

Socially just adaptation requires that social vulnerability and related factors are well understood so that adaptation measures ensure that all communities and individuals are effectively protected from the negative consequences of climate impacts and that they are not negatively affected by these adaptation measures.

Social vulnerability is already addressed quite frequently in relation to emergency events and specific physical impacts like heat waves where vulnerabilities are defined by demographic characteristics. Beyond these physical characteristics, vulnerability is perceived, in most illustrated cases in this report, as a problem of socio-economic disadvantages related to impacts and as a problem of distributional justice (see for example the measures set in place by the Romania NAP to prevent poverty in agriculture) and in the case of (slow-onset) impacts from sea level rise.

Most assessments addressing social drivers of vulnerability encountered in the literature analysed are related to climate impacts and related hazards as increasing temperatures and temperature extremes, droughts and desertification, sea level rise and storm surges, flooding and erosion. These climate impacts are expected to have particularly uneven distributive impacts. Potentially disadvantaged groups identified in relation to these impacts include persons with reduced mobility or physical capacities like elderly and the young, pregnant women and children, but also members of groups lacking social or economic resources like people living isolated or low-income groups, the homeless, and those depending on particular livelihoods like indigenous people, farmers or residents in coastal areas.

Some scholars highlight, as discussed during the meeting of the Expert Group on Just Resilience, that the concept of just transition needs to be based on a wider concept of resilience, which takes into account also non-climate related stressors and the creation of a “crisis continuum” which reduces the capacity of individuals and groups to recognize risks. As a response, Hillier and Castillo (2013) ask for people-centred approaches which are more frequently practiced in developing countries. These people-centred approaches require creating capacities and strategies, which act at individual and community level to respond to the combination of idiosyncratic and covariate shocks.

Understanding of what is “just” or “fair” can indeed change with the geographical (or temporal) boundaries considered. As such, a strategy for just resilience may appear just when considered in the local context, while measures to be implemented can create inequities outside this context in neighbouring countries and globally, or can compromise the well-being of future generations.

Strong political leadership and inter-departmental coordination is key for improving community and government capacity to identify and implement risk reduction strategies. Coordination between different administrative departments and administrations should take place both horizontally and vertically. Also, the availability of specific resources is key for implementation of measures, in particular once implications of just resilience become more visible. The inclusion of social services and community well-being departments is essential in adaptation planning.

Participation is seen in many contexts as one of the key practices for ensuring just resilience from a procedural point of view, but it needs to be remembered that participation does not automatically ensure that procedural justice is granted, (Lioubimtseva and da Cunha, 2020). The way how and for whom participation is

implemented is key: it needs to ensure that the most vulnerable groups are included and helped to understand the issues at stake and are supported to bring in their knowledge to the identification of the best solution. Involvement of disadvantaged groups needs to be meaningful in the sense that it considers and addresses different capacities and power structures, which determine access to and active participation in these processes. In this context, in particular recognizing the intersectional aspects of justice is of high relevance, as social categorisations such as race, class, and gender create multiple overlapping and interdependent systems of discrimination or disadvantage, which result in a lack of recognition of particular needs and representation in decision making processes. Furthermore, it is important to be aware that powerful and well-off groups will likely also fight for gaining as many benefits of climate adaptation projects as possible.

Data availability appears as a key necessity for both identification and mapping of vulnerable groups and for providing meaningful data for monitoring implementation and impacts of measures. Adjustment of existing indicators and datasets from different policy contexts is challenging due to the difficulty of defining what is socially just and fair considering all social settings.

For a just resilience monitoring framework, it is important to clarify the policy goals for which progress should be monitored, to track progress over time, to ensure the involvement of target groups and identify indicators in a participatory way.

7.2 Barriers and enabling conditions for just resilience

While there is advanced research on climate hazards (e.g., high temperatures and flooding) and how they affect people and assets, there is less detailed evidence and knowledge about the social factors (e.g., network, age, and resources) that drive individual or communities' vulnerability to climate change, and there is, as a consequence, less guidance available to support, for instance, cities in taking them through the key steps for assessing and addressing social vulnerability (identifying, locating and involving socially vulnerable groups).

Also, there is a lack of specific harmonised methods for the identification of vulnerable groups, which is partly due to an incomplete understanding of drivers of vulnerability, but also to the aforementioned scarcity of detailed and spatially explicit data. As a consequence, there is also a need for a consolidated approach to the definition of indicators for monitoring the social outcomes of adaptation actions over time. Detailed support for policy makers and local authorities in the development of assessments of local vulnerability and the design of socially just adaptation policies should be integrated into existing guidance tools for urban climate change adaptation. In addition, sharing knowledge and experiences between cities that wish to address social vulnerability in the future should be facilitated.

Integrated modelling approaches are used, for instance, in agriculture. They can support the understanding of complex and systemic consequences of future changes and inform strategic adaptation decision-making. Zagaria et al. (2021) use agent models under different climate impact scenarios on a case on crop farming in the drought-prone Emilia-Romagna region in Italy to explore how the nexus between climate change, farmer behaviour and water policies may influence strategic decision making for adaptation. More such knowledge on how vulnerable groups - and segments within these groups - behave in response to climate risks is needed. Furthermore, as Sovacool et al. (2015) suggest that assessments of stakeholder interests and power relations in climate adaptation processes could shed a light on some of those barriers that vulnerable groups are facing, improving the assessment, decision making and implementation of climate adaptation measures.

Furthermore, there is scope for strengthening interdisciplinary approaches, which are proven to be more effective in implementing comprehensive approaches that are able to tackle socio economic drivers of vulnerability alongside with climate related measures. The same holds for multi-governance approaches to adaptation across governance levels – horizontally and vertically - and across borders, to tackle spill over effects of climate impacts as well as of adaptation measures. For instance, via strengthening the collaboration in transnational regions (which is not very strongly developed at the moment).

Addressing just resilience in a comprehensive and systemic way calls for a solid institutional basis, and procedures for intersectoral collaboration, which should be strengthened by building capacity, good

governance, promotion of appropriate policies, facilitating the flow of information, adoption of effective coordination mechanisms, and appropriate education. All these elements can contribute to the effectiveness of municipal adaptation actions. (CR Bulgaria).

Although distributive aspects are one of the major concerns of just resilience, the availability of funds is rarely mentioned, while it represents a potentially major obstacle – including the implementation of more just procedures for decision making and implementation.

7.3 Actionable recommendations

This technical paper describes the conceptual basis of just resilience and explores its practical implication in the context of the usual adaptation planning and implementation cycle. Based on this and supported by a number of practical examples across Europe, the following recommendations can serve policymakers, adaptation planners and practitioners to integrate just resilience into the adaptation cycle.

Preparing the ground for adaptation (Step 1) requires introducing the key elements for building the foundation for a successful adaptation process:

- Both policymakers and practitioners need to be aware of and recognise the concept of just transition/social justice in adaptation, including its distributive and procedural dimensions both in regards to climate impacts and adaptation response, to ensure that it adequately informs adaptation actions. They should discuss and agree on how they interpret justice and what the final goals of justice should be.
- In addition, socially just adaptation considerations should be integrated into existing instruments and guidance tools for climate change adaptation.
- Dedicated coordination structures or other mechanisms should be set up to ensure that all affected people and communities are equally represented and empowered in the decision-making processes and there is an inclusive and enabling participatory process.

In carrying out the **assessment of climate change risks and vulnerabilities (Step 2),** the following should be taken into account:

- Identifying all the vulnerable/disadvantaged groups likely to be affected by climate change impacts, including focus on future generations and those who might not be vulnerable yet, but are on the path to become so in the future with increasing climate change impacts.
- Identifying the pre-existing inequalities and root causes of vulnerability to avoid enhancing existing or creating new future inequalities and prevent inadvertent adverse effects from adaptation actions.
- Gaining knowledge on how these (sub) groups make decisions - or not - on adaptive actions as a response to climate changes
- Mapping and assessing transboundary climate risks and vulnerabilities and monitoring whether adaptation measures lead to systemic and cascading cross-border effects with social dimensions over time.

When **identifying, assessing, and selecting adaptation options (Steps 3 and 4)** it is important to weight the options through the lens of just resilience by:

- Assessing whether new risks or vulnerabilities are created for some people, communities and places, i.e. adaptation responses should not constitute a mere risk of redistribution but address the root impacts.
- Assessing the costs and benefits of options with due consideration whether there are externalities imposed on certain people or communities, to ensure that both benefits and burdens are distributed more or less equally across different societal groups.
- Avoiding adaptation options that are high jacked by powerful and well-off groups to increase their own benefits.
- Avoiding options that offer short-term benefits but cause vulnerability in the long run; instead, prioritizing no-regret options and win-win solutions that bring in social, environmental, or economic benefits, even though they may come at a higher cost.

- Engage with social policy decision-makers when designing and selecting adaptation measures, as only concerted social and adaptation action can achieve their respective goals due to the closely intertwined climate-social feedback loops. Just like social aspects need to be integrated in adaptation policies and plans, climate change and adaptation considerations need to be integral to social policy rollouts.

The effective **implementation of adaptation actions (Step 5)** is to a great extent dependent on the preceding steps, but can particularly benefit from:

- Extensive sharing of knowledge and exchange of experiences at various levels on how to address social vulnerability and achieve just resilience.
- Rethinking of the participation of vulnerable and disadvantaged groups in the planning processes to consider diversity, power issues, legitimacy in decision-making when implementing adaptation actions.
- Breaking down of sectoral silos. A more holistic implementation process to avoid detrimental social effects
- Behavioural analyses on how vulnerable groups respond to climate change risks
- More comparative case studies on climate adaptation to understand more about geographical and temporal boundaries.
- Ongoing monitoring of the adaptation measures being implemented and their impacts, including on social aspects for an early recognition and elimination of unintended adverse social effects.
- Awareness about co-benefits and potential trade-offs of measures and actions planned in relation to mitigation policies as well as to other policy actions undertaken.

There is a need to **monitor and evaluate adaptation actions (Step 6)** to ensure that they do not worsen or create new inequalities or unintended effects by:

- Designing monitoring indicators via a participatory and inclusive process to enable all affected groups and communities to have a say to ensure equitable treatment and sharing of the benefits and burdens over time.
- Existing monitoring indicators and datasets may be a useful starting point, but they will require substantive modification to reflect the consensus on defining what is socially just and fair for different social settings.
- Use the social evaluation of implemented adaptation measures to inform future adaptation action plans striving to improve the outcomes for all and to truly leave no-one behind.

7.4 Identification of knowledge gaps/directions for future research

Our analysis of the various information sources indicates that there is a widespread call for more and better operational knowledge to support the implementation of local and regional adaptation measures and to develop adaptation measures that are as effective and as closely tailored to target groups as possible. Identified research needs to include, among other things, provide knowledge on how the necessary socio-ecological transformation of society and the economy can be brought forward in a just way and which sectors and actions require particular attention. Austria recommends research to continue focussing on specific impacts, vulnerabilities, and risks in affected sectors where specific socio-economic vulnerabilities are relevant and provide indications for implementation (Source: Country reporting).

Crosscutting research is required that is relevant to preventing or avoiding many of the potential health impacts of climate change including the identification of susceptible, vulnerable, and displaced populations; enhancing and adapting public health and health care infrastructure; developing capacities and skills in modelling and prediction; and improving risk communication and public health education – as called for by Bulgaria in their Country Reporting. Such research should lead to more effective early warning systems and greater public awareness of an individual's or community's health risk from climate change, which should translate into more successful mitigation and adaptation strategies.

During an EIONET meeting with national representatives held in June 2021, some additional requests have been articulated:

- There is a need for a definition to help understanding the difference or overlap between just resilience and social vulnerabilities,
- Strategies for overcoming the paucity of data: identify which data is needed and how existing data could help identifying and mapping vulnerable groups and addressing the burden from climate change and adaptation measures on the background of overall social impacts.
- A further challenge is related to the difficulties in reaching out to vulnerable groups and involving them in a meaningful manner,
- There is lack of experience in integrating just resilience into policies
- There is a need to better recognize links between just resilience and just transition (oral communication).

Also, according to most members of the Expert Group on Just Resilience (see Annexes A and C), indicators for mapping and analysis of existing vulnerabilities, and for monitoring, reporting, and evaluating progress in implementing just resilience, should be a further area for research, including avoiding unjust division of burdens. Ideally, this includes ways of integrating such top-down forms of analysis with local and place-based forms of bottom-up and inclusive investigations into locally specific forms of vulnerability.

For the time being, the importance of just resilience has been recognized only in some areas covered by scientific literature and sometimes on an anecdotal basis. A systematic check of sectors, where just resilience would be most relevant would still be needed, alongside with a coherent set of indicators for assessing this relevance.

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Annexes

Annex A. Details on the methodology

This Annex contains further details on the five sources of information for the technical paper, defined in Chapter 1.

Literature review

The review of scientific literature on social impacts of adaptation and resilience consists of a rapid review of relevant papers, retrieved in a key-word based search in three major scientific databases - Scopus, Web of Science and PubMed - using a common search string with pre-defined search terms. This search yielded 540 unique articles. The articles were screened for relevance and inclusion in the analysis in two steps – first title and then abstract screening, which resulted in a total of 153 relevant articles. This list of articles was then screened for their relevance for the research questions "Does it deal with climate adaptation, does it address social inequalities in exposure to climate change or in capacities to deal with such impacts, or in benefitting from adaptation measures?".

Keywords

The keywords for the literature search represent the core themes that set the boundaries of the study.

A brainstorming of keywords was carried out among the research team for each theme. The final set of keywords is presented in the table below:

Theme	Keywords	Notes (after key-word testing)
Adaptation/resilience context	Resilience, adaptation, Climate (change), global warming	
Justice	Justice, equity, equitability, fairness, just, equality, equitable, fair, equal	Due to generic/broad usage in literature, cannot use: "just, just*" -> Use "justice" and ("just" PRE/3 "adaptation") ("just" PRE/3 "resilience") ("just" PRE/3 "transition") "equal, equal* -> use "equality" "fair"-> use "fairness" Also, add exclusion function for phrase "equity finance"
Social dimension	Social, social dimension,	The use of term "social" problematic as it generates high number of irrelevant results due to the broad use of the term -> add exclusion function for popular, but irrelavnat phrases: "social scienc*","social *benefit*" "social service*"
Vulnerability/capacity	vulnerability, sensitivity, exposure, adaptive capacity, adaptive response	Due to generic/broad usage in literature, cannot use: "sensitivity" and "exposure" -> do not include

European context	Austria, Italy, Belgium, Latvia, Bulgaria, Lithuania, Croatia, Luxembourg, Cyprus, Malta, Czechia, Netherlands, Denmark, Poland, Estonia, Portugal, Finland, Romania, France, Slovakia, Germany, Slovenia, Greece, Spain, Hungary, Sweden, Ireland, Europe	

Choice of databases

The choice of scientific databases relied on the expert experience of past systematic reviews of the authors, and it was decided that three main (large) scientific literature databases will be searched – SCOPUS, Web of Science and PubMed.

The scope of the chosen databases:

SCOPUS – more than 21500 journals, books and collections, containing 60 million records, covering 334 subject areas

Web of Science – more than 20,900 journals, books and conference proceedings, containing over 73 million records, covering 253 research areas

PubMed - more than 32 million citations related to biomedical, health, and life sciences.

Search limitations

9. Only publications in English
10. Published in the last 10 years
11. Excluded a range of research areas determined irrelevant in the expert opinion of the authors
12. Searched in TITLE and ABSTRACT fields
13. Limitation to EEA member states was used to focus publication relevant for the European context, yet, also extra-publications referring to extra-European contexts were found when authors had affiliations in an EEA member state. These publications were excluded from the consideration for case studies. Because of the inclusion of 'Europe' as keyword, UK case studies were also included in the sample.

Search syntax

- SCOPUS

TITLE-ABS (("Resilien*" OR "adaptation" OR "adaptive" OR "vulnerab*") AND ("climate change" OR "global warming") AND ("justice" OR "equit*" OR "fairness" OR "equality" OR "social" OR ("just" PRE/3 "adaptation") OR ("just" PRE/3 "resilience") OR ("just" PRE/3 "transition")) AND ("Austria" OR "Italy" OR "Belgium" OR "Latvia" OR "Bulgaria" OR "Lithuania" OR "Croatia" OR "Luxembourg" OR "Cyprus" OR "Malta" OR "Czech*" OR "Netherlands" OR "Denmark" OR "Poland" OR "Estonia" OR "Portugal" OR "Finland" OR "Romania" OR "France" OR "Slovakia" OR "Germany" OR "Slovenia" OR "Greece" OR "Spain" OR "Hungary" OR "Sweden" OR "Ireland" OR "Europe*")) AND PUBYEAR > 2010 AND NOT ("social scienc*") AND NOT ("social *benefit*") AND NOT ("social service*") AND NOT ("equity finance") AND (EXCLUDE (SUBJAREA , "BUSI") OR EXCLUDE (SUBJAREA , "ECON") OR EXCLUDE (SUBJAREA , "COMP") OR EXCLUDE (SUBJAREA , "BIOC") OR EXCLUDE (SUBJAREA , "MATH") OR EXCLUDE (SUBJAREA

, "MATE") OR EXCLUDE (SUBJAREA , "CENG") OR EXCLUDE (SUBJAREA , "PHYS") OR EXCLUDE (SUBJAREA , "CHEM") OR EXCLUDE (SUBJAREA , "IMMU") OR EXCLUDE (SUBJAREA , "VETE"))

- Web of Science

TI=(("Resilien*" OR "adaptation" OR "adaptive" OR "vulnerab*") AND ("climate change" OR "global warming") AND ("justice" OR "equit*" OR "fairness" OR "equality" OR "social" OR ("just" PRE/3 "adaptation") OR ("just" PRE/3 "resilience") OR ("just" PRE/3 "transition")) AND ("Austria" OR "Italy" OR "Belgium" OR "Latvia" OR "Bulgaria" OR "Lithuania" OR "Croatia" OR "Luxembourg" OR "Cyprus" OR "Malta" OR "Czech*" OR "Netherlands" OR "Denmark" or "Poland" OR "Estonia" OR "Portugal" OR "Finland" OR "Romania" OR "France" OR "Slovakia" OR "Germany" OR "Slovenia" OR "Greece" OR "Spain" OR "Hungary" OR "Sweden" OR "Ireland" OR "Europe*") NOT ("social scienc*") NOT ("social *benefit*") NOT ("social service*") NOT ("equity finance")) OR AB=(("Resilien*" OR "adaptation" OR "adaptive" OR "vulnerab*") AND ("climate change" OR "global warming") AND ("justice" OR "equit*" OR "fairness" OR "equality" OR "social" OR ("just" PRE/3 "adaptation") OR ("just" PRE/3 "resilience") OR ("just" PRE/3 "transition")) AND ("Austria" OR "Italy" OR "Belgium" OR "Latvia" OR "Bulgaria" OR "Lithuania" OR "Croatia" OR "Luxembourg" OR "Cyprus" OR "Malta" OR "Czech*" OR "Netherlands" OR "Denmark" or "Poland" OR "Estonia" OR "Portugal" OR "Finland" OR "Romania" OR "France" OR "Slovakia" OR "Germany" OR "Slovenia" OR "Greece" OR "Spain" OR "Hungary" OR "Sweden" OR "Ireland" OR "Europe*") NOT ("social scienc*") NOT ("social *benefit*") NOT ("social service*") NOT ("equity finance"))

Refined by: [excluding] **WEB OF SCIENCE CATEGORIES:** (OCEANOGRAPHY OR BUSINESS FINANCE OR COMPUTER SCIENCE INTERDISCIPLINARY APPLICATIONS OR COMPUTER SCIENCE SOFTWARE ENGINEERING OR FISHERIES OR GEOCHEMISTRY GEOPHYSICS OR AGRICULTURAL ENGINEERING OR ENERGY FUELS OR ARCHAEOLOGY OR FORESTRY OR ECONOMICS OR COMPUTER SCIENCE INFORMATION SYSTEMS OR OBSTETRICS GYNECOLOGY OR PARASITOLOGY OR BIODIVERSITY CONSERVATION OR PEDIATRICS OR INTERNATIONAL RELATIONS OR MATHEMATICS INTERDISCIPLINARY APPLICATIONS OR OPERATIONS RESEARCH MANAGEMENT SCIENCE OR AUTOMATION CONTROL SYSTEMS OR TROPICAL MEDICINE)

- PubMed

("Resilien*" [Title/Abstract] OR "adaptation" [Title/Abstract] OR "adaptive"[Title/Abstract] OR "vulnerab*") AND ("climate change" [Title/Abstract] OR "global warming" [Title/Abstract]) AND ("justice" [Title/Abstract] OR "equit*" [Title/Abstract] OR "fairness" [Title/Abstract] OR "equality" [Title/Abstract] OR "social" [Title/Abstract] OR ("just" [Title/Abstract] PRE/3 "adaptation" [Title/Abstract]) OR ("just" [Title/Abstract] PRE/3 "resilience" [Title/Abstract]) OR ("just" [Title/Abstract] PRE/3 "transition" [Title/Abstract])) AND ("Austria"[Title/Abstract] OR "Italy"[Title/Abstract] OR "Belgium"[Title/Abstract] OR "Latvia"[Title/Abstract] OR "Bulgaria"[Title/Abstract] OR "Lithuania"[Title/Abstract] OR "Croatia"[Title/Abstract] OR "Luxembourg"[Title/Abstract] OR "Cyprus"[Title/Abstract] OR "Malta"[Title/Abstract] OR "Czech*"[Title/Abstract] OR "Netherlands"[Title/Abstract] OR "Denmark"[Title/Abstract] OR "Poland"[Title/Abstract] OR "Estonia"[Title/Abstract] OR "Portugal"[Title/Abstract] OR "Finland"[Title/Abstract] OR "Romania"[Title/Abstract] OR "France"[Title/Abstract] OR "Slovakia"[Title/Abstract] OR "Germany"[Title/Abstract] OR "Slovenia"[Title/Abstract] OR "Greece"[Title/Abstract] OR "Spain"[Title/Abstract] OR "Hungary"[Title/Abstract] OR "Sweden"[Title/Abstract] OR "Ireland"[Title/Abstract] OR "Europe*" [Title/Abstract])) NOT ("social scienc*" [Title/Abstract]) NOT ("social *benefit*" [Title/Abstract])) NOT ("social service*" [Title/Abstract])) NOT ("equity finance" [Title/Abstract])

Search results, export and elimination of doubles

The searches resulted in the following outputs:

Database	Nr. of search results	Bulk export format
SCOPUS	432	BibTex
Web of Science	343	BibTex
PubMed	71	NBib

All search results were imported in Zotero Software as a database of all search results including all metadata. The software was also used for the elimination of doubles within search results.

Final unique search results: 540

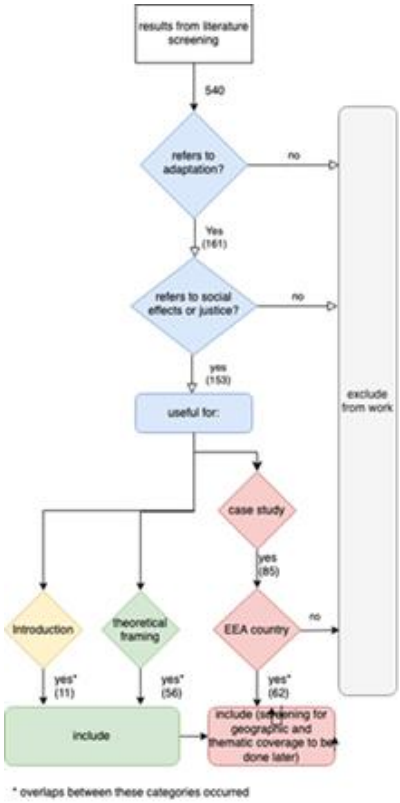
The resulting list was exported to an Excel spreadsheet, which was also used for the 2-stage screening process.

Screening process and results

1St STAGE – Title screening 540

2nd STAGE – Abstract screening 153

The limitation to EEA member states was in the search syntax and has been used to focus publication relevant for the European context, yet, also publications referring to extra-European contexts were found when authors had affiliations in an EEA member state. These publications were excluded from the consideration for case studies.



Furthermore, relevant grey literature is screened and included in the literature review. The selection of grey literature is an on-going process throughout the development of this technical paper that takes place through a snowballing approach and includes previous EEA publications and ETC/CCA Technical Papers as well as policy papers pertinent to the topic. For example, the paper builds on the EEA Report No 22/2018 '*Unequal exposure and unequal impacts: social vulnerability to air pollution, noise and extreme temperatures in Europe*' (EEA, 2018) and the ETC/CCA Technical Paper 2018/1 '*Social vulnerability to climate change in European cities – state of play in policy and practice*' (ETC CCA, 2018). The latter provides a useful starting point with a clear overview of the state-of-play in policy and practice for assessing social vulnerability and developing socially just adaptation responses to climate change in urban areas.

The technical paper furthermore aligns with an EEA study on the "*Social impacts of climate change mitigation policies and outcomes in terms of inequalities*" conducted within the EEA-CET1 group. The purpose of this study is to:

1. Identify the social impacts of given types of climate change mitigation policies and the degree to which they might result in growing inequalities between households;
2. Look at the different policy options available for mitigating these impacts;
3. Give a first insight into existing experiences from EU27 Member State policies.

The EEA-EIONET National Reference Centres (NRC) for Climate Change Impacts, Vulnerability and Adaptation and NRCs for Environment and Health have been invited to contribute content on just resilience in their respective countries. Specifically, they have been asked to provide inputs on the following:

- **examples of unequal distribution of climate change impacts** that occurred in their country on various socio-economic and demographic groups
- **policies, strategies or legal frameworks** either directly focused on adaptation, or in other sectors with an adaptation component, that were developed or implemented in their country that address uneven impacts of climate change, social groups with particular vulnerabilities, or uneven distribution of costs and benefits in adaptation approaches. This might also cover policies and actions in the wider policy context where adaptation is not the primary objective.
- any other research projects, knowledge sources or reports from their country on just resilience

This Request for Information provides a glance on the state of play of relevant recent European adaptation cases with a social impact or relevant justice aspect. Responses have been received from 11 out of 32 member and 6 cooperating countries (see map below). Furthermore, in a subsequent Eionet workshop on 'Climate Change Impacts, Vulnerability and Adaptation, held online on June 16th 2021, additional information was gathered from NRCs that had not responded to the Request for Information.

See Annex B for the NRC Request for Information and the Template.

Expert Group on just resilience

A group of experts has been invited to provide feedback on the preliminary findings of the technical paper and inputs on further topics to be discussed during an on-line meeting which took place the 20th of May, as well as through written feedback.

In total, 16 external experts from a broad range of backgrounds participate in the Expert Group on Just Resilience (see list of experts in Annex C):

1) 2 representatives from European Commission Directorates General (Climate Action and Employment),
2) 2 representatives from local authorities (Cascais, Portugal and Helsinki, Finland)
3) 1 representative from an NGO working as knowledge broker
4) 2 public agencies (forecasting and meteorology)
5) 7 representatives from universities and research institutions.
6) 2 members of the EEA Scientific Committee

In the Expert Group meeting of May 20th, these experts participated together with EEA staff members and the members of the ETC CCA working group. Experts provided short statements/talks presenting their view on relevant issues to be considered in relation to just transition and just resilience. This presentation and the related discussions were followed by targeted discussions in smaller groups which aimed at collecting answers and indications for each of the four key questions of the report. Findings from the discussions and further material indicated by the experts has been summarized in a workshop report (see Annex B) and insights have been used in the following chapters.

The Expert Group on Just Resilience has also been asked to provide feedback on the development of the technical paper itself. Several participants furthermore indicated an interest in potentially taking part in a community of practice which could accompany EEA's work on this topic in the future.

EU Country Reporting on National climate change adaptation planning and strategies

The study furthermore draws on very recent reporting by the member countries on adaptation progress. National adaptation actions are reported regularly, following the obligation established under art. 19/1 of the 2018 Regulation on the Governance of the Energy Union and Climate Action[4]. Based on information provided by the countries during the first reporting period, due in March 2021 recent policies and adaptation approaches with relevance to adaptation policies with a social impact/justice component have been identified.

The information provided by the countries has been screened for mentions of socially vulnerable groups that may be affected disproportionately, potential positive or negative effects of policies (and possible ways to mitigate those), and the types of adaptation responses.

Specific sections of the reporting information screened for relevant information include:

- Adaptation priorities and their coverage of social aspects
- Stakeholder engagement processes – stakeholders particularly vulnerable to climate change impacts and the private sector (reporting should include adaptation policy measures at the national level and good practice examples from the sub-national levels)
- Progress – including towards increasing adaptive capacity; meeting adaptation priorities; reducing CCIVR

Though the information reported by the countries is concise, it has been used to obtain a bird's eye view of the prevalence of the consideration of social effects by the member countries and integration of the social aspects in adaptation planning and implementation across Europe.

Climate-ADAPT Platform

A search on the Climate Adapt platform has targeted database items containing terms “equity” or “just” which yielded reports, description of research projects, and links to tools and description of adaptation options. As the search did not yield any concrete case studies, a further search using the term “social vulnerability” has been added, aiming at identifying cases in which such specific vulnerabilities have been addressed in implementation projects. The Urban Adaptation Support Tool has been similarly screened and relevant sections have been extracted and included under the relevant steps of the adaptation planning, implementation and monitoring cycle, thus integrating urban and local considerations.

Annex B. NRC Request for Information and template

EIONET Request for information
NRCs for Climate Change Impacts, Vulnerability and Adaptation
NRCs for Environment and Health
CC: National Focal Points

8 March 2021

Invitation to contribute content for just transition in adaptation / just resilience

Dear colleagues,

We would like to invite you to share with us your experience and insights on the case studies and policies relevant to 'just transition in adaptation' or 'just resilience'.

'Just transition in adaptation' and 'just resilience' are included in recent and forthcoming EU policies and initiatives related to climate change adaptation, including the European Green Deal, the new EU Adaptation Strategy, and the EU Mission on adaptation to climate change including societal transformation. It is recognised that the transition to a climate resilient society requires specific attention to the social consequences of change and needs to be fair and equitable.

However, we lack knowledge and experience on how to achieve justice in adaptation and we need to specify what this could mean in policy terms and in practice. Therefore, the EEA with the support from the European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA) aims to explore existing knowledge, policy frameworks and practical examples related to issues of social justice resulting from uneven climate impacts and from the uneven distribution of costs and benefits from climate adaptation and resilience measures.

We would like to invite you in this early stage of the knowledge development process to share your experience and insights with us on 'just transition in adaptation' or 'just resilience'. We would particularly appreciate the following information:

- **examples of unequal distribution of climate change impacts** that occurred in your country on various socio-economic and demographic groups
- **policies, strategies or legal frameworks** either directly focused on adaptation, or in other sectors with an adaptation component, that were developed or implemented in your country that address uneven impacts of climate change, social groups with particular vulnerabilities, or uneven distribution of costs and benefits in adaptation approaches. This might also cover policies and actions in the wider policy context where adaptation is not the primary objective.
- **any other research projects, knowledge sources or reports** from your country on just transition strategies in the context of adaptation

Your feedback is crucial for us to identify the relevant topics for this scoping study and to guide the direction of our joint on-going and future work. Your knowledge will feed into the ETC/CCA Technical Paper, planned for December 2021, which we hope can support further efforts towards just resilience, both at the national and EU level, and provide insights into the range of challenges, opportunities and good practices across Eionet member and cooperating countries. We will also organize an EIONET consultation for this Technical Paper later this year during which we hope to invite your feedback again. We furthermore welcome feedback on the type of knowledge that would be valuable to you and hope to align this with the current Technical paper or future activities, as this is envisaged as the start of an ongoing engagement.

We have prepared a template for the input we kindly request, which is available on the Eionet forum here [HYPERLINK]. For information, the template is attached to this email as a PDF version. We would very much appreciate it if you could provide us with the requested information **by April 7th**.

More detailed information on the background of this 2021 EEA/ETC activity, examples of the type of projects and policy approaches we are looking for, and a copy of the information request template are available in the attachment to this email. Please do not hesitate to contact us if you have any questions or require additional information.

Thank you very much in advance.

Kind regards,

Blaz Kurnik

EIONET Request for Information 'Just Transition in Adaptation/Just Resilience' – Additional Information and Template

NRCs for Climate Change Impacts, Vulnerability and Adaptation
NRCs for Environment and Health
CC: National Focal Points

Just Transition in Adaptation

'Just Transition' is a concept that considers how effects of climate action (both mitigation and adaptation) affect different parts of the population**.** In the context of adaptation, where the concept is also referred to as 'just resilience', it refers to how the unequal exposure and vulnerability to climate impacts of different socio-economic groups worsen pre-existing social inequalities and how adaptation policies can cause negative impacts on socio-economically or spatially disadvantaged groups. Implementing adaptation measures without considering and involving socially vulnerable groups may deepen these pre-existing inequalities.

Information request

The information we are looking for concerns a range of types of interventions (from structural interventions to policy proposals or financial programmes) as well as a range of scales. Below we provide a few examples to illustrate but we welcome any information you might be able to provide that you deem relevant to this topic.

Examples of unequal distribution can be found in relation to different **impacts**:

1. In relation to flooding, some disadvantaged individuals or communities are more exposed or more vulnerable to flooding. E.g. social housing may be situated in flood plains, leading to greater exposure to flood risk of the inhabitants; someone dependent on agricultural livelihood may be much more affected by flood than a knowledge worker.
2. In relation to heat, elderly populations and those with pre-existing health conditions are much more affected by heat stress than young, healthy residents. Furthermore, socioeconomically disadvantaged individuals may live in low-quality housing or neighbourhoods with less green areas where the impacts of heat are more severe. Those working outside are more exposed to heat than office workers.

Examples of uneven adaptation **strategies:**

- Some adaptation actions to reduce flood risks might create new or increase existing vulnerabilities. For example, decisions on where to construct or improve flood defences are often driven by the value of the assets protected, deprioritising poorer areas. In the development of adaptation strategies, marginalized communities may not be sufficiently included in the decision-making process.
- Physical improvements in urban areas, such as urban greening, may increase existing or create new spatial inequalities and gentrification effects, with a risk of leaving the most disadvantaged citizens out of the range of benefits from such measures.
- Insurance from flooding and other climate-related hazards in some countries is only available to those with sufficient resources to afford them.

Examples of **just adaptation strategies** that aim to address this uneven distribution:

- Adaptation projects that specifically target socially vulnerable populations. For example, the introduction of green areas in densely built areas with little access to green open space to reduce heat stress
- Adaptation projects that proactively seek engagement from marginalized communities in the decision-making process

EU policy relevance

The notion of a just transition in adaptation or just resilience is an emerging topic. Though many policy frameworks, action plans and strategies mention the need to consider and effectuate just adaptation, at this stage most stakeholders involved are in the early phases of knowledge development. At the same time, it is on the agenda of most of the recent policy frameworks, including the European Green Deal, the new EU Adaptation Strategy, and the EU Mission on adaptation to climate change including societal transformation which all stress the importance of this topic.

EEA work on addressing environmental inequalities

Within the EEA, we are building on previous work on this topic, including the EEA Report No 22/2018 'Unequal exposure and unequal impacts: social vulnerability to air pollution, noise and extreme temperatures in Europe' and the ETC/CCA Technical Paper 2018/1 'Social vulnerability to climate change in European cities – state of play in policy and practice'. We also take into consideration work by the parallel EEA-Climate Energy and Transport group on just transition in *mitigation*, and other ongoing activities, such as analysis of inequalities in access to urban green spaces and the Climate Change and Health Observatory.

We are furthermore aligning this activity with a similar initiative by the Covenant of Mayors for Climate and Energy (CoM) on social justice in climate change adaptation. A representative from the CoM is part of the European Topic Center involved in this task.

Template for the information request:

	Type of information	**Response**	**Link to more information or contact person details**
1.	**Examples of climate change impacts** that occurred in your country where an uneven distribution has become evident		
2.	**Policy approaches, strategies or legal frameworks** in development or implemented in your country that have • identified uneven impacts of climate change; • identified social groups with particular vulnerabilities; or		

	• have addressed the uneven distribution of costs and benefits in their adaptation and transition approaches		
3.	**Any other research projects, knowledge sources or reports** from your country on just resilience or just transition strategies in the context of adaptation		
	Any other comments		

Annex C. Expert Group on Just Resilience Members

	Last name	First name	Affiliation
1	**Charveriat**	Céline	Institute for European Environmental Policy
2	**Dinis**	João	City of Cascais
3	**Dupont**	Claire	Ghent University; EEA Scientific Committee
4	**Filcak**	Richard	Slovak Academy of Sciences, Institute for Forecasting
5	**Gralepois**	Mathilde	University of Tours
6	**Gyorgy**	Endre	DG EMPL
7	**Huenecke**	Katja	OEKO Institut
8	**Kankaanpää**	Susanna	City of Helsinki
9	**Klein**	Richard	Stockholm Environment Institute; Linköping University
10	**Lundgren Kownacki**	Karin	Swedish Meteorological and Hydrological Institute
11	**Mascherini**	Massimiliano	Eurofound
12	**Mysiak**	Jaroslav	CMCC; EEA Scientific Committee
13	**Olazabal**	Marta	BC3 Research
14	**Reckien**	Diana	University of Twente
15	**Stirbat**	Liviu	DG CLIMA
16	**Wolstenholme**	Ruth	Sniffer

Annex D. Expert Meeting Report

Expert Group Meeting – Just resilience

EEA - ETC/CCA; Thursday 20th May 2021

Report of the Meeting

Contents

Objectives and agenda

EEA together with the European Topic Centre on Climate Change Impacts, Vulnerability and Adaptation (ETC/CCA) is developing a scoping paper on just resilience. The invited expert group was asked to provide feedback on the purpose, scope and content of the work.

The aim of the scoping paper is to develop an overview of knowledge and practice for policy advisors, practitioners, and researchers on just resilience in the context of adaptation to climate change in Europe, synthesising available knowledge from both literature and practice and highlighting important gaps. The report and work will be addressing the following questions:

i) What is just resilience?

ii) Why is it needed?

iii) What is the state of play in policy and practice? And

iv) What is needed to make just resilience happen?

Agenda of expert meeting

Time	Theme	Lead
08.50 - 09.00	Log in	
09.00 - 09.05	Welcome	Blaz Kurnik, Head of Adaptation and LULUCF Group, EEA
09.05 – 09.30	Introduction of the work - Context and scope of the EEA work on just resilience - Presentation of preliminary findings - Q&A	Hanne van den Berg, climate change adaptation expert, EEA
09.30 – 10.20	Introduction of expert group and possible "lightning presentations" by experts Q&A	Facilitated by Hanne van den Berg, presentations by expert group members or EEA/ETC team
10.20 – 10.30	*- Break -*	
10.30 – 11.30	Discussion - Breakout Sessions 1. What is just resilience? 2. Why is it needed? 3. What is the state of play in policy and practice? 4. What is needed to make just resilience happen?	Facilitated by members of the EEA/ETC team

11.30 – 12.00	*- Break -*	
12.00 – 12.25	<u>Plenary session</u> - Reporting back from breakout sessions - Overall conclusions - Next steps	Reports from participants of the breakout sessions; overall conclusions and next steps by Hanne van den Berg
12.25 – 12.30	Closing remarks	Hanne van den Berg

Introduction to the work

Disproportionate impacts of climate change on socially vulnerable populations are generally recognized. But there is a risk that adaptation responses intended to address those impacts also result in an uneven distribution of benefits and burdens. Just resilience is a concept that addresses these inequalities and that ensures that the transition to a more resilient society happens in a fair way. It is an emerging topic that is on the agenda of most of the recent policy frameworks, including the European Green Deal, the new EU Adaptation Strategy, and the EU Mission on adaptation to climate change including societal transformation.

The aim of this scoping paper is to synthesize available knowledge from both literature and practice and to highlight important gaps. We started this work at the beginning of 2021 and will finalize the scoping paper by the end of this year. We plan to build on it next year in an in-depth EEA report.

In the scoping paper, we use four main sources of information to find answers to the key questions we pose on just resilience:

A. A literature review of articles on the topic of just resilience, with a focus on practical applications of the topic.
B. A screening of EU country reporting data on their national climate change adaptation planning and strategies that was submitted under the Regulation on the Governance of the Energy Union and Climate Action. Initial observations:
C. A request for information to our national reference centers for information on what their respective countries are doing in this field.
D. This expert group.

This meeting report

This report provides a summary of the discussion points in the expert meeting, which will feed into the scoping paper. They are grouped per question, in bullet-point style. They represent participants' views and are not necessarily based on consensus within the expert group. The report also provides an overview of the references provided by the participants.

Input from participants

Topic 1: What is just resilience?

Interpretations of just resilience

- There are many **interpretations** on the concept of just resilience. This has consequences for the implementation of the concept, i.e. how to achieve justice? As this is complex, it would be helpful if the scoping report were to start with an overview of different interpretations and what each of these mean for the adaptation process.
- Climate change is a stress multiplier so it cannot be addressed only on the biophysical level, nor isolated from existing stressors. Just resilience should therefore both reduce **pre-existing** inequalities as well as root causes of vulnerability (e.g. social and political structures) and avoid **future** inequalities. Just resilience needs to tackle the underlying causes of pre-existing inequalities for justice to happen, not be limited to avoid aggravating existing inequalities. This necessitates a holistic approach where adaptation is integrated into other sectors, rather than as a stand-alone sector. There are related lessons to be drawn also from the COVID19 pandemic with its unequal impacts on different strands of society.
- Just resilience recognizes the wide variety of ways climate change might impact us, depending on where we live, how we live, our livelihoods and backgrounds - **recognition** and **inclusiveness** are key elements of it. Social groups that are not typically thought of as vulnerable, might in fact be or become vulnerable in the future – this needs to be kept in perspective.
- Further to the longer debate in relation to mitigation strategies, there is now some history in discussing issues related to equity in relation to climate impacts, starting from recognition of different vulnerabilities to climate impacts, mainly in developing countries, but to some extent also in relation to the developed world. Here, mainly related inequality arising from spatial planning, transport policies or accessibility and renewable energy. As cross-cutting issues across all these: large differences between **gender** & **income status**.
- **Transformative resilience** (JRC, 2020) builds on the idea that we want to be bouncing forward, not bouncing back.
- Further to distributive justice, participants illustrated different lenses of justice relevant to their work or their research focus:
- Regarding **procedural justice**, it is important to look at evidence of what the impact is of involving vulnerable groups in engagement processes and how this is done. It needs to be underlined that procedural justice cannot be limited to participation. Participation does not ensure that outcomes are fair – we need to move beyond "participation" and consider the legitimacy of decision-making process and transparency of how decisions are made. The other problem that arises often is that the involved social groups do not necessarily have a good understanding of what are the best solutions – they need to be provided with easily understandable knowledge/conclusions from science (in a non-biased way) to enable them to make informed decisions in the first place. Their perspectives on the evidence-based conclusions would then add value. There have been studies that have shown that participation does not automatically lead to more just results, and might even leave communities as vulnerable as before (D'Alisia and Kallis 2016). Involving socially deprived groups in adaptation processes might also be challenging as they have other priorities, as for instance described in a study encountered in the literature reviews which indicates that socially deprived communities were more concerned with struggling with their own daily survival and gave lower priority to more long-term issues such as climate change impacts (Baztan et al. 2020).
- **Intergenerational justice** is becoming increasingly important in the context of climate change. This would need to be addressed and there is also too little work on that. The question to pose is: how can intergenerational justice be translated into policy recommendations? Who are winners and losers in this case? Justice between present and future generations or between young and old in present

societies (this issue is more easily addressed in the mitigation context)? (Source recommended: Filipova et al., 2021).

- **Intersectional** justice recognizes interconnected nature of social categorizations such as race, class, and gender, regarded as creating overlapping and interdependent systems of discrimination or disadvantage which then form the driver for disadvantages and lack of equity also in decision making for just transition.
- **Gender** is a recognised indicator of vulnerability, but more work from academia (and EEA) is needed to push the political agenda. Recommended source coming: EEB is preparing a **report on gender and the green deal** to which IEEP is contributing.
- **Inter (multi) species justice** is an argument which is emerging recently, with calls for thinking "beyond human" and considering the intrinsic value and rights of nature, an argument which is linked to the biodiversity crisis.
- In the development field, there is a large focus on **people-centered resilience adaptation**, built on the capacity to respond to the combination of idiosyncratic and covariate shocks. Another big element is understanding **resilience as a response to a crisis continuum** where you have so many crises overlapping and succeeding each other such that you are actually in a crisis continuum. There is also a big debate in the development field whether resilience is a useful concept or an erosion of the concept of the rights-based approach or climate justice. Another element - stemming from psychology - is **resilience from a mental health perspective** and the role of environmental determinants in overall mental health resilience. From a people centered perspective, resilience is not only about climate, but also about risks linked to other environmental impacts like noise, chemicals etc. (Hillier and Castillo 2013).
- Many contributions focus on inclusive **processes** that draw on diverse voices and values and **multiple forms of knowledge.**

Just ambition

- **Just ambition for just resilience.** How do we describe the destination and steady state (sustainable equitable well-being) through targets (SDG 1, SDG5, SDG10) - as there are no longer targets for SDG1 and SDG10 in an EU context? It is necessary to clarify target levels of compounded acceptable net risk (idiosyncratic and covariate for individuals, countries, regions and countries) and to look at Triple benefit policies (reduced exposure, increased resilience, increased equity) at all levels. Also, EU needs to define modalities for sharing benefits and burdens. IIEP has looked at frameworks for intra-country, intercountry and intergenerational equity within Europe (transfers, investments, taxation, rights & responsibility).

Just transition (mitigation) and just resilience (adaptation)

- How are **just resilience** and **just transition** integrated? Both issues face uneven distribution of burdens and unequal responsibility (issues of distributional justice). It is a very challenging discussion that should not be excluded.
- There is a parallel between just transition and just resilience: transition is policy driven. There are often comparable measures (such as improving building standards, providing climate data).
- Adaptation to climate impacts on the ground is partly happening independently from direct policy decisions responding to (individual/bottom up) needs related to impacts, local resilience is enabling for individual action. This is also due to the fact that society cannot avoid all individual impacts. Individual responsibility is needed (such as using insurances to cover unavoidable damages, individual preventive measures to be better protected etc.).

Topic 2: Why is it needed?

Global dimension of just resilience in climate adaptation

- Climate change occurs in a globalised and hyperconnected world that creates pathways via which people and systems are exposed to new challenges and risks (see Lager et al., 2021). Climate adaptation is a global challenge as i) climate impacts in one country may spill over to other countries; ii) adaptation in one country may redistribute or increase risk in other countries, and iii) adaptation in one country may provide benefits to other countries. An example is coffee farmers who risk being affected both by climate change and by the actions taken by others to adapt to climate change (Example of Tchibo changing contracts with a knock-on effect for small-holder farmers at the beginning of supply chains). This leads to the related question: if adaptation at local or national level is planned, how can we be certain we are building resilience for all across all levels of interdependency?
- A recent Policy Brief presents a framework for a just transition for adaptation in a global perspective, with the objective of achieving globally just resilience (Lager et al., 2021). It addresses what it means to pursue just resilience at the global level keeping in mind that action in one place may affect livelihoods and systems in other places. The framework is defined by justice and interconnectedness. Along the justice axis, conditions may show neither procedural nor distributive justice; elements of procedural or distributive justice; or both procedural and distributive justice. Increasing resilience requires an increase in justice. Along the interconnected axis adaptation may indicate local and narrow adaptation focus; regional and multi-sector focused adaptation; or global and multi-sector in scope. The axis illustrated the degrees to which adaptation plans/action take account unintended effects elsewhere and avoid creating losers. If we do not address justice nor interconnectedness our adaptation strategy will not be working, leading to nonequal failure. Moving towards globally just resilience means moving up the axes on both justice and interconnectedness. If we do not move up the justice axis, but only on the interconnectivity, then we are actually redistributing risks. If we only move towards justice but not on the interconnectedness, then we may end up with fragmented resilience. A key message from the Policy Brief: Ensuring that adaptation is truly just and equitable requires recognising transboundary climate risk and building resilience on a global scale. This involves avoiding actions that simply shift risks to other actors or reinforce existing vulnerabilities. Climate change impacts have been articulated in distributional terms and some adaptation interventions have been explored in similar terms.
- There are (at least) two levels of global impacts: 1) macro level – regions, states – industrial structure affected, macro changes needed; and 2) individual level – variable between men/women, market participation, education. A holistic approach is needed but with one aim: to reduce inequalities between regions and individuals triggered by change.

Who is vulnerable?

- Shore-line protection policies can potentially create conflicts on the use of public resources as mainly rich persons would benefit. Here is a risk that those owning most of the vulnerable assets (the wealthier groups) will be the most vocal in the resilience policy-making and will skew decisions towards their interests, seeking to reduce the expenses and losses they would incur. There is a need to recognize the more (or completely) silent groups and the fact that their vulnerabilities might be more urgent/essential. There are also unknown or tacit vulnerabilities (and coping skills).
- In the SDG framework, the approach much talked about currently is to “put the furthest behind first”. This is especially justified in the climate change context, as those furthest behind have often also contributed the least to the creation of the problem (Fleurbaey, 2018).
- Who is left behind? It is necessary to be inclusive and create an environment for engaging the entire society, not only the privileged. An example was brought forward of the middle-class joining forces to fight a potential climate risk.

- One of the main challenges is to understand *who* is affected. There is a gap currently in indicators addressing or measuring vulnerable groups.
- There is a need for acceptance of the distributional effects of climate adaptation across Europe from a political point of view. We need to better understand distributional effects on different levels.
- There may be a notion that we are so convinced to be already good in our national contexts so we expect socially just and equitable policies to happen automatically in relation to adaptation. There is a lack of participation of different groups in decision-making processes. Practitioners need more information regarding who is at risk, using a mix of knowledge and how to make the transition.
- Even in cases in which equity is the goal of policies, lack of justice can creep in during the implementation of processes (**process** related).

Relocation

- **Relocation** impacts on **mental** health are not well known. BC3 has conducted studies on losses of memories due to flooding (see e.g. Foudi et al., 2017). Refusing relocation is not only about the fear of change, but also about the impact on mental well-being and livelihoods. As part of place-based approaches, it is also important to think about immaterial values as memories or access to intrinsic natural values and benefits from biodiversity (further to, see above, immaterial elements of livelihood social relationships etc.) which might get lost in cases of disruptive events or relocation strategies.

Topic 3: What is the state of play in policy and practice?

Origin of just resilience

- The discussion on just resilience has started within the "adaptation community" quite some time ago, relating to social vulnerability and the recognition of uneven distribution of climate impacts in society. The new elements in this discussion are predominantly based on the recognition that not only climate change **impacts** but also **adaptation itself** creates winners and losers.
- With regards to just transition, it is important to note that just transition is a **political agenda** created by global trade unions (ITUC originally), which therefore focuses on formal employment and unionised sectors. The **just transition movement** has developed well beyond those origins (Atteridge et Strambo, 2020 and https://www.sei.org/featured/podcast-futures-beyond-coal/)
- For the European context, already during the definition of the European adaptation strategy in 2013, social justice was discussed and when redacting the Urban Adaptation Support Tool on Climate-ADAPT, experts added indications on where social aspects should be considered in the adaptation cycle. This is not a detailed guidance, of course, but can serve as first point of reference (and hopefully is being picked up by those developing local strategies in Europe). The impacts of both mitigation and adaption measures on policies on social aspects were recognised already in the background research work for the development of the original EU Strategy on adaptation in 2013 - that work was done in 2011-2012. At least conceptually, the topic has been around at least for a decade. The interesting question is whether it is considered in policies, planning and implementation and policies. This background research was confidential internal working papers prepared for the European Commission back then, the detailed papers are not publicly available. A screening work on local climate action plans in Europe indicates that that most plans analysed social differences with regards to climate impacts, and only slightly less with regards to adaptation measures, while only in a few cases the argument was mentioned in relation to participation, communication or MRE.
- The new EU Adaptation Strategy released on 2021 refers to just resilience by stating that 'Achieving resilience in a just and fair way is essential so that the benefits of climate adaptation are widely and equitably shared' (EU Adaptation Strategy, 2021, p9)
- The European Pillar of Social Rights Action Plan on the context of green transitions talks about the need to strive for a 'social rulebook' that […] focuses on jobs and promotes better living and working conditions, invests in high-quality and inclusive education, training, skills and innovation, and ensures

adequate social protection for all. The aim is to have at least 60% of all adults participating in training every year. Other key initiatives are the fit for 55 initiatives, the sustainable finance framework, and EU adaptation strategy's focus on social dialogue. The ESF+ fund will provide EUR 87 bn for 2021-2027 to support lifelong learning and social inclusion. The 17,5 billion Just Transition Fund has defined a focused instrument: 'enabling to address the social, economic and environmental impacts of the transition towards a climate neutral economy' in specific regions and will focus on upskilling and reskilling of workers; job-search assistance to jobseekers; active inclusion of jobseekers.

- The ESDE (Employment and Social developments in Europe) annual reviews have focused on employment and social effects of climate change (2019), human capital investment needs for green transition (2020) and regional exposure to heatwaves against income level (upcoming). This is being done in cooperation with JRC and open for collaborations.
- ESIR (Economic and Social Impact of Research), a high-level expert group that provides evidence-based policy advice to the Commission on how to develop a forward-looking and transformative research and innovation policy, has published a policy brief on transformation post-COVID recommending a '**protect-prepare-transform' design approach** that focusses on applying key learnings from the pandemic and ensuring transitions that are just and that embody the European Commission's new social, green, and digital pathways for an innovative and resilient post-pandemic Europe with recommendations for research: what type of research and innovation agenda post COVID (EC, 2021).
- A preliminary research on European climate plan shows that justice issues are recognized with regards to climate impacts and adaptation measures, but are generally absent when it comes to participation, communication and monitoring / evaluation.

Climate laws

- For a review of the state of play, have a look at national climate laws and check for equity issues. (Nachmany et al., 2019) and https://climate-laws.org/ .

Examples of working with vulnerability locally

- **Helsinki** Municipality carried out vulnerability mapping a couple of years ago and is currently updating this. The first-generation vulnerability mapping was not used in governance in the city and a 'good practice' on just resilience simply does not yet exist. However, the city administration has recently started working across administrative silos, combining the domains of environment and social issues/wellbeing, but there is a clear need for guidance from science. There is a gap in Helsinki on justice and the social issues and climate work. To date, climate work has mainly been situated in the environment department and treated as an environmental challenge that affects many other sectors/domains. Wellbeing and social issues are new for the environmental sector. Anything to do with natural science is quite weak on social sector**.** The city looks to Malmö for good and inspiring examples. Cities in general are looking for guidance on how to work with and help implement just resilience based on the existing knowledge in literature and elsewhere. This knowledge base needs to be formed/constructed.
- In the **Glasgow** City Region, the Climate Ready Clyde – Adaptation Strategy and Action Plan was implemented with the ambition of achieving a socially just adaptation process by co-creating a vision for the area. It (has attempted to) take(s) account of people and nature, and a Social Impact Assessment of the Draft Adaptation Strategy has been rolled out, so aiming at acknowledging the more complex, and systemic issues associated with long term climate adaptation in the participatory processes put in place.
- In **Barcelona**, a Citizen Assembly was involved in the elaboration of the PLan CLima. 85% of the measures were proposed by citizens and the indicators to monitor have been also proposed in participatory processes. The Climate Justice component is a critical and transversal aspect in the plan, also in the institutional structure of the department that is leading the plan in the City Council.

- **Malmö** (urban policies) and **Ghent** (climate citizen assemblies) were also mentioned as good examples.
- In some regions, the conversation on adaptation is currently only about physical/physiological vulnerabilities, not about the socio-economic indicators (race, indigenous people). Although, due to COVID19, disadvantaged groups are being more in focus now.

Tools and indicators

- Tools and method development is another essential requirement.
- There is an indicator 'soup' in the context of the Green Deal and there is a need for a sense-making exercise on indicators. There are indications that well-being and resilience are being perceived as the north stars, bringing together indicator framework on planet, prosperity and people. We need to arrive at a concise set of indicators to help policy-makers. Operationalising resilience will need few, not many indicators. Current indicators include Eurostat (SDGs); JRC resilience dashboards; IDEA on well-being indicators; EEA/DG environment – Green Deal/8th EAP; RRF/Semester indicators/EIR; Frameworks for other priorities for the EC; Indicators for specific strategies e.g. adaptation; Independent frameworks (ESDR).
- **Leave no one behind inde**x[40]. Countries are ranked by their leave-no-one-behind (LNOB) score. The SDGs are guided by the principle to "leave no one behind" (LNOB). The index tracks inequalities along four dimensions: poverty, services, gender, and income. A higher score means that fewer population groups are being left behind.
- The use of cost-benefit analysis in the context of just resilience is potentially prone to bias in terms of how to weigh costs and benefits for the different stakeholders. This is inherently difficult to apply in the context of just resilience as the question is 'what is just and to whom? There is a need to find or develop tools for identifying how just resilience intersections with other forms of (in)justice.

Studies in relation to policies addressing equity and justice in adaptation policies

- A **global study** (Olazabal and Ruiz, 2021) analyzed the adaptation strategies of 59 cities based on 17 indicators and 53 metrics and found that equity and justice was addressed in less than a third of them.
- **Climate Change and Health: Adapting to Mental, Physical, and Societal Challenges (CHAMPS**) project https://www.syke.fi/projects/champs. The project studied the potential impacts of climate change on health, with a focus on three interrelated topics: i) the first relates to mental health impacts associated with seasonal fluctuations in the intensity of daylight and modifying weather effects such as cloudiness and snow cover; ii) the second concerns health impacts of thermal stress, both heat and cold, and the influence of social vulnerability and exposure of the population on the severity of impacts; iii) the third considers the implications of these varied health impacts for occupational health and work productivity.
- The JPI CLimate-funded project SoLARIS **SOLidarity in Climate Change adaptation policies** - Towards more socio-spatial justice[41] in the face of multiple RISks (started 2020) covers 4 countries (France, UK, Belgium and Finland) with 2 case studies in each country focusing on river flood risks and coastal flood risks. The project seeks to answer the following questions: i) How are inequalities addressed by climate change adaptation policies (CCAP) & what is the role of participation? The project examines the types of mechanisms/instruments employed in CCAP to reduce inequalities and how affected groups are involved in the definition, design and implementation of CCAP planning instruments in the case of flood risk strategies and how these processes impact on the distribution of outcomes. ii) How can we assess and map socio-spatial inequalities related to the implementation of climate change adaptation policies? The project explores what factors make specific groups less involved in climate change adaptation policies and analyse their distributional impacts. There are concrete effects on social and

[40] https://eu-dashboards.sdgindex.org/rankings/leave-no-one-behind#:~:text=Countries%20are%20ranked%20by%20their,groups%20are%20being%20left%20behind

[41] http://www.jpi-climate.eu/media/default.aspx/emma/org/10901492/brochure.pdf

spatial conditions for communities at risk. Hypothesis that some CCAP will increase socio-spatial inequalities more than others. The project looks at trajectories of CC public policies through instrument to see at specific places and moments whether they reduce or aggravate inequality. So far, the case studies are not advanced enough to conclude on the social characterisation of vulnerable groups (e.g. gender and age).

Maladaptation

- There are examples of maladaptation in terms of how procedural justice (inclusion of vulnerable groups) can support the status quo of living in risky locations, instead of contributing to transformative adaptation (D'Alisa et Kallis, 2016).

Sectoral policies

- There is a general lack of recognition of just resilience in sectoral policies. The building and agricultural sector (rural livelihood and communities) is important in this context, in particular regarding inequities in climate change impacts (and adaptation measures) in the agricultural sectors, which is not sufficiently acknowledged. IEEP is starting work on just transition in the agricultural sector, an issue which is not addressed adequately in the current just transition mechanism. There is a need to continue raising awareness of decision makers regarding the true scope of just transition.
- There is generally a big focus on income opportunities rather than other elements that also affect people. In a sustainable transition, lots of money will be made, and it is important to address who will capture benefits across countries in Europe. The element of responsibility is very strong in a justice framework but can easily disappear in a resilience framework.

Topic 4: What is needed to make just resilience happen?

Data availability

- The vulnerable groups are those who are losing something, and we need to have a clear understanding and quantification of what it is that the different groups are losing – health, income, financial security, stable communities and homes, job security, family distress, limitations in using societal options etc. Identifying and gauging the "losses" will help us better formulate solutions.
- Data availability with reliable timelines and spatial resolution is an essential component in monitoring and assessing progress towards just resilience. This includes the importance of combined socio-demographic and spatial data to assess vulnerabilities, trade data to assess the interconnectedness and potential impacts of climate change that have a social impact across boundaries and climate change adaptation law and policies data.
- There is a wealth of indices and indicators on social vulnerability etc., mostly based on indicators of generic inequalities and social or material deprivation. But not all data is (or can be) retrieved in a top-down manner, e.g. from official statistics. As one participant underlined, there is an important role for place-based (bottom-up) processes which help to find boundaries map stakeholders, understand the power relationships etc.

Monitoring and Evaluation

- Focusing on the potential impacts of climate adaptation, monitoring and evaluation could help detecting unequal distributions of burdens created by adaptation measures.
- From a global study on planning and implementation of adaptation it was reported that M&E approaches for measuring adaptation are generally underdeveloped, and that indicators, if used, refer in most cases (85%) to outputs, and do not address **outcome indicators**, which would be much more interesting in the field of equity and justice.

- This also points to a **lack of defined destination**: it is difficult to monitor progress towards goals/objectives which have not been clearly defined. The degree of ambition with regard to resilience and also just resilience requires challenging and meaningful societal/political discussions (See also Topic 1 on just ambition).
- Certain sections of adaptation strategies (participation, communication and M&E) talk less about vulnerable groups. One aspect could be that these sections of strategies are typically more generic and do not go into the specifics of who specifically will be engaged or targeted by some of these actions. Another aspect may be that local policy/ plan makers typically agree to develop a local climate plan, but they are not really interested/ or do not have the time to follow up whether their policies are actually yielding the effect that they want. In a scientific publication from Canada (Guyadeen, D., 2018), planners / policymakers were asked why there is so little monitoring/ work on outcomes of policies. The clear outcome was that policymakers/ planners regard themselves as creators of policies but not as administrators/ controllers of policies. – though an important caveat here is that national legislation often contains a reporting obligation.
- Another key aspect is recognizing that vulnerabilities are often overlapping - we need to recognize the complexity of identifying those with a high number of overlapping and intersecting vulnerabilities. Furthermore, this also links to intersectionality with other vulnerabilities outside of the CCA and DRR realm. Some vulnerabilities will be common across all social groups and some will be specific to one group only – these need to be mapped.
- A common classification of levels of social vulnerability would be helpful, taking into account the abovementioned overlapping complexity. This would also allow target-setting for the level to which we want everyone to be brought up, as currently the targets for just resilience or transition are not clear-cut. At the end of the day everyone will need to move forward – because even those relatively resilient today, may not be in the future if nothing is being done. The key formulation of what needs to happen: “Those that are furthest behind need to be brought forward, while those ahead need to be safeguarded from falling backward”.
- The engagement of vulnerable groups in the decision-making process can be challenging as they often have other priorities, lack of awareness and knowledge, difficulties arising from gender roles, language barriers etc. Participation does not ensure that outcomes are fair – we need to move beyond “participation” to the legitimacy of decision-making process and transparency of how decisions are made. The other problem that arises often is that the involved social groups do not necessarily have a good understanding of what are the best solutions – they need to be provided with easily understandable knowledge/conclusions from science (in a non-biased way) to enable them to make informed decisions in the first place. Their perspectives on the evidence-based conclusions would then add value.
- We need to learn from the current COVID19 pandemic situation – it is evident that no-one is safe from COVID globally until everyone is safe. It is the same with climate change resilience – not until most communities worldwide will have at least basic levels of resilience can everyone else be resilient (e.g. otherwise there is ongoing competition for resources, migration, tensions, conflicts, security issues).
- The top-down technological knowledge needs to be integrated as an element in subaltern forms of knowledge for a more effective and legitimate adaptation action that responds to reals needs of communities (Olazabal, Chu et al. 2021).
- The aspects of justice play out at different levels: some local, others at higher levels. It is a challenge to have uniformity across the continent and there is a role for many different types of practices of justice depending on the level and context of implementation.
- Considering the importance of place-based or regionally specific approaches to both analysis of specific vulnerabilities as well as for the design of adaptation options, there is an important role for bottom-up approaches. Just resilience requires a shift in governance and decision-making mechanisms, empowering and equipping communities and encouraging participatory democracy, innovative mechanisms, including creative approaches and other mechanisms that encourage

collaboration at many scales – including communities working with public sector. This needs to be combined with top-down approaches.

- For the **participatory justice element** in terms of practice: it is helpful to find ways of introducing climate responses into agendas of other discussions - i.e. to meet people where they are at and not introduce adaptation as a standalone issue. Working with just resilience, place-based practice is important and creative interventions have a great potential.

Next steps and take-aways for the scoping paper [questions to be addressed]

Methodology of literature search

- A question was raised concerning the scope of the literature review and whether we capture all aspects related to Just Resilience (JR). Because the topic is relatively new, are we sure to query all relevant stream of the research landscape (including those which do not mention the key word JR)? We used a broad range of keywords to cover all areas that connect to social impacts related to climate change adaptation and resilience, and added a geographic focus related to the area. This led to a broad number of search results which was then reduced with a quick selection based on keywords and abstracts. With regards to conceptual papers, we did not limit the selection to the area of EEA countries, but we had to limit the selection of potential case studies and good practice examples in this sense. We will make sure to outline the methodology of the literature search in detail in the scoping paper.

Other Recommendations

1. The scoping report should start with a definition of the concept of JR, as there are many interpretations, and these have implications for implementation.
2. JR is also about tackling the underlying causes of inequalities, necessitating a holistic approach while at the same time avoid future inequalities. Resilience from a people-centered perspective is also about other environmental risks.
3. Participation does not necessarily ensure fair outcomes. The report needs to take a nuanced approach to participation, in particular in relation to socially deprived groups and needs to avoid limiting the consideration of procedural justice on this element.
4. Consider the different elements of justice further to those most commonly addressed (distributive and procedural), also include intersectional, intergenerational, inter (multi)species, just ambition for just resilience.
5. Consider the links and differences with just transition (mitigation)
6. Consider the global dimension of just resilience and the need for recognising transboundary climate risks
7. Mapping vulnerability needs to take into account the complexity of overlapping vulnerabilities and that some vulnerabilities will be common across all social groups and some will be for one group only. Consider the different kinds of social groups and where they live in terms of those already vulnerable due to other causes and those potentially vulnerable under future climate change (and lack of appropriate adaptation action).
8. Consider the wealth of indicators on the one hand and the scatteredness/lack of ‘easily’ retrievable data on the other hand. Address also the lack of outcome indicators over output indicators.
9. Consider the lack of agreed degree of ambition for just resilience (lack of societal objectives specified in terms of time and quantification).

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