Article

Place-Based Adaptation through Network Governance

YoungHwa Cha [1,2,*], Kate Donovan [1], Simon Shackley [1] and Dan van der Horst [1]

1   Edinburgh Climate Change Institute, School of Geosciences, University of Edinburgh, Drummond Street, Edinburgh EH8 9XP, UK
2   Department of Civil and Environmental Engineering, University of Strathclyde, 75 Montrose Street, Glasgow G1 1XJ, UK
*   Correspondence: younghwa.cha@strath.ac.uk

Abstract: Following the inception of Climate Change Adaptation (CCA) within the UNFCCC in 1992, national CCA plans began to emerge around 2008. However, identifying successful cases of adaptation remains challenging. This is because CCA policies often stop at planning, with selective reporting of relevant projects. Recognizing that planning is not the same as actual delivery, substantial gaps persist in connecting these plans to concrete actions, hindering successful adaptation. This paper explores this implementation deficit through the examination of three different governance modes (hierarchies, markets, and networks). Drawing on a policy review (desk study), a qualitative online survey, and semi-structured interviews with professionals engaged in local CCA policies, we identified enablers of effective adaptation policy progress by comparing the Edinburgh and Glasgow city regions. Despite their close spatial and relational proximity, these two city regions have distinct administrative geographies, political leadership, and adaptation-related networks, which identify unique local contexts sufficient to drive different CCA progress. We noted more CCA progress when specific resources included coordinators (dedicated staff) and fiscal supplements, along with regional networks connecting local communities and strengthening partnerships while sharing common values such as reputational opportunities in the Glasgow city region. These findings shed light on effective adaptation governance modes that require not only a deep understanding of place-based contexts but also the presence or nurturing of broader and reinforced networks.

Keywords: climate change resilience; climate change adaptation; place-based adaptation; network governance; policy implementation; Scotland

1. Introduction

In 2023, at least 167 countries out of the 197 parties in the United Nations Framework Convention on Climate Change (UNFCCC) planned at least one national-level adaptation policy [1]. However, progress often stalls at the planning stage and ends at reporting selective projects related to climate change adaptation (CCA). In the UK, Local Authorities (LAs) face challenges transitioning from planning to implementation [2] despite improved access to adaptation information and enhanced cognitive understanding [3]. The latest UK Climate Change Risk Assessment (UKCCRA) reports that adaptation efforts are not keeping pace with the worsening reality of climate risks [4]. Criticism of the lack of action on adaptation is growing, often attributed to a failure to consider local contexts [5]. This highlights the importance of place-based initiatives that understand and respond to the diverse perspectives and values within individual cities, regions, or rural areas in delivering climate policy [6–8].

The climate policy setting in the UK does not treat CCA with the same level of urgency, planning, and resource allocation as mitigation efforts. For instance, the Scottish Government's Climate Change (Emissions Reduction Targets) (Scotland) Act 2019 proposes a 90% reduction target for all greenhouse gases, aiming for net-zero carbon dioxide emissions by 2045. However, public bodies are not mandated to take specific actions to mitigate

the potential impacts of climate-change-related weather events [9,10]. This is despite the UK government declaring an 'environment and climate emergency' in 2019, and each of Scotland's 32 LAs making a commitment to address climate change by signing the Scottish Climate Change Declaration in 2007 [11]. This reveals a gap between the ambitious goals of Scottish climate change policies and the perceived lack of support in implementing CCA actions [4,6,12,13]. The reasons behind this imbalance in policy and action support between adaptation and mitigation remain unclear, raising questions about how policy progress beyond planning can be achieved for CCA.

Therefore, the aim of this paper is to explore the rationale behind decision-making and policy progress for enhancing adaptation beyond planning by examining case studies from the Edinburgh and Glasgow city regions. More specifically, three different governance modes are examined to explain the rationale background of the decision-making and policy progress (or lack thereof) on adaptation. This comparative case study approach seeks to identify enablers and barriers to effective adaptation policy progress by mapping relevant CCA policies, initiatives, and related networks, particularly focusing on flood risk management within the Scottish Planning Policy (SPP) system. Furthermore, we discuss practical challenges, lessons learned, and the need to develop and resource deliverable adaptation policy measures.

2. Literature Review: Governance of Climate Change Adaptation

2.1. Adaptation Governance

Adaptation requires the ability to anticipate, mitigate, and manage the impacts of climate change, which are inherently linked to the characteristics of local landscapes [14,15]. This complexity is of particular significance as vulnerability to natural hazards is influenced by individual and group characteristics, shaping 'their capacity to anticipate, cope with, resist, and recover' from such events [16] (p. 11). Additionally, the threat to livelihoods varies based on social structures, state institutions, and other overarching determinants of human security [17]. As a result, the design of CCA policies necessitates a comprehensive assessment of current and future impacts, as well as an understanding of the people, resources, and sectors at risk [18]. These assessments are then used to identify required actions across decision-making levels and scales in targeted areas. This aimed-for 'policy to practice transition' appears to strain existing multi-level governance challenges, both horizontally across policy sectors and vertically across government levels. Therefore, adaptation to climate change is a governance challenge requiring careful analytical policy design [19,20].

Despite the climate emergency declaration, CCA operates within the conventional policy-making systems under national governments. The classical approach to addressing policy problems involving linear, single-polity, and economically dominant treatments has been challenged in the literature as an ineffective way of dealing with climate change [21–23]. A significant body of literature suggests that the complexity, uncertainty, and conflicting values associated with adaptation, combined with many structural barriers in the existing policy system, render adaptation policy unwieldy and intractable [5,24–26]. Subsequently, adaptation has often been operated within the existing system where national planning is not necessarily linked to implementation at the local level, which does not seem sufficient to address the current adaptation action deficit. This reflects a widespread issue that policy implementation deficits are considered a common source of policy failure [27].

In response to the ineffectiveness of current adaptation planning within the boundaries of existing systems, which generates small-scale changes to practices and conventions, transformational adaptation arises, calling for fundamental changes that shift to an alternative system for achieving adaptation [28–32]. Despite the increasing use of the term 'transformation', Mustelin and Handmer [33] observe that the concept remains somewhat vague regarding the extent of transformation, such as its level, scale, and speed. Keskitalo and Preston [34] also support this point, emphasizing the need for a clear roadmap of CCA measures that can be delivered. Therefore, we explore what conventional gover-

nance modes operate current CCA, as well as the new governance arrangements that have emerged, to examine what works on the ground through case studies.

The following section unpacks hierarchies and market mechanisms, representing the 'conventional' governance mode and the network governance mode for the new governance arrangements for CCA. These three governance modes are well-established concepts across disciplines, but we consider network governance as a newly emerged one due to its characteristics distinguishing it from centralized, hierarchical control and a set of formal or informal financial rules consciously designed to change behavior [35–37].

2.2. Three Modes of Governance

Governance involves processes of interaction and decision-making among the actors involved in addressing a problem [38]. Through these processes, policy-making is characterized by 'the creation, reinforcement, or reproduction of social norms and institutions' [39] (p. 405). However, defining good governance goes beyond the ambitions of this paper. Instead, we will draw upon existing ideas on the elements of governance from political science to help unpack the rationale behind CCA policy setting and implementation by investigating governance modes.

A number of typologies for governance modes have been proposed, drawing upon a long tradition of political science [40]. Pahl-Wostl [41] distinguishes three different governance modes—hierarchies, markets, and networks. Grubb [42] proposed three dimensions of the governance system from a planetary economic aspect: one domain refers to the hierarchical governance mode, elaborating on statutes and rules and how they are implemented and enforced. The second domain is concerned with satisfying, optimizing, and transforming behavior, reflecting a market-based economic rationality in responding to climate risk. The third domain is aligned with transforming behavior, associated with the innovation and evolution of complex systems, such as network governance.

In summary, there has been a convergence across disciplines, including economics, political and policy science, environmental science, and sociology, on these three types of governance. Table 1 synthesizes the key characteristics of the three governance modes, including governing elements and rationale.

Table 1. The key characteristics of the three governance modes (This table is synthesized from the key studies [41–44]).

	Hierarchies	Markets	Networks
Roles and responsibilities	Clear vertical separation under the regulatory powers to prioritize tasks	Self-regulation of industry, not always clear	Multi-level and multi-stakeholder
Modes of governance	Bureaucracy and centralized system as a conventional mode of governance	Market-based flexible mechanisms	Social mechanisms and exchanges in networks
Coordination	Form of command-and-control or the 'rule of law'	By economic efficiency and trade-off	Across vertical and horizontal policies
Rationale	Weber's ideal bureaucratic structure	Neoclassical and welfare economics	Structural, social, and rational embeddedness
Examples of policy measures	Statutory duties, funding, and incentives	Emissions trading, modeling the economic impacts of climate change	Partnerships, communications
Dominant scale	Short-term Policy routinizes milestones and political cycle	Short- and medium-term	Long-term

2.3. Network Governance

The third governance mode draws specific attention to exchanges occurring across social and organizational networks. In their seminal paper on collaboration between firms, Jones et al. [35] (p. 914) define network governance as engagements creating products or services that involve 'a select, persistent, and structured set of autonomous firms (as well as nonprofit agencies)', based on implicit and socially binding open-ended contracts to 'adapt to environmental contingencies and to coordinate and safeguard exchanges'. As a concept, network governance has evolved beyond the early focus on corporate governance and is recognized as the basis for pursuing transformational CCA, providing a foundation for experiments with new governance arrangements [6,45,46]. Healey [43] highlighted that some level of transformation could occur along networks across formal government agencies and various informal communities through many routinized governance activities. Their view on institutionalized governance routines refers to authority over resources and regulatory powers, which resembles the hierarchical governance mode.

Network governance may be seen as a parallel sub-system to the main regulatory and administrative bureaucracy, alongside a market domain as Pahl-Wostl [47] (p. 34) emphasizes that "in reality, an individual mode will rarely occur in isolation". Whilst some authors tend to consider network governance practices as intimately linked to neoliberalism, others celebrate them as a third way between markets and hierarchies [48,49].

In order to understand the tensions and degrees of realization of each mode for CCA, they must be applied to a living laboratory of policy change and implementation. We selected two city regions that are reacting to recent changes in legislation and that have declared a climate emergency.

3. Methods

By using the three governance modes as a lens, we examined changes related to CCA in planning systems, including legislation, policy settings, and actions, in the case study areas. The Edinburgh and Glasgow city regions were selected based on the existence of CCA initiatives and the launch of a local adaptation vision or strategy in Scotland back in 2016. These city regions include both city councils and their neighboring local authorities. We specifically investigated differences in the formation of their CCA initiatives, visions, strategies, and plans, as well as any resulting changes and what triggered or hindered them.

In our comparative case study approach, we used three sequential and complementary qualitative data collection methods in order to capture those policy changes and CCA progress: (1) reviewing official policy documents to analyze secondary data related to changes in the legislation and planning policy systems for CCA, (2) conducting a qualitative (i.e., open questions) online survey to identify the national policy mainstreaming of CCA into local level implementation, targeting those working in local councils on adaptation-related issues, and (3) conducting semi-structured interviews with former executives, planners, and project managers in order to incorporate these with the policy review and survey responses for thematic analysis of adaptation policy progress.

Relevant documents for review were identified from the key policy documents entitled CCA, FRM, and SPP at the national level and extended to relevant legislative and policy documents and approved policy, as well as accompanying policy support guidelines and consulting reports (See Supplementary Materials for the reviewed policy document list). A total of 25 online survey responses were received through Survey Monkey. The surveys were complemented with twelve interviews carried out between April 2016 and April 2017. The interviews were conducted until reaching saturation point (12 interviewees in total), where the same themes emerged repeatedly, and very few additional insights emerged. Two interviewees from each sector participated, including central government (E1 and E2), planning authority (PA1 and PA2), consulting planners (P1 and P2), CCA initiatives (CI1 and CI2), local councils (LC1 and LC2), and network and communication groups (Eng1 and Eng2). The process of data collection was conducted under the University of Edinburgh School of GeoSciences Ethical Approval process.

The primary qualitative datasets were analyzed using thematic analysis. The thematic analysis enabled the interpretation of descriptive data through a process of identification, coding, sorting, and sifting of themes and texts, leading to findings that can contribute to theoretical knowledge and practical use [50]. The analysis aims to reveal gaps in policy-making and delivery, where different levels of commitment to CCA are present in the political, administrative, and operational spheres in the case study areas.

4. Results

We identified a range of general challenges for the implementation of CCA within existing policies across the central region of Scotland. These challenges include a resource gap, the absence of concrete policy tools, and a fragmented governance system. Table 2 summarizes the case study findings using collected datasets by extracting themes to unpack the perception of CCA, policy changes, and governance structures.

Table 2. Key findings through thematic analysis by extracting themes from collected datasets.

Addressing Gaps	Key Findings	Emerged Key Themes	Data Sources
The Act and Scottish CCA Program	- CCA mainstreamed through SPP * by the legislation in Scotland - Absence of policy tools and clear goals for CCA - Lack of motivation to trigger actions for CCA - More planning and reporting at local level but no moving forward implementing actions	Hierarchical policy setting, statutory duties, CCA motivation, implementation gap	Online questionnaire survey and policy documents
Implementation and resources	- Absence of clear adaptation goal and concrete policy tools to deliver at local level - Coordination challenges across remit of authorities; structural development planning authorities, LAs - Challenges in priority setting; no delivery on identifying local level risks and opportunities due to lack of resources	Implementation gap, organizational setting/silo, resources, CCA goal, policy tools, dedicated staff, business cases, responsibility	Online questionnaire survey, policy documents, interviews
Adaptation policy progress	Divergent progress in the Glasgow and Edinburgh city regions: Mobility from rhetoric to action - Regional approach (Glasgow) and community-based approach (Edinburgh) - Broader network with stronger partnership (Glasgow) and no indication of adaptation initiative activities outside statutory duties (Edinburgh) Resources - Link to business cases and chain activities to secure climate finances (Glasgow)	Edinburgh, Glasgow, partnership, networks, resources, business cases, statutory duties	Policy documents and interviews

* The Scottish Planning Policy (SPP) system has been integrated into National Planning Framework 4 (NPF4) since February 2023 as a result of reforming the planning system followed by the Planning (Scotland) Act 2019.

Our results are organized into two parts. Section 4.1 explores the generic challenges, while Section 4.2 focuses on more in-depth analysis and comparison between the two case

studies, specifically examining what enabled adaptation to go beyond planning at the local level.

4.1. The Interface between Policy and Action in the Central Region of Scotland

A key approach to policy development in Scotland is iteration, often in five-year cycles involving a process of consultation, formulation, implementation, and review. This provides opportunities for policy integration, such as mainstreaming CCA into the planning system whilst reviewing and updating existing policies. This routinized policy cycle for the mainstreaming of CCA within the existing planning system relies on interpretation for the development of pragmatic implementation guidance and then action. However, survey and interview participants indicated that it often ends at the planning stage, resulting in the absence of actions and resources for LAs.

> "... for many people, just getting the climate report in is the end of the process. They have submitted some data, and that's done. Unless you have the capacity to then do something with the data, either on the receiving end or from the supplier side, it is just a process that doesn't lead anywhere. I mean, it has a mild benefit in terms of awareness-raising, but simply submitting data doesn't do anything". (E2, 2017)

This is in line with Fankhauser et al. [2] (p. 28), who suggested that 'adaptation planning is not the same as adaptation action'. Criticisms emerging from the document review and survey indicate inertia surrounding the mainstreaming of CCA, with the need to enhance concrete actions rather than just emphasizing the importance of including CCA in policy documents.

4.1.1. Resource Gaps in Policy Setting for CCA

The centralized structure of the state limits the ability of local authorities to set political agendas or to exercise leadership in some areas. Furthermore, a common theme from the surveys indicated that the system does not allow them to take anticipatory actions because national strategies do not provide adequate resources. Instead, local councils' budgets have been shrinking.

> "... (city) councils are in a really difficult position financially; so their budgets are getting smaller, but that responsibility to deliver on climate adaptation is not going away". (CI1, 2016)

This is consistent with the literature, which points out that lack of funding is one of the major barriers to CCA at the municipal level [22,51–53].

Considering the effect of 'austerity measures' across the UK since 2010, LAs' budgets have decreased, and participants indicate that they are struggling to deliver even the immediate services required of them by law. Consequently, their approach has become more reactive and short-term. Without more funding specifically ring-fenced for adaptation, longer-term investment to adapt to future climate change will remain a much lower priority than more immediate risks.

4.1.2. Absence of Concrete Policy Tools and Clear Goals for CCA

The UKCCRA has been conducted by the UK government every five years since 2012 [4]. Ideally, this is supposed to lead to the development of concrete policy tools to deliver an optimal solution in practice. However, when it comes to delivery at the local level, interviewees note that the significance of CCA has become diluted by other local issues, such as social care, housing, and education, and the potential risks from climate change are often ignored. In response, LAs tend to take only marginal actions that are mandatory rather than proactive measures based on risk assessment.

The concrete statutory duties consist of publishing a plan and reporting progress, but the implementation of those plans remains vague with varying levels of support. Therefore, each organization is required to arrange its own existing resources to undertake concrete

actions. A tension exists between allocating resources required to develop concrete policy tools to deliver CCA or building up the evidence base in order to allocate resources.

Yet the survey and interview results indicate that building an evidence base does not always lead to tangible adaptation action. The scientific information itself and its accessibility have not been described as problematic in the two case study areas, yet action remains limited. This is similar to research by Porter et al. [3] that showed an improvement in adaptation informational access and cognitive understanding in the UK. Although scientific information may support more adaptation plans at the local level when compared to a decade ago, it is not apparent that better information leads LAs in Scotland to move beyond planning to implementation.

The need for actionable, concrete policy tools at the local level, however, appears more urgent. Interviewees highlighted concerns about the limitation of CCA legislation, which lacks clear responsibilities or tasks. The literature suggests that one of the main reasons for this is that climate-related policies and actions are mostly undertaken by individual officials in the involved local authorities, resulting in piecemeal efforts [54]. The question arises as to whether the capacity of individual officials is sufficient to carry out the development of actionable adaptation options when they are working on CCA tasks in addition to their required workload. Furthermore, this takes place within the context of the limited power granted to LAs.

4.1.3. Fragmented Government System and Siloed Organizational Interest

Over the last 20 years, Scottish climate change policy design has been heavily driven by government planning that is focused on reducing carbon emission targets. The results of this study indicate that there is no disagreement over whether addressing climate change requires government intervention. The issue is how the intervention is managed by, for example, a centralized bureaucracy around CCA, with the requirement for a stronger emphasis on markets and, as noted above, on individual leadership. This was a clear message from planners who highlighted that the delivery of a plan is beyond their remit.

"We [Strategic Development Planning Authority] didn't have any remit beyond preparing that plan and the associated documents... in terms of delivery . . . we didn't really get involved in that. Now they would go off and prepare their local development plans and the action programs". (PA2, 2016)

"The planners' role is to get a plan out the door and they will talk about these things in their plan, but they won't necessarily make the connections across departmental delivery". (PA1, 2016)

This finding supports the well-acknowledged governance challenge in between centralization and localization; furthermore it raises the question of whether imposing legally binding requirements or granting discretionary power to LAs is required to achieve effective change in local areas.

Top-down targets are one way to address the potential decoupling of local practice from the goals of the national strategy. For example, a statutory adaptation duty provides leverage for climate officers in internal struggles over resources, such as when prioritizing CCA tasks and improving collaboration with their colleagues. Furthermore, "a stronger mandate for action from the national government gives local decision-makers an official framework within which to act while also making it possible to 'pass' any political blame and possible costs upward" [55] (p.178). However, having a more centralized governance system by adding statutory duties would not entirely fulfill local needs because there are differences in local characteristics, such as culture and interests, which a centralized government can overlook. Interviewees claimed that there are overlaps between CCA and existing related policies but not integration. This echoes Fankhauser et al. [2], who found that the UK has pursued its various environmental objectives through parallel processes.

4.2. Comparison between Edinburgh and Glasgow City Regions

The generic challenges highlighted above become more complex when looking at individual cases. Here, we explore two city regions in central Scotland. Despite being the two largest cities in Scotland and working under the same regulatory processes, their progress on adaptation is significantly different. The partnership behind Climate Ready Clyde (CRC) has accomplished significant progress along the River Clyde, the White Cart Water Flood Prevention Scheme, and various other flood defenses. This work has been driven by several severe flooding events that have occurred in the region, but its development has been informed by longer-term climate change issues and heralded a move towards developing local policy measures and applying for funds.

> "EdinburghAdapt which isn't working on funding and business (while) Climate Ready Clyde . . . is very much about talking to businesses and putting that case which (the project manager) does very well . . . for businesses. And I think EdinburghAdapt . . . a lot of it is more about raising awareness and it is working more with people and engaging with them". (CI2, 2016)

From one perspective, working as a collective ought to lead to more rapid, transparent, and significant change than if authorities are in competition with one another through more 'entrepreneurial' city management. However, an alternative perspective holds that competitiveness motivates individuals and institutions to be more ambitious and risk-taking. Interviewees reported that the competitive city profile contributes towards a collective understanding and stronger partnerships in reality. For instance, Glasgow city was nominated as one of 100 Resilient Cities by the Rockefeller Foundation and hosted the 2014 Commonwealth Games. More recently, the city hosted the European Adaptation Conference in 2017, and the 26th session of the Conference of the Parties (COP 26) to the UNFCCC took place in Glasgow in 2021. These events have contributed to Glasgow's reputation and global branding while also enhancing the prospects for being awarded other funding and motivating the Council's staff and the related members of their networks. Making itself a global and competitive city has strengthened Glasgow's independence from central government in ways that Edinburgh has not, at least with respect to climate-resilient cities. Although progress has been slow in Edinburgh, some work has been undertaken through initiatives such as forming the Edinburgh Climate Change Commission as well as recent flood risk management plans. However, the commission's main focus was on emissions reduction with limited discourse on adaptation.

The different levels of progress in CCA are related to three key themes: geographic characteristics, political power dynamics, and stronger partnerships with a wider range of networks between the city regions. This is despite having the same accessibility to climate risk information under the same legislation.

4.2.1. Geographic Differences

The Glasgow city region has established stronger partnerships and, therefore, has taken advantage of its geographic identity along the River Clyde, which runs through the heart of the city. This has resulted in common experiences and shared responsibility for the causes and impacts of flooding. The common threat from serious flooding has accelerated the formation of Glasgow and Clyde Valley associations, including the Glasgow and Clyde Valley Green Network Partnership (GCVGNP), Clyde Valley Strategic Development Planning Authority (Clydeplan), and the Metropolitan Glasgow Strategic Drainage Partnership (MGSDP). By contrast, Edinburgh has two main catchment flood prevention schemes on the Water of Leith and the Braid Burn, which are unconnected and both rivers are smaller and pose a lower flood threat. The Edinburgh FRM is much more reliant on SEPA.

> "East Lothian for instance, quite a separate flood regime, Midlothian is quite separate, Edinburgh is quite separate. So, hydrologically they are not linked up whereas the River Clyde flows right through the middle of Glasgow and there are 15 local authorities involved. That is why in some ways they've got to be a more

strategic approach and have an overarching partnership working that because hydrologically it is much more complex than Edinburgh" . (E1, 2017)

In addition, there is a considerable difference in urban settings, as Glasgow city (0.44%) has double the impermeable surface compared to Edinburgh city (0.23%) [56]. The risk of sewer and surface water flooding has likely been exacerbated by the widespread use of non-permeable paving in urban areas in the UK [57]. This raises concerns that urban areas in Scotland are likely to suffer from increased flooding events, as 96% of the 'extremely or acutely vulnerable' areas are located in urban settings [58] (p. 71). This indicates that Glasgow is exposed to higher surface water flood risks, a concern recognized by the city council, which is working on flood resilience funded by the Glasgow City Region City Deal via the MGSDP.

4.2.2. Political Leadership

Local policy-making and planning approvals in the UK are made by committee bodies whose membership consists of local councilors. Even though there is scrutinization from expert consultations and public inquiries, it is not equivalent to the influential voices of councilors. This is also confirmed by the survey responses of officers working at LAs across Scotland, indicating that the most influential voices in their policy-making are local committee bodies, which refers to local councilors. The second most mentioned influential voice was the Scottish Parliament. The existing decision-making system is structured to rely on political leadership and central government, indicating that CCA policy-setting follows a top-down process in Scotland. Another issue concerns whose voice has influence politically. For example, some councilors may not represent the view of people who live in a flood-prone area if the majority of the population in their constituency is not affected by flooding. Several interviewees made the comment that, for local councilors, the main interest is their legacy and factors that contribute to their next election, rather than dealing with climate change.

"... our elected members who make the decisions in the city are councilors. I think they have maybe struggled with some of the content of our strategy because in some ways to them it is quite abstract, and actually what they want to know is what does this mean for my ward, what does it mean for the people living in my streets? So that is possibly some of the challenges as a city, is what does this academic conversation mean in reality, in a city context". (LC1, 2016)

"I think what is going on in planning is actually just a reflection that people are feeling disenfranchised from the way that local government is run. ... But those elected individuals are human beings and they are politicians and they are influenced by other incentives". (Planner1) "Local councilors are elected on a 5-year cycle and when you start talking climate change effects 15, 20, 30, 40 or 50 years hence, that doesn't feature far in their radar". (PA1, 2017)

Interviewees pointed out that councilors in both Edinburgh and Glasgow regions, who are key decision-makers, may not prioritize longer-term aspects of flood impacts more than five years beyond their serving period. The pitfall of relying on political leadership is transparency and whether they are representing public or personal interests, including short-term outcomes to benefit their legacy for their next election. This also links to the concern that if only a 'small minority' of people are affected by localized flooding, it raises questions about whether their interests have been properly represented through the local democratic system.

Another factor contributing to Glasgow city's independence and distinguishing it from Edinburgh is its political context—whether the city is governed by a majority party or a coalition of parties. Until 2017, Glasgow was under Labor, which had been in power in the city since 1980 [59]. In 2015, Glasgow City Council stepped out from the Convention of Scottish Local Authorities (COSLA) to establish a new organization, the Scottish Local Government Partnership (SLGP), with other Labor-run local authorities, including

Aberdeen City Council, Renfrewshire Council, and South Lanarkshire council [60]. Then, the 2017 election resulted in historic changes for Glasgow in that the Scottish National Party replaced Labor as the largest party in Glasgow, yet they were four seats short of a majority—39 out of 85 seats. They then revoked the previous decision by Labor, which set up the independent SLGP, and re-joined COSLA in 2017.

4.2.3. Stronger Partnership and Wider Networks

> "Glasgow and Clyde valley work closely with I think Adaptation Scotland worked with Clyde plan . . . We haven't had anything like (Climate Ready Clyde) as developed as that in this area. I'm sure individual authorities: Edinburgh or East Lothian would say that they have got their climate change action plans. . . . There is much more initiative and more collaboration, more partnership in the West of Scotland". (PA2, 2017)

Local contexts, encompassing geographic and political settings, have historically shaped the relationships between city councils and neighboring local authorities differently in the two city regions. For instance, Glasgow city already had well-established and consolidated partnerships and networks for sustainable development along the River Clyde. The Glasgow and Clyde Valley Green Network (GCVGN) was set up due to the need for strategic land-use planning, so-called Structural Planning, when regional councils from Scotland were abolished in 1996. They have maintained strong networks of partnerships over a long period doing strategic development plans, which superseded the structural plans through the 2006 Planning Act. Meanwhile, Edinburgh city's partnerships were created through regulation, with Edinburgh City Council emerging as the perceived dominant partner. For example, Edinburgh City Council published the 2020 vision before the Strategic Development Plan without much communication with neighboring local councils.

As highlighted previously, the key adaptation initiatives in the central region of Scotland are CRC and 'Edinburgh Adapt'. The starting point for the coordination of those initiatives led to the different spatial approaches to CCA. The results of the survey and interviews highlighted that regional-based projects and networks are wider under strong partnerships in the Glasgow city region than in the Edinburgh city region (Figure 1).

The clear distinction in networks, particularly in stronger partnerships and wider regional partnership networks, between the Edinburgh and Glasgow city regions is altered by regional and local approaches to adaptation. The Glasgow city region adaptation covers a wider range of sectors at the regional level, whereas the Edinburgh adaptation narrowly focuses on the conservation sector at a local community level. CRC progress was created by a collective movement linking to the planning sector through sharing partnership platforms in GCVGN and Clydeplan. Edinburgh's community-level adaptation appears to attain only limited interest sharing within a community. Arguably, community-level adaptation may not be sufficient without a connection to a wider network and adequate resources. This support is essential for building a propensity to act beyond rhetoric and for further progress on CCA.
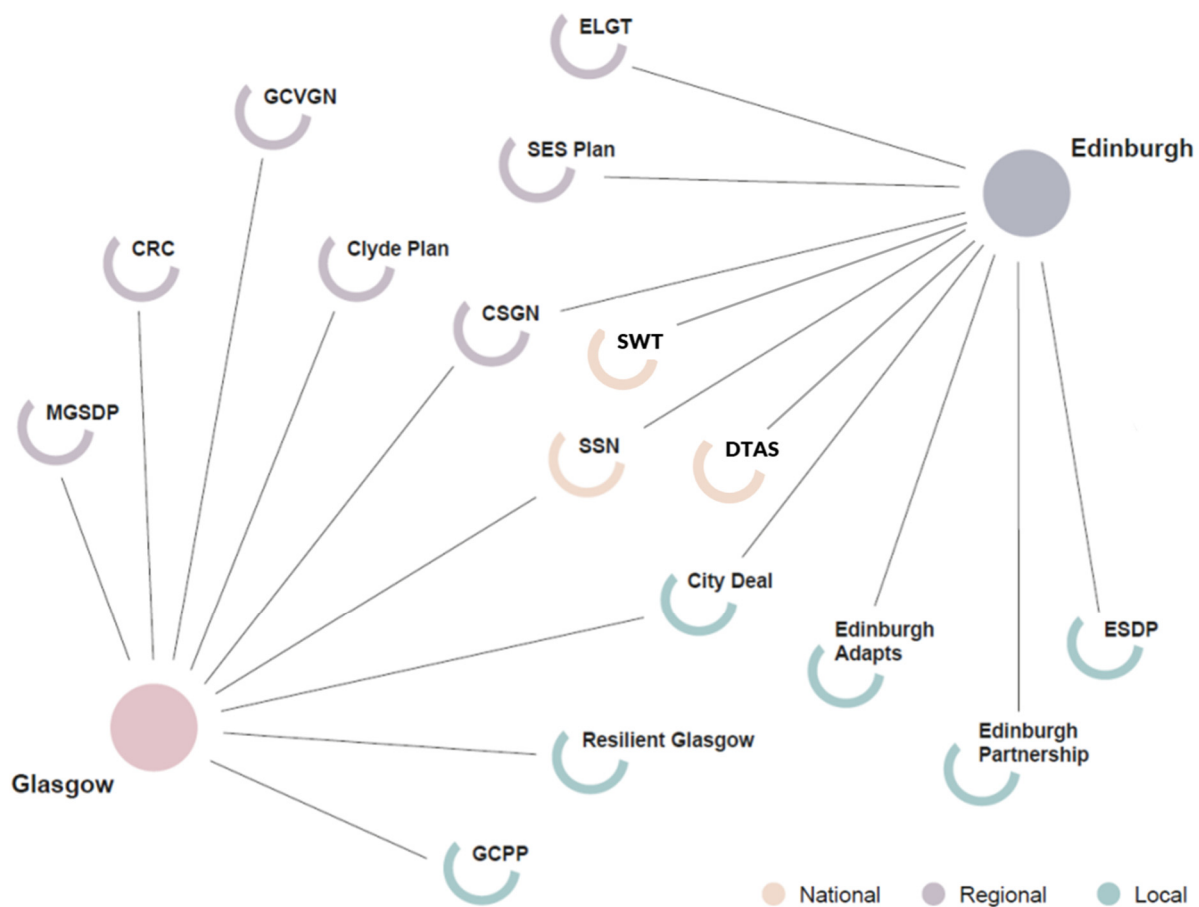
Figure 1. Different spatial levels of networks in establishing partnerships between the Edinburgh and Glasgow city regions. The network around these initiatives and partnerships is based on the survey results carried out in 2016 during the critical transition period of reforming the planning system; therefore, some are no longer operational. For instance, Clydeplan and SESplan were absorbed by Scotland's fourth National Planning Framework (NPF4) as of February 2023. NPF4 aims to consolidate Scotland's national spatial and thematic planning policies in one place, replacing both NPF3 and the Scottish Planning Policy. (Cldyeplan: Strategic Development Plan for the Glasgow city region; CRC: Climate Ready Clyde; CSGN: Central Scotland Green Network; DTAS: Development Trusts Association Scotland; ELGT: Edinburgh and Lothian Greenspace Trust; ESDP: Edinburgh Sustainable Development Partnership; GCPP: Glasgow Community Planning Partnership; GCVGN: Glasgow & Clyde Valley Green Network; MGSDP: Metropolitan Glasgow Strategic Drainage Partnership; SESplan: South East Scotland Strategic Development Plan; SSN: Sustainable Scotland Network; SWT: Scottish Wildlife Trust).

5. Discussion

5.1. Determinants of Effective Adaptation Policy Change

The findings indicate a need for the convergence of specific determinants required for effective policy change. These are illustrated in Figure 2a and include 'mobility', such as a commitment to participating in actions and accumulation of public support, resources to develop concrete policy measures, train staff, and initiate buy-in narratives on the economic benefits, as well as regulations for enacting legislation with detailed guidelines. Reflecting on the governance mechanisms, Figure 2a illustrates that CCA requires some level of convergence of mobility, resources, and regulation (An + Bn + Cn). The mobility from rhetoric to a propensity to act based on collective interest groups and initiatives, which are built around broader networks with stronger partnerships, when combined with funding, has achieved more progress on CCA in the case of the Glasgow city region. On the other

hand, any significant changes would not emerge if there were only A0 rhetoric, B0 no resources, or C0 loose regulations.
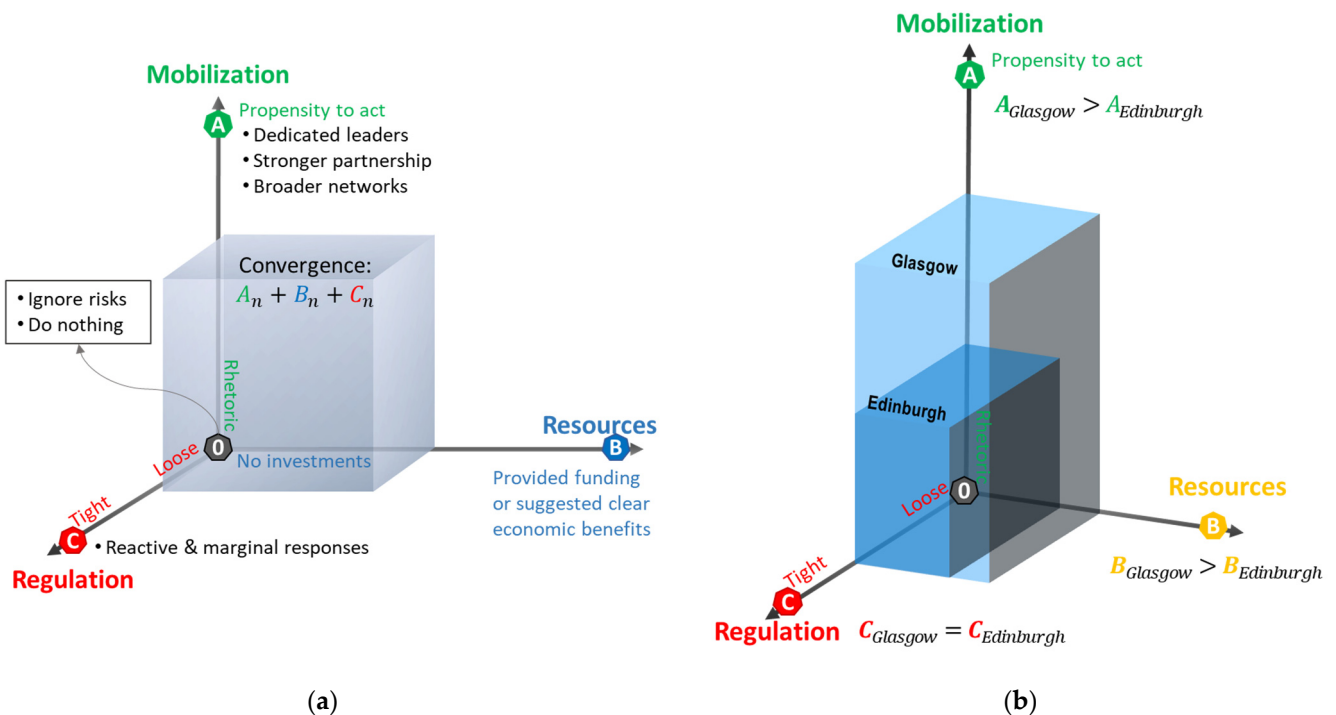

(**a**)   (**b**)

Figure 2. The enablers that drive the progress of CCA, as identified through the case studies in the Edinburgh and Glasgow city regions: (**a**) determinants of policy progress—mobility, resources, and regulation; (**b**) comparison of CCA policy progress by determinants between the Glasgow and Edinburgh city regions. 'Green A' axis indicates a level of CCA mobilization ranging from 'rhetoric' to 'propensity to act'. 'Blue B' axis refers to the availability of resources for CCA, ranging from 'no investments' to 'provided funding'. 'Red C' axis represents the intensity of regulation, with tendencies towards reactive and marginal responses to tighter regulations.

The case studies have revealed that regulatory policy changes achieve limited performance on CCA as policies respond marginally or are reactive. This top-down approach to CCA is represented by the case of 'C_{tight}' in Figure 2a. Resources are perceived to be a critical factor for CCA policy implementation, as well as for developing concrete policy measures. This market-based governance mechanism is deeply embedded in economic benefits where the buy-in narrative is used to leverage action on CCA. In practice, the unlimited resource of '$B\infty$' is unrealistic, and buy-in narratives are currently missing to motivate actions. This links back to the mobility level in which CCA is limited in rhetoric. 'Mobility' in Figure 2a reflects an increased propensity to act, which can be achieved through stronger leadership and partnerships. This necessitates an understanding of the place-based contexts that shape different relationships within each community, locality, and region to act upon CCA. The closer to A_{max}, the stronger the impetus to build collective action within networks around connected partnerships. The comparison between the Glasgow and Edinburgh city regions shows different stages within local CCA plans and implementation timelines. This is reflected in Figure 2b. The partnership behind a large climate change program for Glasgow is called Climate Ready Clyde [61–63].

Despite the surveys indicating that scientific information was not paramount to motivate more actions, the underlying message was that we have enough information to rationalize policy changes. To the extent of triggering actions, it appears to require more resources and clearer narratives for the (primarily economic) benefit of addressing CCA. One of the participants in this research shared reflections on how CCA operates within a hierarchical system without resource provision, stating:

"We are relying on people's good will. It is the same with other adaptation pieces of work where we have been running workshops and things. We are relying on people buying into it. You could always go to a high level in an organization and say 'you need to make people do this' and that would be an option but we don't want to do that because we don't want people to see it as a burden". (LC1, 2016)

This serves as a caution that depending on people's goodwill could risk turning CCA into additional work. With respect to the intertwined relations of three determinants across three governance modes, addressing them collectively may eventually initiate effective CCA policy change. However, there is uncertainty regarding whether these policy changes would be equivalent to transformational adaptation or lead to a transformation of economic, social, and financial systems.

5.2. Which Governance Modes Work within the Existing Planning System

As the case studies reveal, the information about climate change risks and experiencing climate-related disasters is enough to activate the delivery of CCA policies. However, the stalling process in CCA policy changes remains at the planning stage due to a lack of resources to develop concrete measures. These barriers reflect the influence of both network and market modes of governance. This indicates that efforts to address the climate crisis have not progressed beyond planning, and that implementation following market modes is restricted due to conventional funding practices for LAs.

This also reveals the limitations of a top-down system in governance. The literature and the case study demonstrate that the barriers to CCA governance can be lifted when strategic plans and clear roles and responsibilities meet with adequate resources for local actors to deliver CCA. However, the hierarchical system does not know enough about local needs and identities, and this can hinder anticipatory and proactive actions for CCA. The case studies show that CCA needs to find a niche by coupling with local business 'buy-in narratives', enabling local economic growth. This follows the market governance mechanism, which involves an economic-growth-centered belief system. Therefore, it needs a lot more effort to lift the stigma of CCA as a cost rather than an investment. Both case studies show that anticipatory actions are unlikely to be undertaken by local stakeholders without 'buy-in narratives' that reflect their powers and resources.

Debates around centralization and localization in relation to CCA policy are ambivalent. It appears both top-down and bottom-up approaches co-exist through statutory power to take CCA into account for related policies and discretionary power to encourage voluntary actions. This is because the formulation and implementation of climate policy involves multiple dimensions in both vertical and horizontal policy sectors and governance modes. The EU Water Framework Directorate (prior to the process embarked upon following the referendum in June 2016), the UK Climate Change Act, and the Scottish Planning System achieved mainstreaming of CCA into related policies. In order to link these sets of legislation and planning to actions, the findings from this research suggest that efficient and effective ways to motivate people to act upon concrete opportunities in CCA are either by identifying efficient ways to distribute scientific risk information alongside local knowledge or by creating attraction to markets.

Network governance approaches have been more emphasized with respect to limited resources to prioritize CCA at the local level. As local governments have limited power to increase their budgets without a significant contribution from the central government, they need to further explore opportunities for seeking external funding to support local CCA. This involves engaging with international institutions, which enables LAs to enhance their profile in the global society. For example, the case study showed that the chain effect of empowering the Glasgow city region through decentralized movements has been reinforced by successful awards, such as the Rockefeller Resilient Cities, and by hosting international conferences, such as COP 26. These accomplishments are cascading to attract additional investments to the city, both internally and externally. CCA may need to start with a top-down approach to set up strategies and build up recognition of CCA's importance, while

learning from good practice cases where LAs have tried to overcome a lack of resources and move forward. This emphasizes the importance of connectivity across governance modes: hierarchies operate top-down, markets function bottom-up, and networks can operate in both ways. Networks also represent a distinct organizational type characterized by a horizontal structure that achieves action through collective responses without requiring a hierarchical framework. However, it is important to note that there is often a risk of chaos and breakdown without appropriate coordination.

6. Conclusions

This paper explored three different governance modes to understand the rationale behind the CCA policy setting resulting in an implementation deficit and identified what enables adaptation to go beyond planning by examining case studies from the Edinburgh and Glasgow city regions. In this paper, we observed through a case study that local-level decisions often tend to be made to satisfy standards set by the central government; this may lead to short-term thinking whereby risks are ignored. These hierarchical governance mechanisms are limited in their ability to 'know' enough about local needs and identities; they often stop at the planning stage or report only selective projects related to adaptation. Secondly, we noted market governance mechanisms (e.g., direct financial incentives or fines) are often insufficiently linked to clear benefits or to 'buy-in narratives' that are needed to mobilize more powers and resources.

The case studies showed that more progress in CCA was observed in the Glasgow city region, where available resources, including coordinators (dedicated staff) and fiscal supplements, along with regional networks, connected local communities and strengthened partnerships. The connected and strengthened network served as a venue to share common values, such as reputational opportunities, shifting policy rhetoric towards a propensity to act. This illustrates that even adjacent cities have distinct geographic and political leadership and networks, constituting unique local contexts. The findings from our paper thus emphasize the importance of place-based approaches and network governance for CCA planning to mitigate the implementation deficit.

This research was conducted during a turbulent political period. The survey and interviews were held during the renewal period of the Scottish Planning Policy with the disruptive effects of the Brexit referendum in the background. It reflects a transitional period when wider policy and political changes could exert influences on the development and implementation of CCA policies in Scotland.

While comparing the Edinburgh and Glasgow city regions revealed factors enabling further progress in CCA, it does not necessarily demonstrate the effectiveness of specific CCA measures and actions. The research findings are limited to representing the national planning structure of mainstreaming CCA in Scotland and how it links to regional and local initiatives and operations, as well as how it is governed within the case study region within a particular timeframe. Further analysis can be conducted to explore specific measures and stakeholders' actions for future research aimed at measuring successful CCA delivery.

References

1. United Nations Environment Programme. *Adaptation Gap Report 2023: Underfinanced*; Underprepared. Inadequate Investment and Planning on Climate Adaptation Leaves World Exposed; United Nations Environment Programme: Nairobi, Kenya, 2023; ISBN 978-92-807-4092-9.
2. Fankhauser, S.; Averchenkova, A.; Finnegan, J. 10 Years of the UK Climate Change Act. 2018. Available online: https://www.lse.ac.uk/granthaminstiute/wp-content/uploads/2018/03/10-Years-of-the-UK-Climate-Change-Act_Fankhauser-et-al.pdf (accessed on 20 February 2024).
3. Porter, J.J.; Demeritt, D.; Dessai, S. The Right Stuff? Informing Adaptation to Climate Change in British Local Government. *Glob. Environ. Chang.* **2015**, *35*, 411–422. [CrossRef]
4. Climate Change Committee Independent Assessment of UK Climate Risk Advice to Government for the UK's Third Climate Change Risk Assessment (CCRA3). 2021. Available online: https://www.theccc.org.uk/wp-content/uploads/2021/07/Independent-Assessment-of-UK-Climate-Risk-Advice-to-Govt-for-CCRA3-CCC.pdf (accessed on 20 February 2024).
5. Eriksen, S.H.; Nightingale, A.J.; Eakin, H. Reframing Adaptation: The Political Nature of Climate Change Adaptation. *Glob. Environ. Chang.* **2015**, *35*, 523–533. [CrossRef]
6. Howarth, C.; Lane, M.; Fankhauser, S. What next for Local Government Climate Emergency Declarations? The Gap between Rhetoric and Action. *Clim. Chang.* **2021**, *167*, 27. [CrossRef] [PubMed]
7. Murtagh, E.; Lane, M. Putting the 'Place' in Place-Based Climate Action: Insights from Climate Adaptation Initiatives Across Scotland. In *Addressing the Climate Crisis*; Howarth, C., Lane, M., Slevin, A., Eds.; Springer International Publishing: Cham, Switzerland, 2022; pp. 15–25, ISBN 978-3-030-79738-6.
8. Beer, A.; McKenzie, F.; Blažek, J.; Sotarauta, M.; Ayres, S. 1. What Is Place-Based Policy? *Reg. Stud. Policy Impact Books* **2020**, *2*, 11–22. [CrossRef]
9. Climate Change (Emissions Reduction Targets) (Scotland) Act. 2019. Available online: https://www.legislation.gov.uk/asp/2019/15/enacted (accessed on 20 February 2024).
10. Yule, E.L.; Donovan, K.; Graham, J. The Challenges of Implementing Adaptation Actions in Scotland's Public Sector. *Clim. Serv.* **2023**, *32*, 100412. [CrossRef]
11. Scottish Government Climate Ready Scotland: Climate Change Adaptation Programme 2019–2024. 2019. Available online: https://www.gov.scot/publications/climate-ready-scotland-second-scottish-climate-change-adaptation-programme-2019-2024/ (accessed on 20 February 2024).
12. Climate Change Committee. Adapting to Climate Change—Progress in Scotland. 2023. Available online: https://www.theccc.org.uk/wp-content/uploads/2023/11/Adapting-to-climate-change-Progress-in-Scotland-Web.pdf (accessed on 20 February 2024).
13. National Audit Office. Government Resilience: Extreme Weather. 2023. Available online: https://www.nao.org.uk/reports/government-resilience-extreme-weather/ (accessed on 20 February 2024).
14. Carter, J.G. Urban Climate Change Adaptation: Exploring the Implications of Future Land Cover Scenarios. *Cities* **2018**, *77*, 73–80. [CrossRef]
15. *Intergovernmental Panel on Climate Change (IPCC) Climate Change 2022—Impacts, Adaptation and Vulnerability: Working Group II Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, 1st ed.; Cambridge University Press: Cambridge, UK, 2023; ISBN 978-1-00-932584-4.
16. Wisner, B.; Blaikie, P.; Cannon, T.; Davis, I. (Eds.) *At Risk: Natural Hazards, People's Vulnerability and Disasters*, 2nd ed.; Routledge: London, UK, 2010; ISBN 978-0-415-25216-4.

17. Adger, W.N.; Barnett, J.; Brown, K.; Marshall, N.; O'Brien, K. Cultural Dimensions of Climate Change Impacts and Adaptation. *Nat. Clim. Chang.* **2013**, *3*, 112–117. [CrossRef]

18. Juhola, S.; Keskitalo, E.C.H.; Westerhoff, L. Understanding the Framings of Climate Change Adaptation across Multiple Scales of Governance in Europe. *Environ. Politics* **2011**, *20*, 445–463. [CrossRef]

19. Adger, W.N.; Arnell, N.W.; Tompkins, E.L. Successful Adaptation to Climate Change across Scales. *Glob. Environ. Chang.* **2005**, *15*, 77–86. [CrossRef]

20. Walker, B.; Barrett, S.; Polasky, S.; Galaz, V.; Folke, C.; Engström, G.; Ackerman, F.; Arrow, K.; Carpenter, S.; Chopra, K.; et al. Looming Global-Scale Failures and Missing Institutions. *Science* **2009**, *325*, 1345–1346. [CrossRef]

21. Morgan, M.G.; Kandlikar, M.; Risbey, J.; Dowlatabadi, H. Why Conventional Tools for Policy Analysis Are Often Inadequate for Problems of Global Change. *Clim. Chang.* **1999**, *41*, 271–281. [CrossRef]

22. Moser, S.C.; Ekstrom, J.A. A Framework to Diagnose Barriers to Climate Change Adaptation. *Proc. Natl. Acad. Sci. USA* **2010**, *107*, 22026–22031. [CrossRef] [PubMed]

23. Wehn, U.; Rusca, M.; Evers, J.; Lanfranchi, V. Participation in Flood Risk Management and the Potential of Citizen Observatories: A Governance Analysis. *Environ. Sci. Policy* **2015**, *48*, 225–236. [CrossRef]

24. Collins, K.; Ison, R. Jumping off Arnstein's Ladder: Social Learning as a New Policy Paradigm for Climate Change Adaptation. *Env. Pol. Gov.* **2009**, *19*, 358–373. [CrossRef]

25. Tschakert, P.; Dietrich, K.A. Anticipatory Learning for Climate Change Adaptation and Resilience. *Ecol. Soc.* **2010**, *15*, 11. [CrossRef]

26. Termeer, C.J.A.M.; Dewulf, A.; Karlsson-Vinkhuyzen, S.I.; Vink, M.; Vliet, M. van Coping with the Wicked Problem of Climate Adaptation across Scales: The Five R Governance Capabilities. *Landsc. Urban Plan.* **2016**, *154*, 11–19. [CrossRef]

27. Capano, G.; Howlett, M.; Ramesh, M. Disentangling the Mechanistic Chain for Better Policy Design. In *Making Policies Work*; Capano, G., Howlett, M., Ramesh, M., Virani, A., Eds.; Edward Elgar Publishing: Northampton, MA, USA, 2019; ISBN 978-1-78811-819-4.

28. Kates, R.W.; Travis, W.R.; Wilbanks, T.J. Transformational Adaptation When Incremental Adaptations to Climate Change Are Insufficient. *Proc. Natl. Acad. Sci. USA* **2012**, *109*, 7156–7161. [CrossRef] [PubMed]

29. Dow, K.; Berkhout, F.; Preston, B.L.; Klein, R.J.T.; Midgley, G.; Shaw, M.R. Limits to Adaptation. *Nat. Clim. Chang.* **2013**, *3*, 305–307. [CrossRef]

30. Lonsdale, K.; Pringle, P.; Turner, B. *Transformative Adaptation: What It Is, Why It Matters & What Is Needed*; UK Climate Impacts Programme; University of Oxford: Oxford, UK, 2015; ISBN 978-1-906360-11-5.

31. Pelling, M.; O'Brien, K.; Matyas, D. Adaptation and Transformation. *Clim. Chang.* **2015**, *133*, 113–127. [CrossRef]

32. Klein, R.J.T.; Midgley, G.F.; Preston, B.L.; Alam, M.; Berkhout, F.; Dow, K.; Shaw, M.R. Adaptation Opportunities, Constraints, and Limits. In *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change*; Cambridge University Press: Cambridge, UK; New York, NY, USA, 2014; pp. 899–943.

33. Mustelin, J.; Handmer, J. *Triggering Transformation: Managing Resilience or Invoking Real Change?* University of Oslo: Oslo, Norway, 2013; pp. 24–32.

34. Keskitalo, E.C.H.; Preston, B.L. (Eds.) Introduction: Understanding Adaptation in the Context of Social Theory. In *Research Handbook on Climate Change Adaptation Policy*; Edward Elgar Publishing: Northampton, MA, USA, 2019; ISBN 978-1-78643-252-0.

35. Jones, C.; Hesterly, W.S.; Borgatti, S.P. A General Theory of Network Governance: Exchange Conditions and Social Mechanisms. *Acad. Manag. Rev.* **1997**, *22*, 911. [CrossRef]

36. Provan, K.G.; Kenis, P. Modes of Network Governance: Structure, Management, and Effectiveness. *J. Public Adm. Res. Theory* **2007**, *18*, 229–252. [CrossRef]

37. Dedeurwaerdere, T. The Contribution of Network Governance to Sustainable Development. *Les Semin. L'iddri* **2005**, *13*, 1–15.

38. Richards, D.; Smith, M.J. *Governance and Public Policy in the United Kingdom*; Oxford University Press: Oxford, UK; New York, NY, USA, 2002; ISBN 978-0-19-924392-1.

39. Hufty, M. *Investigating Policy Processes: The Governance Analytical Frame-Work (GAF)*; Martin, W.U., Hans, H., Eds.; Research for sustainable development 6; Geographica Bernensia; NCCR North-South: Bern, Switzerland, 2011; pp. 403–424. Available online: https://boris.unibe.ch/68343/ (accessed on 20 February 2024).

40. Thompson, G.; Frances, J.; Levacic, R.; Mitchell, J. (Eds.) *Markets, Hierarchies, and Networks: The Coordination of Social Life*; Sage Publications: London, UK; Newbury Park, CA, USA, 1991; ISBN 978-0-8039-8589-6.

41. Pahl-Wostl, C. A Conceptual Framework for Analysing Adaptive Capacity and Multi-Level Learning Processes in Resource Governance Regimes. *Glob. Environ. Chang.* **2009**, *19*, 354–365. [CrossRef]

42. Grubb, M.; Hourcade, J.C.; Neuhoff, K. *Planetary Economics: Energy, Climate Change and the Three Domains of Sustainable Development*; Routledge: New York, NY, USA, 2013; ISBN 978-0-415-51882-6.

43. Healey, P. Transforming Governance: Challenges of Institutional Adaptation and a New Politics of Space1. *Eur. Plan. Stud.* **2006**, *14*, 299–320. [CrossRef]

44. Hanssen, G.S.; Mydske, P.K.; Dahle, E. Multi-Level Coordination of Climate Change Adaptation: By National Hierarchical Steering or by Regional Network Governance? *Local Environ.* **2013**, *18*, 869–887. [CrossRef]

45. Bulkeley, H.; Marvin, S.; Palgan, Y.V.; McCormick, K.; Breitfuss-Loidl, M.; Mai, L.; von Wirth, T.; Frantzeskaki, N. Urban Living Laboratories: Conducting the Experimental City? *Eur. Urban Reg. Stud.* **2019**, *26*, 317–335. [CrossRef]

46. Jordan, A.; Huitema, D.; Schoenefeld, J.; van Asselt, H.; Forster, J. Governing Climate Change Polycentrically: Setting the Scene. In *Governing Climate Change*; Jordan, A., Huitema, D., van Asselt, H., Forster, J., Eds.; Cambridge University Press: Cambridge, UK, 2018; pp. 3–26, ISBN 978-1-108-28464-6.

47. Pahl-Wostl, C. Conceptual and Analytical Framework. In *Water Governance in the Face of Global Change*; Water Governance-Concepts, Methods, and Practice; Springer International Publishing: Cham, Switzerland, 2015; pp. 25–50, ISBN 978-3-319-21854-0.

48. Blanco, I. Analysing Urban Governance Networks: Bringing Regime Theory Back in. *Env. Plann. C Gov. Policy* **2013**, *31*, 276–291. [CrossRef]

49. Blanco, I.; Lowndes, V.; Pratchett, L. Policy Networks and Governance Networks: Towards Greater Conceptual Clarity. *Political Stud. Rev.* **2011**, *9*, 297–308. [CrossRef]

50. Boeije, H. *Analysis in Qualitative Research*; SAGE: Los Angeles, CA, USA, 2010; ISBN 978-1-84787-006-3.

51. Huitema, D.; Adger, W.N.; Berkhout, F.; Massey, E.; Mazmanian, D.; Munaretto, S.; Plummer, R.; Termeer, C.C.J.A.M. The Governance of Adaptation: Choices, Reasons, and Effects. Introduction to the Special Feature. *Ecol. Soc.* **2016**, *21*, art37. [CrossRef]

52. Nordgren, J.; Stults, M.; Meerow, S. Supporting Local Climate Change Adaptation: Where We Are and Where We Need to Go. *Environ. Sci. Policy* **2016**, *66*, 344–352. [CrossRef]

53. Biesbroek, G.R.; Klostermann, J.E.M.; Termeer, C.J.A.M.; Kabat, P. On the Nature of Barriers to Climate Change Adaptation. *Reg. Env. Chang.* **2013**, *13*, 1119–1129. [CrossRef]

54. Lee, T.; Painter, M. Comprehensive Local Climate Policy: The Role of Urban Governance. *Urban Clim.* **2015**, *14*, 566–577. [CrossRef]

55. Corfee-Morlot, J.; Cochran, I.; Hallegatte, S.; Teasdale, P.-J. Multilevel Risk Governance and Urban Adaptation Policy. *Clim. Chang.* **2011**, *104*, 169–197. [CrossRef]

56. Surface Water Management Planning Guidance. 2018. Available online: https://www.gov.scot/publications/flood-risk-management-scotland-act-2009-surface-water-management-planning/ (accessed on 20 February 2024).

57. Sayers, P.; Penning-Rowsell, E.C.; Horritt, M. Flood Vulnerability, Risk, and Social Disadvantage: Current and Future Patterns in the UK. *Reg. Environ. Chang.* **2018**, *18*, 339–352. [CrossRef]

58. Kazmierczak, A.; Cavan, G.; Connelly, A.; Lindley, S. Mapping Flood Disadvantage in Scotland 2015: Final Report to the Scottish Government. 2015. Available online: https://www.gov.scot/publications/mapping-flood-disadvantage-scotland-2015-main-report/ (accessed on 20 February 2024).

59. Aiton, A.; Berthier, A. Local Government Elections 2017. Available online: https://digitalpublications.parliament.scot/ResearchBriefings/Report/2017/5/19/Local-government-elections-2017-1-1 (accessed on 20 February 2024).

60. Campbell, A.; Burrowes, E. Financial Scrutiny Unit Briefing: Subject Profile—Local Government in Scotland. 2016. Available online: https://archive2021.parliament.scot/ResearchBriefingsAndFactsheets/S5/SB_16-69_Subject_profile_local_government_in_Scotland.pdf (accessed on 20 February 2024).

61. Climate Ready Clyde. Glasgow City Region Climate Adaptation Strategy and Action Plan. 2021. Available online: https://climatereadyclyde.org.uk/gcr-adaptation-strategy-and-action-plan/ (accessed on 20 February 2024).

62. Climate Ready Clyde. Climate Ready Clyde Risk and Opportunity Assessment Workshop. 2017. Available online: https://climatereadyclyde.org.uk/wp-content/uploads/2018/06/CRC-Risk-and-Opportunity-Workshop_8-November-2017_FINAL_For-circulation.pdf (accessed on 20 February 2024).

63. Climate Ready Clyde. Be Part of Adapting Glasgow City Region to Climate Change. 2018. Available online: https://climatereadyclyde.org.uk/wp-content/uploads/2018/07/Climate-Ready-Clyde-Prospectus.pdf (accessed on 20 February 2024).