Climate change adaptation and urban development: a genealogy of flood risk management in Glasgow

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Abstract
As cities increasingly implement climate change adaptation (CCA) projects, it is important to assess the potential long-term consequences of urban climate adaptation on socio-economic inequalities. As CCA is still in its infancy, observing long-term impact can be challenging. In this context, the historical study of past flood risk management (FRM) measures provides a useful proxy. This study uses Foucauldian genealogy to depict the inter-relationship between FRM and urban development in Glasgow, Scotland. Foucauldian genealogy seeks to unveil the complex historical processes, accidents and power struggles that form present institutions, narratives and governance practices. By applying a genealogical perspective, the study questions modern narratives of a FRM that (1) rely on sustainable solutions, (2) encourage cooperation, (3) foster individual responsibilisation and (4) contribute to urban regeneration. Our study shows how these seemingly apolitical framings tend to silence historical power struggles and socio-economic inequalities. Decisions around flood risk in Glasgow have traditionally benefited a small economic elite, whose members disproportionately influenced urban policymaking in the city. At the same time, less privileged parts of the population are largely absent from historical records. By accounting for the complexities of the past, our genealogy problematizes linear historical thinking and contemporary 'taken-for-granted' narratives of FRM and CCA. The study also highlights the role of power struggles in shaping these policies. Finally, it argues for including a larger range of perspectives in knowledge production, so as to better appreciate the incidental, complex, power-laden nature of both the past and the present.

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Summary

Historically perceived as large polluters, cities have recently been framed as potential solutions to the climate crisis (Angelo & Wachsmuth, 2020). Among other measures, cities are increasingly implementing climate change adaptation (CCA) projects (Chu et al., 2017; Anguelovski et al., 2016). However, researchers disagree on the consequences brought by urban CCA. Some portray urban climate adaptation as win-win, one-size-fits-all solutions, which can generate significant co-benefits (Newman & al, 2019; Mees & Driessen, 2011; Halegatte, 2009; Woodruff et al., 2018). Others argue that CCA projects can create and reproduce vulnerabilities, while also invisibilising power struggles around these decisions (Sovacool et al., 2015, Shi et al., 2016; Atteridge & Remling, 2018; Anguelovski et al., 2019b). Consequently, it is essential to better understand the potential unexpected consequences of CCA projects and policies, so as to avoid maladaptive outcomes (Atteridge & Remling, 2018; Barnett & O'Neil, 2010). As most CCA projects are still in their infancy, however, assessing their long-term impacts can prove challenging (Juhola et al. 2016).

In this context, historical studies provide valuable insights to CCA research (Adamson et al., 2018). Historical accounts help to document the impact of past adaptation measures — such as flood risk management (FRM) — and therefore assist to unveil the deep roots of inequitable adaptation (Shi, 2020b). At the same time, historical searches for origin often end up being overly simplified, linear and misleading (Foucault, 1977; Tamboukou, 1999; Garland, 2014). By embracing past complexities — *descent* — and power relationships — *emergence* — Foucauldian genealogy provides a useful tool to question the taken-for-granted nature of present CCA narratives, as well as their consequences for socio-economic inequalities. The study applies a genealogical lens to FRM and urban development to the context of Glasgow, a post-industrial city sited along the river Clyde on the west coast of Scotland. The choice of case study is motivated by Glasgow's long history of floods, which are expected to worsen in the coming decades due to climate change (SEPA, 2015; England et al., 2018; Climate Ready Clyde, 2020). In addition, Glasgow suffers from large socio-economic disparities and one of the highest flood disadvantage levels in Scotland (Kazmierczak et al., 2015; SIMD, 2020).

Our genealogy unveils the complex history of FRM and urban development in Glasgow. While FRM played only a marginal role in the urban development of the city, it is impossible to understand its modern characteristics without accounting for the many complexities which formed the city's past. After describing the chronological inter-relationship between FRM and urban development, our study questions modern narratives of FRM in Glasgow. Studying the past shows how modern narratives of sustainability, cooperation, regeneration and individual responsibilisation are far from apolitical, and instead tend to silence deeply rooted inequalities. Our genealogy contributes to the academic literature in three distinct ways. First, it criticises the "taken-for-grantedness" of modern narratives. Second, it serves to problematize linear historical thinking in FRM and CCA studies. Finally, it highlights the role of inequalities and power struggles in shaping what is often presented as apolitical measures, such as FRM and CCA policies. These insights, in turn, bring perspective to the academic literature on climate urbanism, green gentrification, maladaptation and resilience.

Abbreviations

CCA — Climate Change Adaptation

COP — Conference of the Parties

FRM — Flood Risk Management

NGO — Non-Governmental Organisations

UNFCCC — United Nations Framework Convention on Climate Change

SEPA — Scottish Environment Protection Agency

SIMD — Scottish Index of Multiple Deprivation

SUDS — Sustainable Drainage Systems

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1 Introduction

1.1 Background

The scientific evidence that the earth's climate is warming due to human activities is univocal (IPCC, 2018, Dow & Downing, 2011). Yet, there are a variety of framings of the issues that climate change poses to the planet and those who inhabit it (O´Neill, 2010). These different perceptions, in turn, dictate the framing of potential solutions, tools and responsibilities.

Increasing awareness of the already present and expected impacts of climate change fuels a perceived need and pressure for political action. From the early 2000s onwards, climate adaptation, along with mitigation measures, increasingly became a central topic for science, academia, NGOs, media and the public (Moser and Ekstrom, 2010). The mounting political pressure has resulted in decision makers implementing more climate change adaptation (CCA) projects (Chu et al., 2017; Anguelovski et al., 2016). As part of this shift, cities and urban spaces are increasingly framed as solutions to the climate crisis (Angelo & Wachsmuth, 2020). Accordingly, greenhouse gas mitigation and climate change protection are becoming priorities for city planners and urbanists (Castán Broto et al., 2020, p. 4). As shown by initiatives such as The Rockefeller Foundation's 100 Resilient Cities, the Global Covenant of Mayors for Climate and Energy or the C40 Cities Climate Leadership Group, cities are mobilising to face the climate crisis beyond traditional state actors and borders.

Along with this trend, urban decision-making processes, design and implementation of CCA solutions has become an intrinsic interplay of different actors' voices — some more dominating than others, all contributing to shaping the success or failure of these projects (Woroniecki et al., 2019, Sovacool et al., 2015). In this context, it is crucial to ask which stakeholders are included and excluded from CCA decisions and processes, who is benefiting and who is not. Indeed, CCA is all too often framed as an apolitical response to a clearly definable threat, offering a win-win opportunity for green urban development (Sovacool et al., 2015). However, scholars have highlighted that "green" interventions can result in exclusion or removal of the most socio-economically vulnerable population (Anguelovski et al., 2019a; Anguelovski et al., 2019b). As such, adaptation projects can generate unforeseen and inequalitarian consequences, for example by causing gentrification[1] or segregation (Anguelovski et al., 2018a; Shokri et al., 2020; Gould & Lewis, 2018). Altogether, these phenomena can bring a city on the path of maladaptation, increasing rather than decreasing its vulnerability to climate change (Atteridge & Remling, 2018; Barnett & O'Neil, 2010; Juhola et al. 2016). In addition, framings of CCA projects as apolitical tools aimed at reducing society's vulnerabilities can invisiblize potential unequal impacts (Anguelovski at al., 2019a).

[1] A process of "displacement of a lower-income population by a higher-income one through some combination of economic, physical and social upgrading" (Marcuse, 2015).

The literature has done much to "demystify" the portrait of urban green climate development as a public good (Anguelovski et al., 2019b). However, to date, it has paid limited attention to the deep roots of some of these phenomena. Concepts such as climate urbanism (Castán Broto & al, 2020) and climate gentrification (Keenan et al., 2018; Anguelovski et al., 2019a) tend to document the emergence of new climate impacts, without questioning how 'new' their underlying processes are. However, as argued by Shi (2020a, p. 51), "emerging urban responses to climate change are not necessarily new or urban". Consequently, a long-term perspective allows scholars to better understand the processes shaping CCA projects, without overlooking historical continuities and power inequalities embedded within them.

1.2 Purpose

While many urban CCA initiatives have only recently been implemented, cities have modified their geographical environments with the aim of reducing the impact of natural hazards for centuries (Pelling, 2011). As climate change is expected to generate sea level rise and increase the risk of flooding, studying the long-term consequences of past flood protection measures can help assess the potential impact of upcoming programs (Noble et al., 2014). At the same time, analysing the complexity of the past allows researchers to question present narratives — both those in favour and those against current FRM and CCA practices.

This study aims to conduct a genealogy[2] of urban FRM, in order to better understand current framings of CCA projects, as well as their potential future impact on social and spatial urban inequalities. From our analysis, we expect to identify relationships between FRM and urban development over time, so as to question the 'taken-for-grantedness' and 'newness' of current FRM and CCA framings. Adding to this, we hope to analyse competing narratives that have influenced this relationship, including how changes have been perceived, justified and/or challenged by different actors. The case study is Glasgow, a city that historically and currently experiences issues with flooding, as well as significant socio-economic inequalities. By studying the genealogy of flood risk management schemes in Glasgow, we hope to contribute to the academic literature on climate urbanism, maladaptation, resilience and green gentrification.

1.3 Research question

More specifically, the thesis aims to answer the following research question:

What is the genealogy of flood risk management and urban development in Glasgow?

[2] Foucauldian genealogy aims to reveal how a situation emerged from a complex interplay of past events (Dean, 1992, p. 217). The concept is further discussed in the conceptual framework.

1.4 Context

With a population of approximately 600.000 inhabitants, Glasgow is the third largest city in the United Kingdom (UK) and the biggest city in Scotland (Encyclopaedia Britannica, n.d.; Anguelovski et al., 2018b, p. 115). It is situated along the River Clyde, 32km upstream of the mouth of the river. Glasgow is the most ethnically diverse city in Scotland, with 15% of the population identifying as ethnic minority (Anguelovski et al., 2018b, p. 117). Glasgow also portrays significant economic inequalities, with 20.4% of the city's population defined as living in income deprivation (SIMD, 2020). With an average life expectancy of 72.9 years, it is the city with the lowest life expectancy in the UK (Anguelovski et al., 2018b, p. 117).

Climate change is expected to have a significant impact on the city. According to Climate Ready Clyde's technical report "climate risks and opportunities for Glasgow city region" (England et al., 2018), Glasgow faces 47 direct risks and 8 opportunities as a consequence of climate change. Among them, floods are expected to increasingly threaten infrastructures, homes, as well as new and existing business sites (England et al., 2018). Already, one third of the extremely surface flood disadvantaged neighbourhoods in Scotland are located in Glasgow. 65,250 people are estimated to be at risk from a 1 in 200-year flood event (Kazmierczak et al., 2015). Communities' flood risk is expected to further increase due to climate change (Sayers et al. 2017). Climate models estimate that Scotland will experience increased precipitation and extreme weather, which will worsen the risk of fluvial, pluvial and coastal flooding (SEPA, 2015, p. 3). Under a high emission scenario, the Clyde basin may increase its average peak river flow by 44% in 2080 (SEPA, 2015, p. 355). According to this scenario, the number of residential properties at risk of river flooding could increase from 7,800 to 12,000 (SEPA, 2015, p. 355). In this context, climate change is becoming a topic of concern for decision-makers in Glasgow. The city declared a climate emergency in 2019 and is expected to host the United Nation Framework Convention on Climate Change's (UNFCCC) 26th Conference of the Parties (COP) in November 2021 (Glasgow City Council, 2019). Finally, the city region is currently adopting a CCA strategy, aimed for implementation in 2021 (Glasgow City Council, 2020, p. 4).

1.5 Structure

The rest of this master's thesis will be structured as follows. First, we define key concepts and terms. Second, we describe our methodology, including ontological and epistemological assumptions, research strategy, data collection and data analysis method. Third, we present our findings and analysis in a two-part section, which highlights the chronological history of FRM in Glasgow before questioning current framing of CCA using a genealogical approach. Fourth, we discuss these findings — as well as some inherent limitations of our study. Finally, we end the research paper with a concluding section.

2 Conceptual Framework

This chapter aims to introduce a set of concepts, which will serve as central lenses throughout this master's thesis. These concepts are *Flood Risk Management, Climate Change Adaptation, Urban Development* and *Foucauldian Genealogy.*

2.1 Flood Risk Management

In order to define the concept of flood risk management, we must first define three related concepts: risk, risk management and floods.

First, floods — the most recorded disaster in the last decades — can take many forms (IFRC, 2020, p. 50). One way to categorise different floods is by event type. While a specific event may emerge from a mix of causes, scholars commonly consider at least five types of floods: pluvial, fluvial, coastal, groundwater and breaching (Becker, 2014, pp. 60-64). For the purpose of this thesis, three types will be of particular interest: pluvial, fluvial and coastal flooding. Pluvial flooding — also called surface water flooding — "occurs when rainwater does not drain away through the normal drainage systems or soak into the ground but lies on or flows over the ground instead" (SEPA, 2015, p. 394). Fluvial floods, also called river floods, occur when large amounts of water flow into rivers or watercourses, making them overflow their banks (Jha et al., 2012). Finally, coastal flooding "results from high sea levels or a combination of high sea levels and stormy conditions (...) it is also referred to as tidal flooding" (SEPA, 2015, p. 387).

Second, risk is defined as the "uncertainty about and severity of the consequences (or outcomes) of an activity with respect to something that humans value" (Aven & Renn, 2010, p. 3). Thus, assessing risk involves both measuring objective variables, such as the intensity and return period of a specific hazard, and accounting for value-laden statements about what 'humans value' (Hansson, 2010, p. 236). Following from this, risk management refers to the "coordinated activities to direct and control an organization [here, a city] with regard to risk" (ISO 31000, 2009, p. 2). For the purpose of this work, risk management will be defined in a broad way, including both actions purposefully targeted at risk and risk-modifying 'by-products' resulting from other interventions. Accordingly, in the context of this master's thesis, we will define flood risk management as the intended or unintended activities that reduce or alter the risk of pluvial, coastal or fluvial flooding.

2.2 Climate Change Adaptation

Climate change is "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods." (UNFCCC, 1992). While climate change is attributable to human activities, such as the release of greenhouse gases, climate variability refers to the natural variation of climate over time (IPCC, 2018).

Adaptation is defined as the “process through which an actor is able to reflect upon and enact change in those practices and underlying institutions that generate root and proximate causes of risk” (Pelling, 2011, p. 21). In turn, climate change adaptation can be defined as “the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities” (IPCC, 2012, p. 556). FRM can be conceptualised as a tool for CCA, especially with relation to the impact of sea level rising and increased precipitation patterns.

2.3 Urban Development

Urban development is difficult to define, as both the urban and development are complex, contested concepts (Iossifova et al., 2017; Potter et al., 2008). According to the Collins English Dictionary, urban development refers to “the development or improvement of an urban area by building” (Collins English Dictionary, n.d.). Urbanization and development are generally theorized as interlinked processes (Potter et al., 2008, p. 382). However, development is an inherently normative concept, insofar as it represents the preferred pathway of a set of actors at a given time (Becker, 2014, p. 131). Thus, according to Becker (2014, p. 131), development is the "preferred expected scenario of change in a set of variables over time, from a current to a desired state, and includes purposeful activities to drive or steer this change." Accordingly, for the purpose of this thesis, we define urban development as the past changes in the city’s built environment; preferred expected scenarios expressed by various actors with regard to the city’s future built environment; as well as tangible activities deployed towards this goal.

2.4 Foucauldian genealogy: a ‘history of the present’

Michel Foucault was a French philosopher and social theorist born in 1926 and deceased in 1984. He authored several foundational books, such as *Madness and Civilization* (1967), *The Order of Things* (1970), *Discipline and Punish* (1975) and *The History of Sexuality* (1978). From 1975 onwards, Foucault most often described his approach as genealogical (Garland, 2014, p. 371). Often referred to as a “history of the present’’ (Garland, 2014, p. 371), Foucauldian genealogy aims to reveal how a situation emerged from the interplay of “intelligible trajectories of events, discourses, and practices with neither a determinative source nor an unfolding toward finality" (Dean, 1992, p. 217). However, as Foucault did not provide any overarching set of procedures and guidelines, genealogy is best understood as a conceptual approach — a way to look at the present and its past — rather than a methodology as such (Tamboukou, 1999; Kearins & Hooper, 2002).

Instead of seeing the present as a result of a linear, rational chain of events, genealogies seek to unveil the complex processes, accidents and power struggles which give rise to present institutions and governance practices (Rostis, 2010, p. 417; Foucault, 1977). Genealogy does this by focusing on instances of *descent* and *emergence* in history. *Descent* aims to “identify the pre-contexts of the taken-for-granted” (Rostis, 2010, p. 417). It involves tracing back “numberless beginnings” to a current situation, in order to better understand the present (Rostis, 2010, p. 417). *Emergence* connects and relates the findings of descent and analyses them under the lens of power processes and relations of domination (Rostis, 2010; Tamboukou, 1999).

Importantly, genealogists — unlike traditional historians — "make no claims to any absolute truth, theirs is just one possible narrative among others" (Kearins & Hooper, 2002, p. 736). Thus, genealogy tends to adopt an inherently critical perspective towards the present, while simultaneously refusing to replace one truth with another (Owen, 1995). In its attempt to show that there is "discontinuity in the present social formations," genealogy helps us rethink the present, leading to a re-evaluation, a separation and an opening for new ways of thinking and being (Tamboukou, 1999, p. 203). As such, we believe it provides a valuable tool for questioning dominant narratives of FRM and CCA.

3 Methodology

3.1 Ontological and Epistemological assumptions

Before presenting our methodology, we will first describe our ontological assumptions — *how we think the world is* — and our epistemological assumptions — *how we think we can know about it*. We believe that there is a physical reality outside of the human mind: water, cement constructions and a warming planet exist, regardless of how different people perceive them. That said, since human senses are imperfect, the act of observing reality is inherently subjective and interpretive. Each individual makes sense of the world in differing ways, by inscribing a specific set of meanings into what they perceive of it. Throughout the study, we will therefore adopt an ontological perspective grounded in *cautious realism:* in order to produce knowledge, researchers must adopt a "cautious and critical attitude" towards their topics of research (Blaikie, 2010, p. 93). Accordingly, researchers must gather a wide range of evidence collected by a large variety of sources. These pieces of evidence can then be systematically analysed while reminding both ourselves and readers of the source's (and our own) bias. In addition, the study of narratives is especially useful to understanding how different individuals and groups perceive a physical reality, which unequally impacts them. Accordingly, our epistemological assumption can be defined as *constructivist* (Blaikie, 2010, p. 95; Crotty, 1998, p. 5).

3.2 Research Strategy

The relationship between FRM and urban development can best be analysed by collecting a wide range of data produced by a variety of actors over time and drawing a subjective generalisation from them. Analysing these varied sources enabled us to establish a detailed description of the relationship between FRM and urban development measures both at the time they were adopted and over time, up to the current situation. Accordingly, our overall logic of enquiry is inductive. An inductive research strategy aims to "establish limited generalization about the distribution of, and patterns of association amongst, observed or measured characteristics of individuals and social phenomena" (Blaikie, 2010, p. 83). More specifically, the study was conducted by building on Michel Foucault's genealogical approach (Foucault, 1977). Following the example of other contemporary scholars (see Kearins & Hooper, 2002; Miller & Rose, 2008; Dean, 2010), we used Foucault's work to develop our own methodological approaches. We now turn to present our methodology.

3.3 Methodology

3.3.1 Data collection process

Foucault (1977, p. 139) described genealogy as "grey, meticulous, and patiently documentary. It operates on a field of entangled and confused parchments, on documents that have been scratched over and recopied many times". As Foucault did not provide any guidance on how to conduct a genealogy, our data collection and analysis processes were designed iteratively, based

on relevant literature. At its core, genealogy involves some form of archival research (Kearins & Hooper, 2002). We relied primarily on document analysis and interviews.

Document analysis

In order to conduct our genealogy, we first assessed and mapped available documentary sources, including archives, historical data — maps, written testimonies, local newspapers, etc. — and current planning strategies. Data mapping was conducted using a snowball sampling method, during which relevant resources were identified from previously accessed sources or through the referral of previously contacted stakeholders (Creswell, 2013; Palinkas, 2015). This process was carried out until data saturation was reached, when consulting new stakeholders and examining documents did not lead us to further relevant sources. Mapped archives and documentary sources were then reviewed for relevance. After review, three archives were selected for further investigation: the University of Guelph's Scottish Studies Collection, the online British Newspapers Archive and the Scotsman Digital Archive. Document selection was largely dependent on the time coverage of the archives. The selected documents span from 1816 to 2009. Importantly, the choice of archive was partly constrained by the team's incapacity to physically travel to Scotland. Due to the Covid-19 pandemic, the country was under a lockdown and international travels were severely restricted for the entire research period. This meant that the team was unable to conduct archival research and interviews in Glasgow, as initially planned. Consequently, the choice of archives was made on the basis of those that were available online.

Document selection in the archives was performed as follows:

- The University of Guelph's Scottish Studies Collection was accessed through the website *Archive.org*. A text content research for "Glasgow", "flood", "Clyde" and "damage" identified 263 books written between 1840 and 1923. After reviewing the books' titles and abstracts and performing a keyword search for "flood" in the body of the text, a subset of 22 books were deemed relevant and purposefully selected for further analysis (Annex 1.A).

- The British Newspaper Archive was accessed via its online website. A keyword search for "Glasgow", "flood", "Clyde" and "damage", further limited to articles published in the Glasgow Herald, identified 1,923 articles written between 1822 and 1900. By first discarding coding mistakes — for example when the search engine mistakenly coded 'floor' for 'flood' — and then scanning remaining titles for explicit mentions of floods or flood management, a sample of 35 articles was selected for further analysis (Annex 1.B).

- The Scotsman Digital Archive was accessed via the National Library of Scotland's website. A keyword search for "Glasgow", "flood", "Clyde" and "damage" identified 628 articles written between 1823 and 1950. After scanning through the articles for coding mistakes and titles explicitly mentioning floods or flood management, 35 articles were purposefully selected for further analysis (Annex 1.B).

In addition, since archives did not cover present FRM and CCA frameworks in Glasgow, six current strategies and plans were selected for analysis and coding (Annex 1.C). The selection of current strategies and planning documents was performed using snowball sampling, following recommendations from interviewees and references from accessed documents. When information was still lacking, we performed targeted searches on Google Scholar, LUBSearch[3] and Glaswegian flood risk organisations' websites. A complete list of analysed sources can be found in Annex 1. We provide reference to the page numbers for these sources when available. Importantly, while one of the two team members had some previous knowledge of the city, neither of us have lived in Glasgow. Conducting interviews with key actors within the FRM sphere, all based in or around Glasgow, helped us to mitigate this limited contextual knowledge. Additionally, attending Scotland's Flood Risk Management Conference 2021 allowed us to further contextualize the information given by the interviewees, strategies and plans.

Interviews

To complement the document review, six semi-structured interviews were conducted with professionals from five key organisations active in Glasgow's FRM scene, and one tenant union. Three of the interviewees were male and three female. Our strategy for purposeful sampling of interviewees was based on a snowball method, with earlier contacts suggesting relevant stakeholders to interview (Palinkas, 2015). Interview guides were constructed based on a general interview guide approach, which allowed us to construct open-ended questions with the flexibility of asking follow-up questions (Turner, 2010). The following were considered when designing the interview guide: a) wording allowing open ended questions, b) using neutral language, c) using clear and understandable language, d) posing one question at a time (McNamara, 2009 as cited in Creswell, 2009). The interview questions were developed based on the construction of sub-questions of the main research question. New questions arising during data analysis were later included in the interview guide. An interview guide template can be found in Annex 2.

Importantly, while we could secure interviews with several major actors of FRM in Glasgow, we were unable to access one of the most central stakeholders. The Scottish Environmental Protection Agency (SEPA) — which issues flood warnings and forecasts, designs flood maps and publishes FRM strategies in Scotland — suffered a major cyber-attack on the 24th of December 2020. As a result, the agency was unreachable for the entire period of data collection. None of our other informants could provide us with contact details of stakeholders at the agency, as all SEPA email addresses had been deactivated following the attack.

3.3.2 Data analysis method

The data analysis for this project followed an iterative process, with coding performing a transitional and cyclical act between data collection and data analysis (Saldaña, 2015). While collecting the data, a qualitative analysis was used to assess the available sources and define key narratives, based on Foucault's concepts of *descent* and *emergence*, as described in the

[3] "The collective entry point to all the Lund University libraries' resources" (Lund University Libraries, n.d).

conceptual framework (Foucault, 1977; Creswell & Plano Clark, cited in Blaikie, 2010, pp. 224-225). The data gathered during the interviews was compiled and grouped into narratives, creating a coding system constituting similar thoughts, expressions, themes, etc. Using Nvivo, we performed the first coding phase of documents and interview transcripts simultaneously with the data collection. During this phase, we developed a "pragmatic stance" (Kearins & Hooper, 2002, p. 742) — or working hypothesis —, wherein initial coding led us "from the data to the idea, and from the idea to all the data pertaining to that idea" (Richards & Morse, 2007, p. 137, cited in Saldaña, 2015, p. 8). This process, in turn, directed our data collection efforts and informed modifications to our interview guide, so as to tease out contradictions and contingencies in the data (Kearins & Hooper, 2002). After finishing the collection of data, we then delved back into the documentary sources and performed a second round of coding using Nvivo, with the aim of testing our stance and developing theoretical categories of analysis (Kearins & Hooper, 2002). The result of this process — the genealogy itself — is presented in the next section.

Importantly, since genealogies result from the interpretation of past events, the previous knowledge, values and the unique position of researchers inevitably influence the results. Similarly, genealogies are influenced by the type of secondary sources accessed, as well as these sources' biases. We have aimed to acknowledge the potential biases of our sources — as well as our own — throughout.

4 Findings and analysis

This chapter, which describes the results of our analysis, follows a two-step approach. The first section depicts a traditional historical timeline of FRM in Glasgow, highlighting significant trends and changes over time. The second section draws on this chronological account — together with interviews with key stakeholders and analysis of current plans and strategies — to identify four characteristics of modern FRM in Glasgow. A genealogical lens is applied throughout the second section, to question the 'newness' and 'taken-for-grantedness' of each characteristic. By applying concepts of *descent* and *emergence*, genealogy highlights the role of complexities and power struggles in forming the present. This approach allows us to showcase the power of Foucauldian genealogy in bringing perspective and depth to the taken-for-granted (Dean, 1992). By presenting a chronological narrative before deconstructing it, we question linear narratives of FRM, while at the same time displaying the relevance of Foucauldian thinking for urban policymaking.

4.1 Flood risk management and urban development: a chronological perspective

4.1.1 Natural occurrence of floods

Early settlement

Ghlaschu — the small village that would eventually become Glasgow — was situated on high grounds to the north of the Clyde river and, according to Riddell (1979, p. 7) "those who built houses there [...] were no doubt content to be well clear of the Clyde's marshy, flood-prone banks." Inhabitants only turned towards the Clyde for fishing once Ghlaschu merged with Fishergate, a fishermen's settlement situated closer to the river (Riddell, 1979, p. 8). Other villages, which would eventually merge with Glasgow, also developed along the river. Govan's church, for example, first built in the 6th century, is located right next to the Clyde (Dalglish and Driscoll, 2009, pp. 11-12).

The Clyde formed a shallow river, meandering 170 km from the Scottish moorlands[4] to the Atlantic Ocean. (Gillespie, 1876, p. 87). The inability of the water current to dredge the riverbed, largely composed of a hard crust of sand, gravel and stones, meant the Clyde remained parsed with sand banks and islands until the mid-eighteenth century (Cleland, 1816). These features, which can be seen on a 1662 map of the Baronie of Glasgow (Figure 1), prevented even small boats from navigating the river (Ridell, 1979, pp. 8-9). At some places, the Clyde was so shallow it could easily be crossed by wading through the water (Dalglish and Driscoll, 2009, p. 11).

[4] "An area of open and usually high land with poor soil that is covered mainly with grass and heather." (Collins dictionary, n.d.)

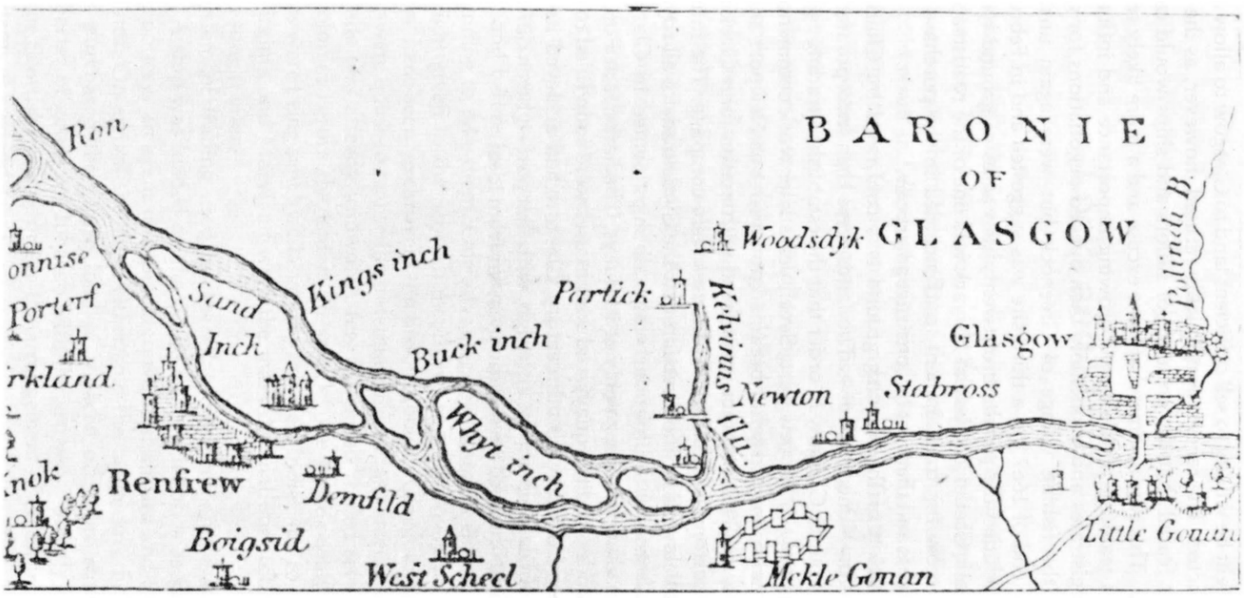

Figure 1: Part of the map of the Clyde by Blaeu, 1662. Retrieved from Riddell (1979, p. 9).

Due to the lack of large riverbanks and the irregular structure of the shore, high tides or heavy rainfall made the river easily swell into surrounding lands (Riddell, 1979; Cleland, 1816). Thus, floods seem to have been part of everyday life for inhabitants along the Clyde (Riddell, 1979; Cleland, 1816). The earliest record of flooding dates back to 738 AD, with floods featured in many historical accounts of Glasgow (Dalglish and Driscoll, 2009; Pagan, 1884; WWF, 2002). In 1454, for instance, a heavy flood was recorded in Govan, causing severe destruction and forcing people to take refuge on their rooftops (Marwick et al., 1909, p. 162; Dalglish and Driscoll, 2009, p. 19). Another large flood was recorded in 1712, with the river rising 5,4 meters above its ordinary water levels, causing major damage to properties (Gillespie, 1876, p. 87). The following depiction of the 1712 floods by an eyewitness, Mr James Duncan, gives us an idea of the level of the water at the time:

> *"[Mr Duncan] saw a boat swim* over *the bridge at the foot of the Saltmarket and swim up the street opposite"* (MacGeorge, 1880, p. 238, emphasis added).

The first known attempt to deepen the river occurred as early as 1556, with inhabitants from Glasgow, Renfrew and Dumbuck taking turns to work on removing a ford in Dumbuck, as well as some large sandbanks along the river (Riddell, 1979, p. 8). It is however unclear whether these early efforts were directed at reducing floods or rather at improving navigation. There was little improvement to the Clyde prior to the mid-eighteen century and fluvial floods happened seasonally (Marwick, 1909; Dalglish and Driscoll, 2009, p. 52). During that time, pluvial flooding was rarely mentioned in flood testimonies. This can be explained by the large amounts of vacant, drainable land in and around Glasgow, which likely prevented urban areas from pluvial flooding (Riddell, 1979).

Deepening the Clyde: navigation, trade and fluvial floods

While there were early attempts to modify the river's natural shape by removing rocks, fords and sandbanks, more prominent efforts to deepen the Clyde only began in the mid-eighteen century (Marwick, 1909, p. 5; Dalglish and Driscoll, 2009, p. 52). Importantly, the costly and unprecedented modifications of the riverbed that would take place over the next century were not prescribed as a way to reduce flood risk, but rather as a mean for economic development. Following Scotland's union with England, in 1707, Scottish traders started to benefit from the products of oversees British colonies, such as the cotton and tobacco grown by slaves in the United States of America (Riddell, 1979, p. 15). By 1720, tobacco had become Glasgow's main export trade, generating large economic gains for the city (Riddell, 1979, p. 15). During the eighteenth century, 'tobacco lords' — as some tobacco merchants were called at the time — greatly increased their influence on the city, to the point that "[their] wishes and aspirations [...] became to a large extent the wishes and aspirations of Glasgow itself" (Riddell, 1979, p. 15). One of these wishes was to widen and deepen the Clyde to facilitate transport along the river (Riddell, 1979, p. 15; The Scotsman, 1872a). In 1736, under pressure from the tobacco lords, the Glasgow Council appointed a committee to experiment clearing a small portion of the Clyde from its sand banks (Marwick, 1898, p. 24). While this experiment was expanded in 1740, the first act of parliament allowing physical modification of the Clyde river and harbour was not passed until May 1759 (Marwick, 1909, p. 177). The tobacco lords, who perceived the lack of a reliable transport system between Glasgow and nearby seaports as an economic constraint, were in favour of constructing a system of locks and dams along the river (Riddell, 1979). Despite financial concerns from Glasgow Council and the population's fear that building weirs[5] along the river would result in greater flooding, the project went ahead in 1760 (Riddell, 1979). This is a testament both to the tobacco trade's influence and the limited consideration of flood risk by decision-makers at the time. The building work, subsequently interrupted by floods in 1760 and 1761, was finally deemed unrealisable and abandoned in 1762, due to the impracticability of building a solid structure on the sandy banks of the river (Riddell, 1979).

To the best of our knowledge, the military survey of Scotland conducted by William Roy between 1747 and 1755, represents the last map of a largely unmodified river (Figure 2). Substantial and structural deepening of the Clyde finally started in 1770. At that time, Glasgow Council voted for the construction of "protruding jetties[6] to narrow the channel and to funnel the natural scouring action of the river" (Dalglish & Driscoll, 2009, p. 52). By constraining the river to a narrower bed, these modifications created a stronger water-flow, thereby increasing the natural ability of the river to dredge its own bed (Dalglish & Driscoll, 2009, p. 52). This natural form of dredging continued throughout the 1780s and 1790s, until the river reached an average depth of 1.5 to 2 meters (Dalglish & Driscoll, 2009, p. 52). At the beginning of the 19th century, a programme was put in place to join the jetties with longitudinal walls, so as to further strengthen the river flow (Riddell, 1979, pp. 57-69). Physical changes to the riverbanks must have been prominent at this point and were even represented on a map of the county of Renfrew, dated 1800 (Figure 3). By the 1820s, the limit of the river's natural scouring action had been

[5] "A low wall or barrier built across a river in order to control the flow of water or change its direction". (Oxford Learner's Dictionary, n.d.)

[6] " A structure built from a shore out into the water to direct currents or protect a harbour". (Collins dictionary, n.d.)

reached and the deepening was continued by artificial dredging of the riverbanks (Figure 4) (Dalglish and Driscoll, 2009, p. 52).

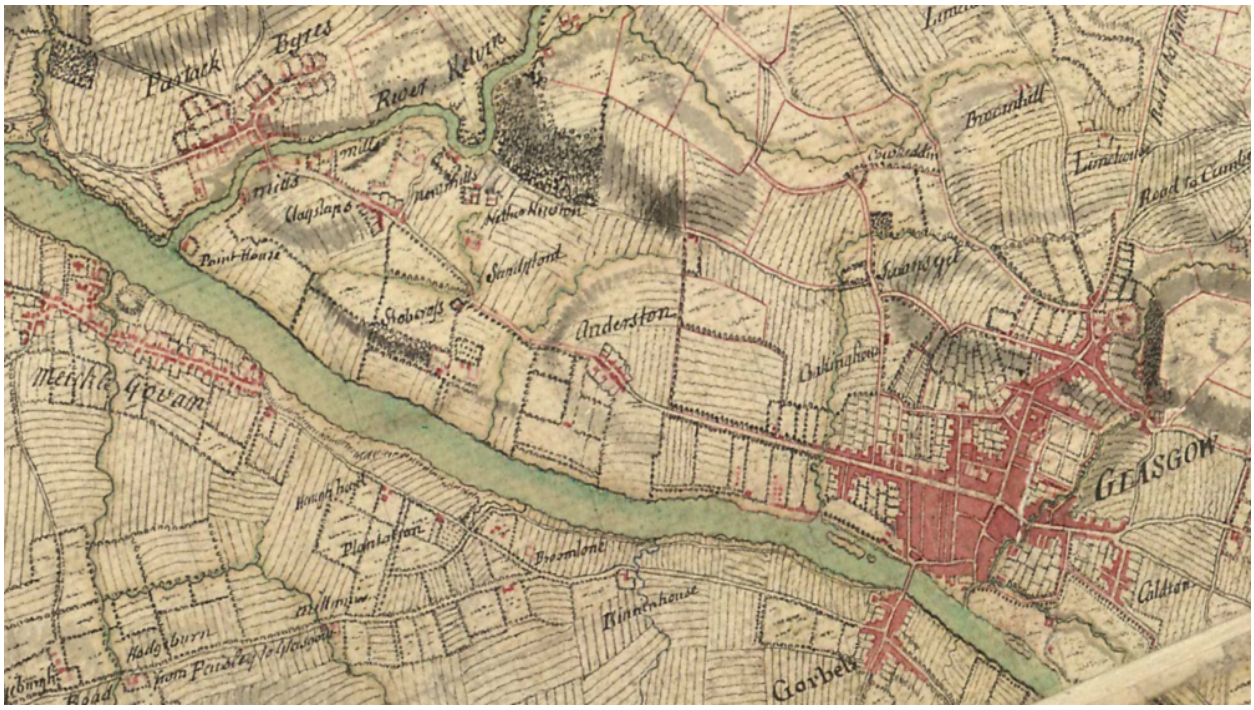

Figure 2: William Roy's Military Survey of Scotland, 1747-55, the last known depiction of the Clyde before structural modifications of the river. Available at https://maps.nls.uk/roy/index.html.

Figure 3: John Ainslie's *Map of the County of Renfrew* (1800), showing physical alterations of the river's banks. Available at https://maps.nls.uk/joins/669.html.

While these efforts steadily increased the depth of the Clyde over time (Figure 5), the risk of river floods seems not to have decreased until the mid-nineteenth century. Exceptional flood events were recorded throughout the eighteenth and nineteenth century, in 1782, 1794, 1795, 1808 and 1816, among others (MacGeorge, 1880, pp. 238-239, Pagan, 1884, pp. 118-119 & p. 381). In 1782, for instance, the river rose approximately six meters above its usual level, generating severe damage.

On that occasion, as described in the Scots Magazine of 14th March 1782:

> *"The inundation was sudden and unexpected. Hundreds of families were obliged to leave their beds and their houses. A particular account of the damage which individuals have sustained cannot be ascertained, but the loss in tobacco, sugar, and other merchandise carried away by the river or spoiled by water will amount to a very large sum. A young woman in the Gorbals was drowned; and a woman in Partick, thinking herself in safety, refused to leave her house, and being afterwards removed from it by her neighbours, expired in half an hour. A great number of horses and cows, which could not be removed from the stables or byres, were drowned"* (Pagan, 1884, p. 119).

Similarly, on the 18th of November 1795:

> *"The Bridgegate is completely inundated, and boats plied along its waters to supply with food the inmates of houses who were detained prisoners in the upper portions of their dwellings. All the arches of the fine new bridge across the river, opposite the Saltmarket, which had been passable on foot, fell in, one after another; and cows, sheep, and much agricultural produce were carried away by the rapidity of the torrent, and lost"* (Pagan, 1884, pp. 118-119).

Despite these catastrophic events, our research found very few attempts to purposefully alter flood risk prior to the nineteenth century. In fact, settlements around Glasgow appeared to have been frequently flooded, with little recorded efforts to purposefully reduce flood hazard or vulnerability. St. Andrew's Church, for example, was built in 1808 on Clyde Street, an area that had suffered several floods in prior decades (Pagan, 1884, p. 251). From its construction up until the mid-nineteenth century, the church was frequently flooded (Pagan, 1884, p. 229). In 1816, the water even reached "such a height as not only to cover the humble situation of the clerk, but even to bathe in its waters the footstool of the more dignified pulpit" (Pagan, 1884, p. 251). One notable exception was observed in 1772, when a weir was built to protect the foundation of the Broomielaw Bridge, which was then threatened by a flood (Ridell, 2000, p. 55). However, the construction of this early flood protection measure did not seem to have been premeditated:

> *"On the occasion of a small flood in the river, a report arose of the Broomielaw Bridge being unsafe, and that its foundations were undermined. This happened upon a Sunday. The magistrates of Glasgow, notwithstanding the sanctity of the day, instantly ordered a number of carts to be hired, to carry stones to the bridge; and I recollect seeing the carters, on the said Sunday, tossing these stones over the bridge into the river, so as to form a dam across the stream for the protection of the bridge"* (Pagan, 1856, p. 288).

Other testimonies tell us that individuals took action on their own account to reduce their flood risk. In 1788, for example, a local esquire called Robert Houston single-handedly raised the riverbank to protect his recently bought property (Pagan, 1856, p. 282). However, this example of individual action hardly illustrates broader awareness of FRM in Glasgow at the time.

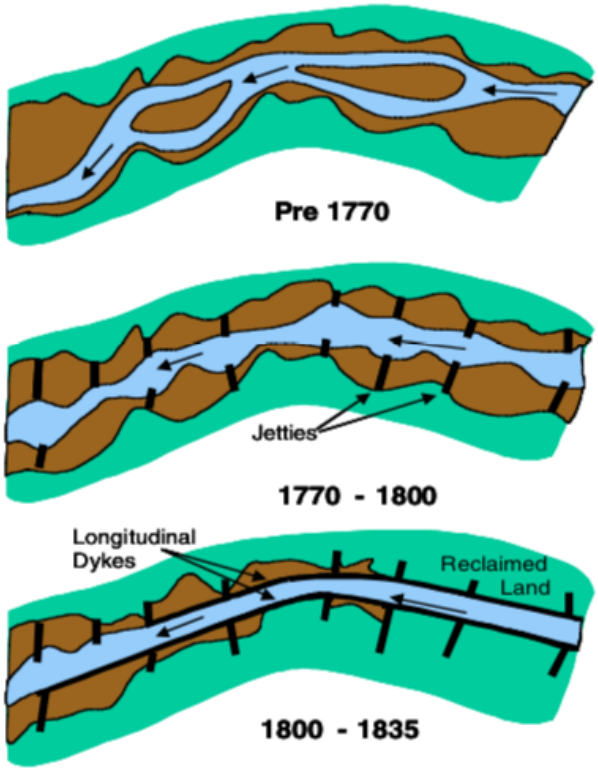

Figure 4: Physical modifications of the Clyde between 1770 and 1835.
Retrieved from WWF, 2002, p. 8.

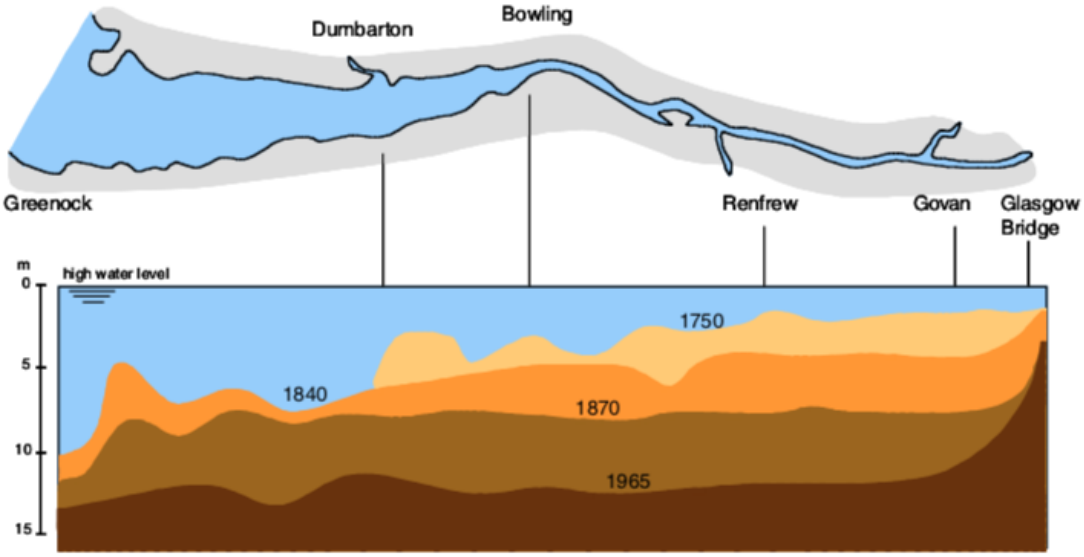

Figure 5: Effect of dredging on the bed of the Clyde, from 1750 to 1965.
Retrieved from WWF, 2002, p. 8.

4.1.2 Flood as a problem to manage

From fluvial to pluvial flooding

Glaswegians seem to have accepted the regular occurrence of floods for centuries. Loss of life to flooding remained minimal and the water usually spilled along undeveloped flood plains (Riddell, 2000). Except in times of exceptional floods, the water only caused limited damage to buildings, mostly sited on higher grounds (Riddell, 2000, p. 53). However, with the nineteenth century bringing greater prosperity to Glasgow, this state of affairs changed. As the deepening of the river allowed for bigger ships to reach the city, a class of merchants, shipbuilders and shipowners settled along the banks of the Clyde (Riddell, 2000). More exposed, their warehouses, factories and boats started to suffer repeated damage from flooding (Riddell, 2000). Following repeated complaints from the merchants, the magistrates of Glasgow decided to investigate the cause of the flooding. While the occurrence of exceptional flood events between 1770 and 1830 did coincide with early modifications of the riverbed, the relationship between the two phenomena was not straightforward. In 1799, a report written by engineer John Rennie did not attribute the floods to the alterations of the river (Riddell, 2000, p. 54). Instead, according to him, flooding was due to the "building up of land, the paving of streets and the intensification of agriculture" in the catchment area of the Clyde, which "channelled [rainwater] into gutters, drains and streams, all of which led to the river" (Riddell, 2000, p. 54). According to Rennie, continued development along the river would likely worsen future flooding (Riddell, 2000, p. 54). Instead of limiting urban sprawling, however, the engineer proposed that further deepening of the Clyde should be undertaken (Riddell, 2000, p. 54). This would allow the river to contain larger amounts of water without overflowing its banks.

Glasgow's shipping industry, which began to take form in the 1830s and 1840s, eventually came to dominate the global market. Along with the rise of economic opportunities, the city's population grew significantly during the nineteenth century (Dalglish and Driscoll, 2009, p. 101). From a population of 30,000 people in 1770, Glasgow's population increased more than ten times in 70 years, reaching 350,000 in 1851 (Marwick, 1898, p. 42 & 35) and 656,185 inhabitants in 1891 (Smith & Wannop, 1985, pp. 6-7). As the shipbuilding industry expanded, so did its influence on the river's waterfront (Dalglish and Driscoll, 2009, pp. 81-82). The early editions of the Ordnance Survey from the 1850s (Figure 6), 1890s (Figure 7) and 1900s (Figure 8), clearly illustrate the vast development and urbanisation that took place along the Clyde during this time. The completion of the Queen's Dock in 1880, for example, clearly shows the influence of shipbuilding on the waterfront at the time (Riddell, 2000, pp. 205-215). This changing landscape becomes even more striking when comparing these maps with William Roy's Military Survey of Scotland, 1747-55 (Figure 2).

Figure 6: First edition Ordnance Survey 1:10, 560 map, 1857–58. Available at https://maps.nls.uk/view/74427695.

Figure 7: Second edition Ordnance Survey 1:10, 560 map, 1893–94 available at https://maps.nls.uk/view/75650634.

Figure 8: Third edition Ordnance Survey six inch map, survey 1909, available at https://maps.nls.uk/view/189685536.

Throughout the nineteenth and twentieth century, the destructive influence of floods on urban development and economic activities was frequently mentioned in the Scotsman and the Glasgow Herald. Out of the 70 newspaper articles analysed, 39 mentioned the impact of floods on properties, agricultural yield or transportation. Different types of damage can be identified from the documents. First, the impact of floods on agriculture and trade is prevalent. In 1875, for instance, an article from The Scotsman (1875c, p. 3) reports damage to "large amounts of grain" and that "all the potatoes near the Clyde are covered in water". One century later, the same newspaper wrote that floods generated "severe damage to both standing crops and stacked corn" (The Scotsman, 1948b, p. 3). Second, newspapers often highlight the impact of floods on properties. The review of article subtitles from the Glasgow Herald exemplifies this point: "Serious damage to property" (Glasgow Herald, 1880a, p. 5), "Damage to property and serious floods" (Glasgow Herald, 1893, p. 5); "Serious floods and damage to property" (Glasgow Herald, 1895, p. 7), "Much Damage to Property" (Glasgow Herald, 1898b), etc. Third, flooding also damaged critical infrastructures. In 1872, for example, a flood breached the embankments protecting a graving dock under construction. The flood delayed the work and generated significant material damage, costing "a large sum of money" to Glaswegian taxpayers (The Scotsman, 1875b). Throughout the time period, destructions of bridges, quay walls, embankments, etc. are frequently mentioned. Fourth, flood damage is often mentioned in relation to transportation issues. In 1846, for example, the wooden bridge at Portland street had to be shut down during a flood, as a protection measure for the population (Glasgow Herald, 1846). In 1910, flooding "seriously interfered with the tramway and other street traffic" (The Scotsman, 1910, p. 5). In 1919, flooding rendered "roads temporarily impassable" (The Scotsman, 1919, p.6), while in 1945, "buses and traffic had to be diverted" because of the water (The Scotsman, 1945, p. 5). Interestingly, based on the newspaper articles analysed, mentions of disrupted transportation increased from the beginning of the twentieth century onwards.

While floods impacted urban development, the fast growth of Glasgow and the Clyde waterfront from the mid-nineteenth to the mid-twentieth century also impacted flood risk. Two main trends can be observed. On one hand, the canalisation and deepening of the Clyde, primarily aimed at facilitating navigation and trade, eventually came to provide efficient protection against coastal and fluvial floods (Ridell, 2000). In 1835, James Walker, a consulting engineer commissioned by the Clyde Trustees, foresaw that dredging the riverbed would "do much towards the removal of these evils (i.e. the floods)" (Ridell, 2000, p. 111). In July 1874, for example, the completion of Plantation Quay provided protection to "the south side of the Clyde from Glasgow Bridge to Kelvinhaugh Ferry" (The Scotsman, 1875b, p. 4). In fact, as the Clyde got deeper and its banks consolidated by quay walls, there was a decrease in the number of newspaper articles mentioning the Clyde overflowing its banks. On the other hand, urban development along the Clyde replaced floodable land and green space with less drainable surfaces, thereby increasing waterflow to the sewers and rivers (Figure 9). The shrinking green space becomes apparent when comparing a 1778 map from McArthur (Figure 10) with a contemporary satellite image (Figure 11). While the Clyde itself could mostly cope with the increased water flow, most floods reported in the news during the twentieth century resulted either from failures in the drainage system or in tributaries of the Clyde — such as the Kelvin or the Cart — overflowing their banks. In 1919, for example:

> *"The gratings*[7] *got choked with rubbish, and the torrents ran down the streets and collected into lakes"* (The Scotsman, 1919, p. 6).

Or again, in 1930:

> *"In some of the suburbs, drainpipes and sewers were unable to cope with the deluge, and, within a short time, streets were turned into rivers" (*The Scotsman, 1930, p. 9).

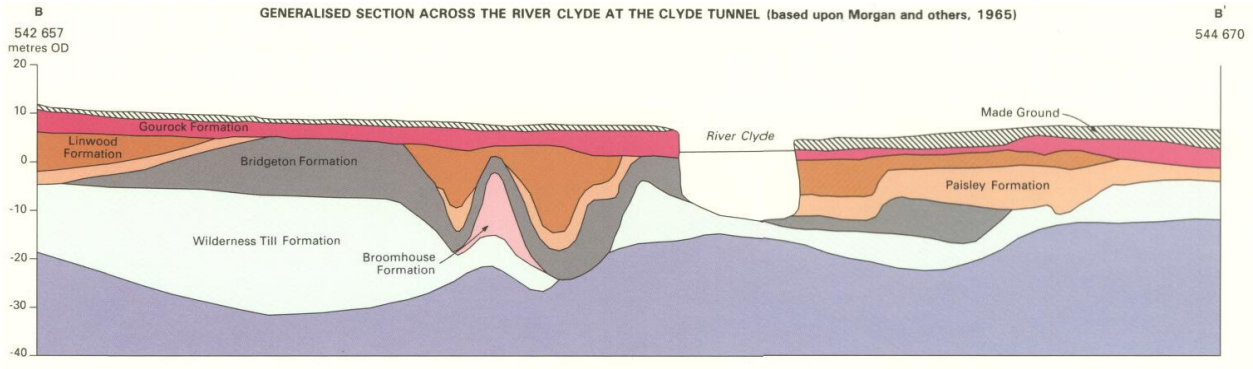

Figure 9: Cross section of the river Clyde (1994), showing the extent of soil artificialization, available at https://webapps.bgs.ac.uk/data/maps/maps.cfc?method=viewRecord&mapId=11013.

[7] "A flat frame with metal bars across it, used to cover a window, a hole in the ground, etc.' (Oxford Learner's Dictionary, n.d.)

Figure 10: Map from McArthur (1778), available at: https://maps.nls.uk/geo/explore/#zoom=15&lat=55.85612&lon=-4.25798&layers=126160581&b=1

Figure 11: Present day satellite image, available at: https://maps.nls.uk/geo/explore/#zoom=15&lat=55.85612&lon=-4.25798&layers=126160581&b=1

Frameworks of flood risk management

Up to the twentieth century, there was no overall framework to manage floods in Glasgow. Instead, and at best, Glaswegian landowners managed flood risk on their own, for example by draining wetlands, constructing bank revetments[8] or raising flood embankments (Werritty and Hoey, 2002. p. 5). However, along with the increasing damage described above, policies to manage rivers started to appear at the end of the 19th century. According to newspaper articles of the time, these policies were partly justified by concerns for the mounting impacts of flooding on economic development in the UK.

[8] "Stones or other material used to make a wall stronger, hold back a bank of earth, etc." (Oxford Learner's Dictionary, n.d.)

For example, an 1881 article reporting on readings at the House of Lords quotes:

> *"Something must be done to put a stop to an evil which is every year becoming more and more intolerable. The damage to property of all kinds by the frequent recurrence of floods is so great, and the interruption they cause to so many industries has lately been so forcibly demonstrated, that by general consent the time has arrived when some settlement of the question must be reached"* (Glasgow Herald, 1881b).

This particular reading concerned the Rivers Conservancy Bill, which aimed to better manage floods in England and Wales. Much to Glasgow's defeat, Scotland was not included in the proposal (Glasgow Herald, 1881b). Disappointed, the Glasgow magistrates decided to put forward their own proposal, suggesting creating a Conservatory Board, whose aim would be to preserve the riverbanks and control operations along the Clyde and its tributaries (Glasgow Herald, 1881a). This would ultimately also help to reduce flooding.

In the past, as shown above, the actors managing FRM in the city were mainly those that developed the Clyde, even though individual landowners also played a role. This state of affairs began to change in the 20st century with the emergence of new actors dedicated to river management. In the 1950s, River Purification Boards were established to regulate water quality and sustain commercial fisheries. One of their tasks was to develop a river gauging network, which was then used as a flood-warning scheme from the 1970s onwards (Werritty & Chatterton, 2004, p. 6). The Flood Prevention Act of 1965 recognised local authorities' right to tackle floods outside their administrative boundaries (Werritty & Chatterton, 2004, p. 6). The Scottish Environmental Protection Agency (SEPA) was founded in 1996 to protect and improve the environment and quickly became a crucial actor (Scottish Government, 2015). The increasing number of actors managing flood risk eventually led to rather fragmented responsibilities (WWF, 2002, p. 4). As highlighted by one of the interviewees:

> *"There has always been an element of blame and pushing things around. Because when it comes to surface water, there are so many different responsible parties in Scotland".*

To remedy this, the 2009 Flood Risk Management Act clarified the responsibility and role of different FRM actors. Today, SEPA has the mandate to manage flood risk on a strategic level in Scotland, facilitating coordination and information delivery (SEPA, 2015). The organisation also produces risk assessments and carries out forecasting and flood warning services (SEPA, 2015). Scottish Water has a public drainage duty and is responsible for foul drainage, drainage of rainwater run-off and assisting property sewage flooding (SEPA, 2015). In addition, local authorities work jointly to plan FRM and implement flood protection actions. Together, these actors bear the primary responsibility for FRM in Scotland (SEPA, 2015). Individuals have a responsibility to protect themselves against flooding, and riparian owners[9] are responsible for maintaining and preventing water courses from deteriorating (The Metropolitan Glasgow Strategic Drainage Partnership, n.d). The individual landowner's responsibility goes back to at

[9] Ownership of land that is located either next to a watercourse, has a watercourse running through or beneath the land (Thomson Reuters Practical law, n.d.).

least 1948, with the Land Drainage (Scotland) Act, which made individual riparian owners the primary responsible for flood defence (Cook, 2017, p. 78).

Economic decline and climate change

Many factors have contributed to shaping FRM in Glasgow at the end of the twentieth and the beginning of the twenty-first century. We highlight two major trends in this section: Glasgow's struggling economy and the rising awareness of climate change.

The early 20th century proved to be a volatile period for the city´s industrial economy, with an overall decrease in industry interrupted by temporary recoveries (Pike, 2017). However, following the steady decline of shipbuilding from the 1920s onwards, the 1960s marked the final defeat of the industry on which Glasgow had flourished (Dalglish and Driscoll, 2009, pp. 81-82). Consequently, Glasgow's long-term deindustrialisation left large parts of the Clyde waterfront to decay (Glasgow City Council, 2007, p. 6). As a result, the rivers quay walls, which since their installation protected the city from floods, have suffered a lack of maintenance (Glasgow City Council, 2007, p. 6). Recent studies show that very few of the walls live up to current standards (Glasgow City Council, 2007, p. 6). This lack of investment threatens to increase flood risk in the future. The economic decline continued throughout the 1970s, during which the city struggled with limited investment, a declining population and high unemployment (Pike, 2017). The economic downfall eventually came to stabilize during a period of low and slow growth (Figure 12) (Pike, 2017, p. 17). The 2008 financial crisis put an end to this era and Glasgow saw further economic decline in the 2010s, also marked by austerity — "the scaling back of government functions in response to budgetary pressures" (McKendrick, 2016, p. 3). The economic recovery since then has been weak (Pike, 2017, p. 17). In 2020-2021, the Covid-19 pandemic negatively affected Glasgow, just like most other economies (PWC, 2021).

While overall flood risk has decreased over time, the city suffered from recurring flooding during the last decades, with some events causing major damage. In 1994, for example, the Clyde recorded its highest water levels in 150 years, resulting in major flooding across Glasgow. The event affected properties, roads and agricultural land with an estimated damage of £100 million (SEPA, 2015, p. 282). Another major flood occurred in 2002, with extreme rainfall outrunning the capacity of the drainage system and overflowing the sewers, causing severe damage to infrastructure (SEPA, 2015, p. 263). The economic impact of the 2002 floods was also estimated at approximately £100 million (SEPA, 2015, p. 263). On the larger scale of the Clyde and Loch Lomond district, fluvial floods caused 41 per cent of the annual average damage in 2015, coastal flooding 29 percent and pluvial flooding 30 percent (Figure 13) (SEPA, 2015, p. 13). However, the damage by flood type varies substantially across space. For example, north Glasgow mainly suffered damage from fluvial flooding (88 percent) and less from pluvial flooding (12 percent) in 2015 (SEPA, 2015, p. 237). During the same year, 68 percent of the damage in east Glasgow was caused by fluvial flooding and 32 percent by surface water flooding (SEPA, 2015, p. 260).

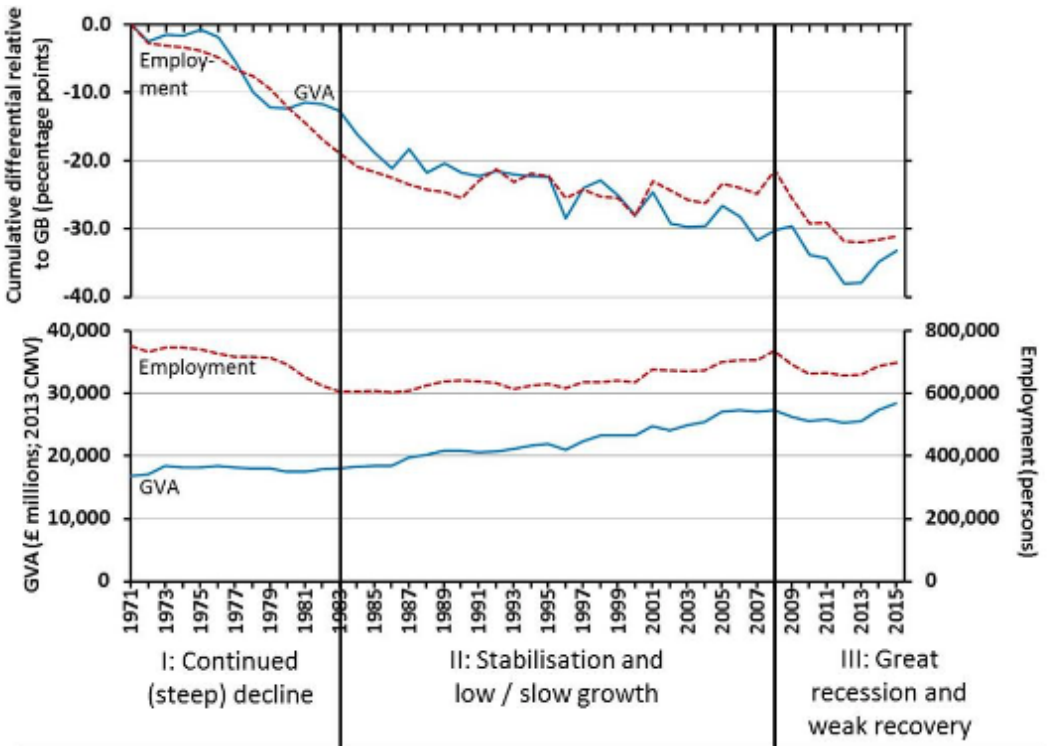

Figure 12: Gross Value Added (GVA) and unemployment rate in Glasgow from 1971-2015 (Pike, 2017, p. 2).

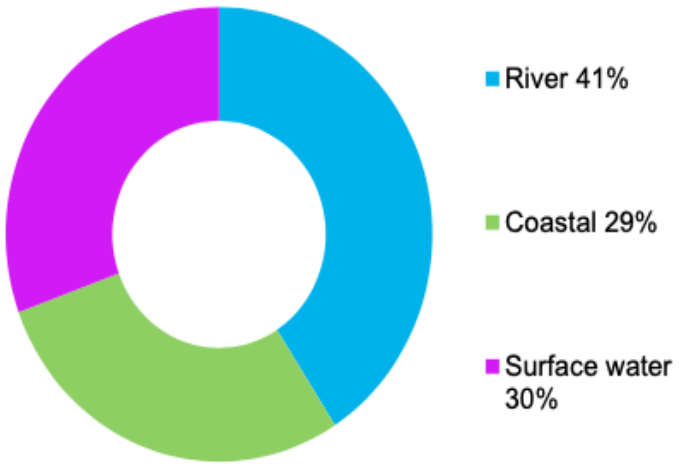

Figure 13: Annual average damage by flood source in the Clyde and Loch Lomond area (SEPA, 2015, p. 13)

While it is difficult to estimate how much the occurrence of these recent floods can be attributed to climate change, several informants clearly made the connection:

> *"We're seeing an overall drying trend in Scotland to a tiny degree, but the rainfall that we do see, it's falling in fewer rainfall events and an awful lot more dramatic in terms of the intensity of the rainfall."*

Similarly:

> *"Everybody keeps talking about climate change and the impacts of climate change in 2050 or 2080... but actually, we're already dealing with the impacts of climate change. When you look at sewers that were maybe built in the 80s or early 90s, that were built to have a one in 30 years event. Those sewers are now not coping, because of the volume of additional surface water that's getting into them."*

Mounting scientific evidence on climate change — as well as growing political pressure to mitigate and adapt to it — have influenced the way Scotland and Glasgow respond to flooding. In April 2019, the Scottish government declared a climate emergency, followed by the Glasgow City Council in May 2019 (BBC, 2019; Glasgow City Council, n.d). As such, modern narratives of FRM are fundamentally shaped and influenced by the risk that climate change poses to the region (England et al., 2018). In the pursuit to adapt to the impacts of a changing climate, FRM is increasingly conceptualized as a fundamental part of CCA. Within this context, new actors and cross-sector partnerships have entered the FRM arena. One such example is Climate Ready Clyde, a partnership supported and funded by the Scottish government with the aim of creating a shared vision, strategy and plan for adapting the Glasgow City region to climate change (Climate Ready Clyde, 2020, p. 4). In the next section, we identify and deconstruct four characteristics of modern FRM in Glasgow, using a genealogical lens.

4.2 Flood risk management and urban development: genealogical perspectives

The account presented above describes a chronological narrative of FRM in Glasgow. Having traced how floods were considered throughout history, we argue that flood management was only recently problematized as a societal priority. Flood management was a secondary concern in most of the city's history. From the early settlements to the mid-eighteen century, inhabitants accepted the Clyde frequent overflows. Since then, and up to the mid-twentieth century, alterations of the Clyde were primarily justified for navigation and trade. While fluvial flood risk did decrease in the nineteenth century, it was only as a secondary consequence of other urban development projects. Today, FRM has become more of a priority in Glasgow. Along with other expected impacts of climate change, floods are deemed an urgent societal risk to tackle. This is reflected in the city's strategies and plans for urban development, FRM and CCA, for example. However, while this chronological account does stem from observable trends, it depicts a simplified progress of events from the past to the present. By itself, we argue that a chronological account overlooks the messy complexities and power struggles that have defined FRM in Glasgow. Glasgow´s contemporary FRM has emerged from countless events, accidents and decisions. By building our genealogy as a continuity of the previous sections, we hope to productively question the taken-for-grantedness of the present without overlooking existing historical trends. To analyse the descent and emergence of modern FRM in Glasgow, our genealogy identifies and problematizes four perceived characteristics: cooperation, regeneration, sustainability, and responsibilisation. Importantly, the reality of FRM in Glasgow is deeply complex, and emphasising these categories over others result from an analytical choice. While another categorisation might have been as pertinent, we believe these four categories adequately depict modern narratives around FRM in Glasgow.

4.2.1 Cooperation

Informants and the strategies analysed depict modern FRM as an effort to foster cooperation between pragmatic actors, tasked with reducing vulnerabilities and fostering resilience to floods. For example, interviewees depicted the Flood Risk Management Act of 2009 as a key improvement of cooperation between FRM actors in Glasgow:

> *"The introduction of the Flood Risk Management Act (2009) [...] means that everybody has the same shake of the whip. [...] What has also happened is that relationships across parties have improved. And there's less of the blame game and more saying: 'Okay, what is the actual issue? And is it something that we can solve together?'".*

The importance of cooperation in modern FRM is also highlighted by the Clydeplan, which aims to apply a collaborative approach by:

> *"Working together to deliver outcomes. Using spatial planning as a collaborative tool to stimulate and co-ordinate public and private sector investment in places"* (Clydeplan, 2017, p. 8).

Similarly, the cooperative approach is reflected in the Climate Ready Clyde initiative, which was "established on the basis that adapting is cheaper, easier and more effective when done together" (Climate Ready Clyde, 2020, p. 4). However, by applying a Foucauldian lens, it becomes apparent that present narratives of pragmatic cooperation can silence a variety of competing narratives and interests shaping political decisions around FRM in Glasgow. By looking into the past, our analysis highlights the continued importance of power struggles — or *emergence* — in FRM decisions. From the first decision to deepen the river to the location of Sustainable Drainage Systems (SUDS) in the city, power relationships are omnipresent in the history of FRM in Glasgow. Our genealogy identifies several examples of such power struggles throughout the history of Glasgow. We now turn to one such example: the destruction of a weir along the Clyde in 1880.

After the construction of a first weir in 1772, several other dams were built in the upper section of the river (Ridell, 2000). By the end of the nineteenth century, however, most weirs had been removed to facilitate navigation along the river. By 1865, there remained only one weir in Glasgow, situated above the Hutchisontown Bridge (Ridell, 2000, p. 131). Discussions about whether or not to keep that weir, frequently featured in newspapers at the time, provide a useful insight into how different actors, interests and narratives shaped past decisions. With disputes over the weir's removal spanning several decades, this example proves particularly fruitful. In 1865, several actors started to advocate for the weir to be removed. The Clyde Trust claimed that taking the structure down would improve navigation and help to further deepen the river (Glasgow Herald, 1865a, p. 6; The Scotsman, 1865, p. 6; Glasgow Herald, 1865b, p. 4). This, in turn, would benefit shipbuilders by allowing for the production of larger boats (Glasgow Herald, 1865b, p. 4). In addition, the Glasgow Water Company argued that removing the weir would help wash away the sewage to the sea, thereby improving water quality above the structure (The Scotsman, 1865, p. 6). Others raised concerns about the potential consequences of removing the weir. Would large quantities of silt be released into the harbour (Glasgow Herald, 1865a, p. 6)? Would the tide flow in greater length and volume, potentially rising above the bridges (Glasgow Herald, 1872b, p. 9)? Would winter floods be worsened (Glasgow Herald, 1865b, p. 4)? Would water quality below the bridge be lowered and aquatic sports prevented (Glasgow Herald, 1872b, p. 9, The Scotsman, 1865b, p. 6)? In 1880, the City Council decided to bypass these concerns by removing the weir, a decision justified in the name of improving navigation along the river (Ridell, 2000, p. 133). The consequences were overwhelmingly negative: hundreds of thousands tons of material were brought down to the harbour (Ridell, 2000, p. 132); winter floods increased and caused large financial damage in the following years (Glasgow Herald, 1880b, p.3, Glasgow Herald, 1881a, p. 6, The Scotsman, 1901, p. 10); and the navigation was ultimately slowed down by the increased tide (Ridell, 2000, p. 132). In 1901, a new type of weir was finalised across the river, so as to provide flood protection to the city (Ridell, 2000, p. 132). In the words of contentment of a local decision-maker, following the installation of the new weir:

> "*[The population of Glasgow] looked forward to a quiet and placid Clyde above. They looked forward to having the water regulated. They looked forward to having the scour of the river diminished, and above all they looked forward to having those disastrous inroads on the banks of the Clyde [...] abolished* (The Scotsman, 1901, p. 10).

Concerns about flood risks only represented one of the many interests involved in the decision, and arguably not the most powerful one. While anecdotal, this example illustrates an observable trend of FRM in Glasgow: rather than resulting from cooperation, flood risk decisions are enmeshed with broader economic and political interests. In fact, while cooperation is frequently put forward, some informants also acknowledge a lack of consensus around FRM measures. As expressed by an urban resilience officer:

> *"People have different views on what you should do [about FRM and CCA along the Clyde], should you manage, retreat, and not develop that area near the river? Or should you build higher walls? I think everybody agrees that there is an issue, they agree that we need to adapt, but then have different ideas on what that means."*

In a similar way to the nineteenth century, modern FRM decisions continue to be shaped by political agendas. Potential conflicts can arise from seemingly simple decisions, for example the location of nature-based solutions:

> *"There can often be a competing conflict, [for example] between a cycle lane and a rain garden. [...] A lot of people aren't enthusiastic about cycle lanes and a lot of people aren't enthusiastic about rain gardens and that sort of thing, particularly if it means that they're going to have less roads to drive on or they're going to have reduced parking outside their home."*

In addition, FRM primarily influences policy making after large flood events. This means that the capacity of flood risk managers to influence urban development decisions varies greatly over time, depending on external factors that they cannot control. As described by one of our informants:

> *"When we are talking to stakeholders and people who hold the keys to funding, telling them that there's [a certain] level of flood risk. As most people tend to do, they'll look out their window and say: "Well, you know, I've lived in my house for five years, ten years... I've never flooded. So, you know, I'm not really sure that I believe that flooding is a big risk for the city."*

To summarize, instead of cooperation, a genealogical approach highlights how FRM emerges from the confrontation of temporary coalitions of actors with unequal capacities to impose their decision on others. In turn, this confrontation is partly influenced by external factors, on which none of the actors have a clear influence. In the current context of transformation of former industrial areas of the Clydeside into "a vibrant inclusive, liveable and well-connected place, with an accessible waterfront and attractive spaces where people want to spend time" (Glasgow City Council, 2020, p. 42), genealogy serves to question the powerful interests driving this process. Furthermore, it draws attention to the voices potentially silenced by an apolitical promotion of pragmatic cooperation.

4.2.2 Regeneration

Since the 1980s, the City Council has intended to regenerate some of Glasgow's neighbourhoods (Glasgow City Council, 2017, p. 10). Regeneration can be described as the "process of reinvestment in a disinvested place" (Shaw, 2008, p. 1719). These efforts can be seen as part of the city's answer to the de-industrialisation and economic decline of the twentieth century. In this context, regeneration serves as a way to tackle economic challenges, such as stalled development sites, derelict lands and high levels of long-term unemployment (Glasgow City Council, 2017, p. 40; Clydeplan, 2017, p. 17). Among others, the Clyde Waterfront and nearby communities are currently identified as a priority for regeneration (Glasgow City Council, 2017, p. 40; Clydeplan, 2017, p. 25). The riverside's post-industrial character is framed as "an underused asset" with the potential to attract visitors, facilitate sustainable transport and provide housing (Clydeplan, 2017, p. 25). At the same time, redeveloping the waterfront is also said to have the potential to mitigate flood risk and facilitate the management of surface water (Clydeplan, 2017, p. 25). Similarly, CCA and FRM are increasingly branded as positive for urban development and regeneration. The River Clyde Flood Management Strategy, for example, highlights that mapping and identification of future flood risks is fundamental to the regeneration of the Clyde River corridor (Glasgow City Council, 2007, p. 3). Similarly, informants recognised the role of FRM in facilitating regeneration:

> *"The primary driver for the [organisation] was flood risk management, but over the years, the additional drivers or benefits that come from that or from the types of projects we deliver include things like water quality, sustainable economic development and regeneration."*

This positive role is usually expressed in terms of co-benefits of FRM, as one informant described it: "the biodiversity benefits, the cooling benefits, the mental health benefits." This focus was also featured in Scotland's Flood Risk Management Conference 2021, with one day dedicated to "land, place-making and planning." Also discussed by a climate resilient manager:

> *"We're also seeing the kind of reuse or designing of blue-green infrastructures to fit multiple community needs, so exercise, play space, green space, etc. That, I think, has been a very positive move, and actually I think it does lead to some areas being perceived as more attractive than they were historically, more desirable."*

The inclusion of FRM as part of a broader strategy for urban regeneration is relatively new and has only recently been conceptualised as a way to improve the urban space (Newman & al., 2019). However, the relationship between flood risk and urban development stretches centuries back. By unveiling its complexities, genealogy allows us to question the framing of FRM as a tool for regeneration and economic development. In the early days of Glasgow, floods actually provided opportunities for development. Boat owners, for instance, could use high tides to navigate along the Clyde. At the beginning of the eighteenth century, for example, a ship-owner called William Simpson took advantage of a large flood to bring two large boats down the river from Broomielaw, a journey which would then have been impossible otherwise (Marwick et

al., 1909, p. 169; Eyre-Todd, 1911, p. 125). The first act of parliament intending to improve the harbour and the Clyde, signed in 1759, even stated that "the river was then so very shallow in several parts that boats, lighters, barges, or other vessels could not pass to and from the city *except in time of flood or high water at spring tides"* (Marwick et al., 1909, p. 177, emphasis added).

Later, as already mentioned, FRM was considered secondary to urban development — and often appeared only as a by-product of other urban projects. Most of the urban development to the Clyde waterway and Glasgow harbour – primarily justified by trade and navigation (Glasgow Herald, 1879; Glasgow Herald, 1893) – also served to reduce flood risk. The deepening of the riverbed allowed larger amounts of rainwater to flow down to the sea (Glasgow Herald, 1872b), while harbour improvements "had the effect of diminishing the amount of flood water in the upper part of the river" (Glasgow Herald, 1865b). Development along the riverside, such as the building of quayage for boats also provided flood protection, both to the riverbanks and to buildings located along them (The Scotsman, 1872a). Simultaneously, the deepening of the river sometimes threatened flood protection infrastructures along the river, for example by undermining the foundation of quay walls and bridges, thereby increasing flood risk (Glasgow Herald, 1870). While flood protection measures — such as hydrological barriers or embankments — have historically provided protection for buildings, they also sometimes acted as a barrier to urban development. The construction of the weir across the Clyde in 1772, for example, was initially meant to protect the foundation of the Broomielaw bridge. However, a later report found that the dam prevented the free passage of the water down the river, thereby worsening upstream flooding (Ridell, 2000, p. 55). The weir also obstructed navigation along the river and acted as a barrier to urban development along the Clyde banks (Glasgow Herald, 1865a, p. 6). Taken together, these examples highlight the complex relationship between urban development and FRM over time. Similarly, the role of FRM in facilitating contemporary development is not as straightforward as the concept of regeneration may presume. In fact, FRM should in theory *limit* urban development, for example in flood-prone areas. According to one of our informants, a Community Resilience Manager:

> *"The guidance says housing or development should not be built on areas, and I emphasize should, should not be built in areas of medium to high flood risk."*

In reality, however, urban development often bypasses these constraints:

> *"You get [flood guidance] from the Scottish Environmental Protection Agency (SEPA), but the local authority is the decision-making body for planning decisions. So SEPA gives guidance, planning applications come in, and the local authority doesn't need to follow that guidance."*

Indeed, there is an incentive dilemma, as local authorities can benefit from ignoring flood concerns:

> *"When a developer gets planning permission to build new houses, for each new house that is started there's a fee paid to the local authority. So, when local authorities are cash-strapped, [...] they are pushed to accept housing as a source of income, even if it's*

not necessarily in the right location or if they feel that there needs to be more consideration of flood risk".

On the other side, housing developers can be tempted to cut costs by lowering flood standards. Thus, according to one of our informants, a strategic planner at a flood protection organization:

> *"I used to deal with all of the new developments, [conducting] a drainage Impact Assessment to understand if that development did or didn't have an impact on the sewer network. We would do that investigation and then the developers would go and not build what had been agreed or it wasn't built to the right standards."*

Ensuring that an area is protected from flooding allows urban development and regeneration in this area. At the same time, urban developers frequently bypass guidance from flood experts, for example by building on flood plains. In addition, even when successful, some interviewees noted the potentially negative impact of FRM on the urban fabric:

> *"If flood systems are nice and well maintained, [they] will add value to [nearby properties] and it tends to be people who can afford it that live there. So, are we stacking-up another problem* [i.e. gentrification] *for 20 years down the line? I really hope not."*

All in all, a genealogical approach points to the primacy of economic development interests over flood risk concerns, such as vulnerability or exposure. FRM is increasingly presented as one way to facilitate urban development, rather than merely a by-product of it. However, as argued by one of our informants: "economic considerations come first." As we have seen, groups that have disproportionately benefited from the improvements and developments of the Clyde in the past were primarily those who dictated this development in the first place: the tobacco merchants, the shipbuilding industry, wealthy landowners, etc. At present, regeneration is framed as a public good for all, which is aimed at reducing vulnerabilities and inequalities. This is expressed, for instance, in the vision of the Clydeplan:

> "*[The plan] seeks to improve the health and wellbeing of the people of the city region by creating a successful, sustainable, natural, resilient, low carbon and connected place that reduces inequalities whilst maximising the use of existing resources. It does this by setting out broad principles, including a focus on regeneration* [...]" (Clydeplan, 2017, p. 22).

However, while the perceived aim of CCA and FRM in Glasgow is to reduce communities' exposures or vulnerabilities, CCA and FRM projects are encouraged only insofar as they also improve the urban space and facilitate economic growth. This can ultimately have the opposite effect on communities' vulnerabilities. As one of our informants put it: "Regeneration is demolishing perfectly public homes and replacing them with private homes, so that developers can make money." By placing economic interests at the forefront, urban developers and local authorities can end up ignoring flood threats and threatening communities' resilience. Could regeneration reduce the amount of permeable land along the river and further increase pluvial flood risk? Could FRM generate gentrification and, by improving the built urban environment,

increase rather than decrease vulnerabilities of the local population? As new residential areas are being constructed along the Clyde waterfront, genealogy helps us to question the complex relationship between FRM and regeneration. With new investments being brought in these areas, it is important to consider how the social fabric, including patterns of exposure and vulnerability, will change as a result. According to our study, however, informants, strategies and plans did not explicit consider the ways in which FRM and CCA policies could worsen existing vulnerabilities.

4.2.3 Sustainability

The theme of sustainability — including carbon mitigation and environmental mainstreaming — is frequently mentioned as a significant and increasing part of FRM in Scotland and Glasgow. During Scotland's Flood Risk Management Conference 2021, for example, one entire day was dedicated to finance and green recovery, with panels titled: "Integrating natural capital into flood risk management appraisals" or "Net zero carbon in the construction of flood defence schemes". As already mentioned, climate change plays a significant part in this narrative, with five out of six interviewees emphasising the important role that climate plays in FRM decisions, as well as the increased importance of carbon footprint. Related to this is a perceived shift from concrete (grey) infrastructures to nature-based (blue-green) solutions. In the words of one informant:

> *"Our focus has been on grey infrastructure, it's been on tanks, it's been on additional CSOs [Combined Sewer Overflows], it's been on actually hard engineered grey solutions. Whereas the drive from our business now is to look at how we incorporate the green and the blue with the grey."*

In the plans and strategies analysed, for example, nature-based solutions are conceptualised as "opportunities for using the land and coast to slow down and store water" (SEPA, 2015, p. 3) before it reaches sewage systems and rivers. As exemplified by the City Council's declaration of a climate emergency in May 2019, sustainability is a central theme of Glasgow's urban development (Glasgow City Council, 2019). Nature-based flood solutions are increasingly prioritized across the region (Climate Ready Clyde, 2020, p. 43), a shift described by several informants as novel. For example:

> *"Historically, funding projects [have] tended to be relatively carbon heavy interventions: concrete walls along the banks of a river, upper-catchment storage measures, etc. [...] Projects dealing with sewer flooding have tended to be again carbon heavy, they've been big, concrete infrastructure below ground: pipes, tunnels, tanks, pumping stations... that sort of thing."*

However, the use of nature-based solutions is far from unprecedented. For example, efforts to deepen the Clyde from 1770 to 1835 relied primarily on the natural scouring action of the river (WWF, 2002, p. 8). Similarly, Glasgow's oldest park — the Glasgow Green — has served as a protective floodplain for most of the city's history (See Pagan, 1851, pp. 209-210, Cleland, p. 41). Finally, the cohabitation of the citizens of Glasgow with seasonal floods for hundreds of

years was without doubts ‘sustainable’. Here, genealogy shed light on the relationship between green spaces, floods and urban development. As mentioned above, green spaces that previously served to protect from flooding have disappeared over the years due to pressure from urban development (figures 10 & 11). Similarly, urbanisation also puts pressure on sewers and drainage systems. Altogether, these developments have increased flood risk in Glasgow. As explained by a flood risk manager:

> *“The increase in flooding tends to come from the increase in urban creep. So, it is people paving over their driveways, it's the removal of the green areas and their gardens, decking and things like that. Initially, when a new development [is put in place,] everything works the way it's supposed to work. But actually, with the additional increase in surface water and the removal of green areas, the flows to the sewer have increased.”*

The issue is not new. As mentioned above, the 1799 report by John Rennie identified the development of the Clyde catchment area as the main origin of increased flooding in the eighteenth century (Ridell, 2000, p. 54). At the beginning of the eighteenth century already, the dumping of sewers and rubbish into the Clyde silted up the riverbed, thereby increasing the effects of seasonal floods (Ridell, 1979, p. 13). At the same time, urban development also provided some blue-green solutions against floods. While post-war urban developments — largely made of concrete — tended to increase the risk of flooding, houses built during the earlier Victorian era benefited from large, flood-mitigating green spaces. In fact, a number of urban development measures designed during the Victorian era served as flood protection for the next century. According to one of our informants, a resilience officer:

> *“Historically, we have relied on Victorian over engineering. All of our drainage, in the UK, we just trusted on the fact that the Victorians went a bit nuts and built things far too big and competently and optimistically, and we've not really needed to upgrade our drainage because we could rely on that spare capacity*.”

By focusing on *emergence* and *descent*, our genealogy highlights the impact of ‘green’ solutions on different parts of the population. For example, landowners along the riverbanks benefited from the natural modification of the Clyde (Dalglish and Driscoll, 2009, p. 52). The empty space between jetties and the longitudinal walls were gradually filled by flood deposits and the dumping of various material by inhabitants and were eventually covered with grass. Not only did this protect their property from floods, but also increased the quantity and quality of land they owned (Dalglish and Driscoll, 2009, p. 52; Glasgow Herald, 1848). As recalled by Pagan (1984, p. 47):

> *“I remember many of the proprietors of lands next to the river filling up the vacancies between the jetties with the cuttings of hedges and all kinds of rubbish, so as to form firm land by the deposits of floods. Mr. David Todd at Springfield, and Mr. Francis Reid at Greenlaw, each gained above an acre of river [approximately 4000 square meters].”*

Sometimes, this land would even be purchased back by the Clyde trustees, at the financial benefit of local landowners (Pagan, 1884, pp. 47-48). In the same way, flood-protected Victorian houses, which are often situated on higher grounds, have higher rents than post-war tower blocks. Promoting green spaces as a flood protection measure can have other unintended consequences. Green spaces can increase the gentrification processes of certain urban areas, driving traditionally underserved communities further away from the city centre (Anguelovski et al., 2018a; Shokri et al., 2020; Gould & Lewis, 2018). By opposition, as mentioned by one of our informants, "in some areas that may be struggling economically and socially, there is the risk that blue-green infrastructures will actually worsen the situation, because it can provide locations for antisocial behaviour."

Again, power relationships frame how desirable green spaces are defined. In turns, the advertised co-benefits of green urban spaces are not equally shared between different parts of the population. As one informant working for a tenant union highlighted:

> *"I used to take people [to Cowlairs Park and Pettershill Park]. The council stopped maintaining [these parks] and they became woodland. And, you know what people use them for? Quad bikes, drugs, etc. [...] Now, I wouldn't take the view that green spaces are undesirable. No one takes that view of the parks that are particularly well managed. No one takes that view of Kelvingrove Park, no one takes that view of the Botanic gardens. It's always the parks in poor people's areas that are chosen to be disinvested."*

To sum up, our study emphasises how framings of nature-based solutions as inherently desirable and sustainable could invisibilise the complexities and inequalities that have shaped and continue to shape FRM and urban development in Glasgow.

4.2.4 Responsibilisation

Interviews with stakeholders highlighted a trend towards the responsibilisation of individuals to install flood protection on their own property. In a time when "there is less money available to deliver anything," as emphasized by one informant, several respondents highlighted the disengagement of the state. In parallel, informants also emphasised that communities and individuals should do more to protect themselves against flooding.

That individuals are personally responsible to protect their properties against floods is not entirely new. The Land Drainage (Scotland) Act in 1958 stated that individual riparian owners had the primary responsibility for defending their property against flooding (Cook, 2017, p. 78). However, in a context of national austerity since 2009, flood risk managers expressed awareness of the increased financial constraints they face. As a result, individuals are made responsible to take further actions. As one of our informants put it:

> *"We won't be able to have enough money to deliver big sort of projects [...] to sufficiently reduce flood risk for everyone. So, we need property owners to do more for themselves, to protect themselves from flooding."*

Under the concept of property flood resilience, such as flood-proof doors or water-resistant plasterboards, several informants highlighted the need for property owners to install flood measures "at [their] own cost, but also at [their] own benefit."

> *"There is a greater realization [...] that actually communities are probably the best place to look at their own resilience or to look after their own."*

This increased emphasis on individuals' responsibilities should also be questioned. In fact, the "individualisation" of flood risk stems from a long history of unequal responsibilities and power relationships, which form the root of modern FRM. By analysing (1) who has written the narrative of FRM, (2) who traditionally took FRM decisions and (3) who benefited from them, genealogy provides useful insights into the potential consequences of 'responsibilisation'. As already mentioned, property flood risk protection measures were overwhelmingly put in place by those private landowners who could afford the investment (Werritty and Hoey, 2002, p. 5). At the same time, testimonies of flooding in Glasgow were largely written from the point of view of this wealthier part of the population. Traders describe the damage incurred by their merchandise, landlords depict the threat to their houses, farmers insist on the loss of their cattle, etc. While Pagan (1884, pp. 119-122) offers a three-page description of the efforts of Mr. Dale, a local Esquire, to carry on with his planned dinner party in the middle of a flood, working class accounts of flooding are hard to come by. Thus, testimonies from poorer parts of the population seem to be missing from the official history. However, it is unlikely that lower classes were spared by the floods, as the less affluent, low-lying parts of Glasgow were often flooded, and there is evidence of charitable donations being specifically targeted at poorer classes having suffered from inundations (Pagan, 1851, pp. 79-81). This historical insight is important, as poorer parts of the population continue to be the most at risk of flooding. According to one of our informants, a climate resilience manager:

> *"A lot of the people that are most vulnerable [to flooding] are either on private rented or socially rented properties. And, the security of tenure [...] is appalling. You could be evicted within about a month if a landlord starts an eviction notice on you."*

Current risk assessments confirm the disproportionate distribution of climate risks, with the less affluent part of the population being most vulnerable to climate change in the Glasgow City region (Climate Ready Clyde, 2020, p. 7). Another facet of flood inequality relates to the omnipresence or absence of certain voices in official narratives of flooding. For example, a majority of the historians of FRM in Glasgow — including most of the authors of our documentary sources — are male. In addition, flood risk has historically been framed as a technical topic, controlled by 'experts' and policy-makers. As written in the Glasgow Herald (1881b, p. 6), "the prevention of floods has been said to be an engineer's question, and in this case, we have an engineer's remedy." Once more, this historical tradition continues to influence the way floods are managed in Glasgow. As one of our informants says:

> *"The Flood Risk Management community is very homogenous, it's very tightly knit, It's quite clannish and old boys' network, and quite, quite conservative with a small C. You know they're primarily engineers, they're all hydrologists. They are very sceptical of planners and different ways of thinking and doing, but they're opening up a little bit."*

Or, as recently expressed by a member of the City Council:

> *"[We need an] engineering solution to offset and mitigate that flooding risk - some kind of Clyde barrage is really what we need, that'll do more than offset flooding: it'll contribute to ways of making the Clyde more usable and developable"* (Fraser, 2020).

In this light, focusing on individual capacities could seem like a promising way to include a more diverse audience in FRM. However, it is unclear whether encouraging responsibilisation will modify deeply rooted power inequalities. While floods disproportionately impact the most deprived, decision-making around flood risk has been historically monopolized by a limited group of people: Glasgow magistrates, Clyde trustees, tobacco lords, shipbuilders, urban developers, etc. FRM in Glasgow has been shaped by a range of actors, generally representing powerful economic interests. In turn, as shown above, modification to the river and the city's built environment largely benefited these same economic interests. Assessing the potential for a just flooding adaptation policy in Glasgow is beyond the scope of this study (for such an exercise, see Cotton, 2017). That said, by analysing specific responsibilisation measures, we can highlight the continued influence of unequal power relationships on FRM in Glasgow. In this regard, the obligation to present a flood performance certificate when selling a home provides a good example.

Flood performance certificates have been proposed as a way to encourage homeowners to display potential flood risks to their property. While floods must be mentioned in the home report accompanying a house's sale, there is a perception that uptake of property flood resilience could "mark [a] property out as having flooded in the past," in the words of an interviewee. As described by one of the informants:

> *"There is a percentage of people that think 'I won't be able to sell my home if I've got a flood door there', because people will take one look at it and think 'Oh, this house is going to flood'. That has been a barrier to the uptake of property flood resilience."*

By displaying both risks and protection measures, flood certificates have the potential to increase the proportion of people implementing property flood resilience. Although often presented as a win-win solution, a genealogical perspective helps us identify different interests and power struggles related to flood performance certificates. Thus, while home buyers may benefit from such a measure, home sellers may fear that their house would lose value. Financial lenders could also refuse to provide mortgages to owners of houses significantly at risk of flooding. By potentially modifying the housing market in the UK, flood certificates could even impair the interests of banks, insurers and the financial market. According to one informant:

> *"Banks and financial institutions are very weary of having what they call their mortgage books blighted by loans against houses that may be unsellable in the future."*

This, in turn, is likely to influence the decision of whether to implement flood performance certificates in Scotland. As expressed by an urban resilience officer, "a lot of these decisions are sometimes unpopular, and politicians find it difficult to make unpopular decisions." Thus, while some informants promoted flood performance certificates as technical, win-win nudges

to encourage individual action, flood certificates are enmeshed in complex power relationships. To sum up, recent emphasis on individualisation — like cooperation, sustainability and regeneration — stems from a deep, complex and unequal history. By immersing themselves in the genealogy of FRM and urban development in Glasgow, researchers can better understand modern characteristics of FRM and CCA in the city. In the next section, we discuss our findings as well as future promising areas of research.

5 Discussion

As shown in our analysis, modern characteristics of FRM and CCA in Glasgow stem from a deep and complex past, to which a chronological account fails to do justice. While past trends and timelines are useful, they ignore the complexities, accidents and contradictions of the past. By highlighting the role of *descent* in forming history, Foucauldian genealogy helps to bring complexity at the forefront, while also questioning the 'taken-for-grantedness' of the present. Our genealogy shows how modern characteristics of FRM and CCA in Glasgow arise from a unique history made of countless "intelligible trajectories of events, discourses, and practices" (Dean, 1992, p. 217).

FRM played only a marginal role in the urban development of Glasgow. Yet, it is impossible to fully understand its modern characteristics without accounting for the many complexities which formed the city's past. What would be the risk of fluvial flooding in Glasgow today, had the Clyde Trustees not deepened the river to facilitate navigation? What would be the current risk of pluvial flooding, had Victorian engineers settled for smaller sewer designs? We will likely never know, but asking these questions helps us to better grasp the complex influence of past events on present risks. This, in turn, shines light on the potential consequences of present decisions for future risks.

In addition, by highlighting the influence of *emergence* and power struggles in past events, our genealogy serves to criticize seemingly apolitical narratives. In this sense, our work questions modern framings of FRM as cooperative, regenerative, sustainable and responsibilising. By diving into the past, we show how narratives around these four concepts tend to silence historical power relationships in Glasgow. Similarly, these modern framings overlook the complex relationships between FRM and urban development, as well as structural inequalities enmeshed within them. We discuss our genealogy's contributions to the academic literature in the next section.

5.1 Main contributions

Our genealogy of Glasgow's FRM contributes to the academic literature in several ways. First, it questions the 'taken-for-grantedness' of modern narratives. Second, it problematizes linear historical thinking in FRM and CCA studies. Finally, it highlights the role of inequalities and power struggles in shaping seemingly apolitical measures.

5.1.1 Questioning the newness of modern narratives

As shown in our findings, climate change became a prominent feature of FRM in Glasgow from the turn of the 21st century. However, this shift did not fundamentally change the way urban development was conducted in the city. Following the historical trend of using the riverfront as a mean for economic growth and trade, developments along the Clyde continue to be encouraged — even though flood risk is predicted to increase due to climate change (SEPA, 2015). Despite recent emphasis on sustainability, blue-green solutions and climate change, soil

artificialisation continues along the Clyde (Figure 10 & 11). Derelict lands are targeted for housing development, while FRM is increasingly used as a tool for urban regeneration and economic growth. When FRM guidelines prevent development, however, they are sometimes bypassed by local authorities and developers.

In addition, our genealogical approach helps questioning the current 'climatisation' of concepts. In recent years, the rising impacts of climate change, as well as sustained pressure from scientists and civil society, has brought increased academic interest to the concept of climate. A search for the keyword 'climate' in LUBSearch yields 3,370 peer-reviewed books and articles written in 1990. Twenty years later, in 2010, the database recorded 50,559 results. Among 2020 publications, 134,379 peer-reviewed books and articles contained the keywork 'climate.' Along with this increased interest, scholars have coined an array of new 'climate terms.' Among them are 'climate urbanism' (Castán Broto et al, 2020), climate resilience (Leal Filho, 2020) and climate gentrification (Anguelovski et al., 2019b).

To what extent are climate concepts new, then? Our results provide two points of reflection. First, researchers must consider the complexity of long-term history to assess the newness of modern climate narratives. By diving into the past of Glasgow, our genealogy criticises the city's recent emphasis on sustainable FRM and blue-green solutions. As shown in the analysis, while sustainability is framed as a new innovation within FRM, large parts of Glasgow's early flood management efforts can be defined as 'sustainable'. The long-term usage of Glasgow Green Park as a protective floodplain is an example of this. Second, the influence of climate and the environment on the urban fabric is not new in Glasgow, and neither are urban decision-making processes. As our analysis shows, Glasgow has suffered from extensive flooding in the past, with major consequences for the inhabitants and the built environment. Today, there are different actors managing and influencing the city's flood risk, but as our study has been able to show, "economic considerations come first". On one hand, the city emphasises a commitment to a development that is sustainable and adaptive to a changing climate. On the other, its visions affirm the ambition to regenerate the waterfront to attract business, investment, leisure and new homes. These findings are in line with several studies pointing to the paradox of cities favouring urban development that contradict their own climate assessment and regional frameworks (Berke et al., 2015; Olazabal et al., 2019; Shi and Varuzzo, 2020).

By studying history, researchers can learn from the past. As we have shown, genealogy highlights the complex influence of past phenomena and power struggle on the present. As such, it raises awareness of the "unanticipated consequences of purposive social action" (Merton, 1936). Scholars are already advocating for a better use of the past to inform current debate on CCA (Shi, 2020b; Adamson et al., 2018). While researchers must stay away from *presentism* — "reading present-day social arrangements or cultural meanings back into history" (Garland, 2014, p. 367) — genealogy can go a long way in informing and criticizing current FRM and CCA decisions (Adamson et al., 2018).

5.1.2 Complex historical thinking

By depicting the chronological history of FRM and urban development in Glasgow, our genealogy provides a clear example of the explanatory potential of the past. The chronology of urban development along the Clyde, for instance, contextualizes the decrease of fluvial flood risk over time, as well as the parallel increase in pluvial flood risk. This, in turn, helps to predict potential future risks. For example, quay walls decreased fluvial and coastal flood risk for nearby developments, thereby allowing settlement along the riverside. With economic decline and a lack of maintenance, the quay walls now threaten to increase flood risk for parts of the population. These results are in line with CCA scholars' growing recognition of the multi-temporal aspects of adaptation and maladaptation (Magnan, 2014; Olazabal et al. 2018; Juhola, et al., 2016). Accordingly, we support the calls for a better integration of history in CCA research (Adamson et al., 2018; Shi, 2020b).

However, adopting a genealogical approach also points to a significant caveat: simply adding a traditional historical account to climate change research risks oversimplifying the complexities of the past (Rostis, 2010; Garland, 2014). Newtonian science, from which classical history stems, analyses complex phenomena by reducing them to their simplest components (Heylighen et al., 2007, p. 4). According to this tradition, an object of study can be understood by objectively analysing the sum of its parts (Heylighen et al., 2007, p. 4). Taking a historical perspective, one can posit that a modern phenomenon is adequately explained by the linear description of its components, as well as their origin (Heylighen et al., 2007, p. 4). This claim is strongly criticized by Foucault's (1977) genealogical approach. As the second part of our analysis shows, a chronological account only provides limited understanding. Indeed, grasping uncertain, complex, ambiguous and dynamic phenomena — such as climate change — requires going beyond simplification, linearity and determinism (Becker, 2014). For example, green-blue spaces are often framed as a new sustainable solution to flood risk, but our analysis highlights the complex history of their use over time.

As our study proves, genealogy helps to balance the tension between historical analysis and determinism by highlighting the role of *descent* and *emergence* in the broader trends of history (Tamboukou, 1999). By depicting the complex decision-making around the removal of the weir in 1880, for example, we have highlighted some of the emerging power struggles in FRM decisions. Thus, deconstructing contemporary narratives of cooperation shows how FRM actually emerges from the confrontation of temporary coalitions of actors with unequal capacities to impose their decision on others.

5.1.3 Power struggles, politics and inequalities

By presenting a "history of the present" of FRM (Garland, 2014), our genealogy identifies the power struggles and inequalities that have formed the current situation as 'natural' (Dean, 1992). As our analysis shows, FRM and urban development decisions tend to benefit a specific set of actors at a given time. In Glasgow, complex struggles between powerful economic actors have deeply influenced urban development and FRM decisions. From the tobacco merchants to housing developers, these actors — or the engineers they hired — were also the main authors

of the local history of FRM. By opposition, lower-class accounts of flooding and FRM are largely absent from the documents studied. The role of genealogists, then, is to ask difficult questions: who decides, who benefits from these decisions, who suffers the largest consequences, who writes history and who is absent from it? Our study helps to provide answers to these questions in the context of FRM and urban development in Glasgow.

Nature-based measures, a typical example of so-called 'no-regrets' solutions, provide a good case study of the political nature of FRM and CCA (Halegatte, 2009). Our analysis shows that these measures are seldom 'no-regrets'. Instead, they tend to unequally benefit different actors. In Glasgow, for example, early nature-based deepening of the Clyde primarily benefited riparian landowners. Similarly, as highlighted by our informants, recent shifts towards blue/green flood protection could have a range of consequences, from increasing property prices to facilitating petty crimes. While we will return to these findings later, our genealogy contradicts descriptions of blue/green infrastructures as 'win-win' measures that can generate 'co-benefits' for urban development (Halegatte, 2009; Alves et al., 2019). Importantly, our findings do not point to a hierarchy between grey, blue and green infrastructures. Rather, we call for the assessment of each measures' complex sets of benefits and inconveniences for different stakeholders at different points in time. Deciding between one or the other measure is an inherently political exercise, made by a certain group of people at the benefit and disadvantage of others.

Local governments, decision-makers and scholars have praised and implemented 'no-regrets' adaptation strategies — perceived as apolitical win-win responses to the climate crisis (Mees & Driessen, 2011; Halegatte, 2009; Woodruff et al., 2018). Others instead raised awareness on the role of CCA in reproducing inequalities or generating new vulnerabilities (Shi et al., 2016; Atteridge & Remling, 2018; Anguelovski et al., 2019b; Haase et al., 2017; Sovacool et al., 2015). Our analysis contributes to unravel the long and complex history on which this debate stands.

5.2 Targeted contributions

In addition to the three contributions described above, our genealogy provides useful insights to several targeted research communities. As we show next, a genealogy of FRM and urban development in Glasgow contributes to the literature on climate urbanism, maladaptation, green gentrification and resilience.

5.2.1 Climate urbanism

As our analysis shows, while FRM and CCA are increasingly depicted as central features of urban decision-making, long-term processes of urban development and flood protection in Glasgow portray significant continuities over time. From the early tobacco trade to shipbuilding, heavy industry and house construction, our analysis shows that economic development and urban growth have been the main drivers of urbanism in Glasgow. For sure, FRM and CCA have recently taken more of a central role in urban planning and development. However, flood concerns only rarely dictate development decisions. Despite increasing flood

risk, for example, the Clyde waterfront continues to be open to development. Local councils are incentivised to bypass SEPA's flood guidance and encourage housing development, as building permission fees is one of their income sources. Similarly, while climate change is slowly institutionalized in the city's decision-making processes — for example through Glasgow's declaration of a climate emergency — climate change remains far from being a driving force of urbanism in the city. These findings contribute to the academic literature on climate urbanism — "a twenty-first-century policy orientation that promotes cities as the most viable and appropriate sites of climate action and prioritizes efforts to protect the infrastructures and institutions of urban economies from the hazards associated with climate change" (Long & Rice, 2019, p. 992).

Multiple forms of climate urbanism can be grouped into three categories (Broto et al. 2020, pp. 9-10):

(1) Reactive — measures and strategies aimed at adapting to the noticeable impacts of climate change.
(2) Entrepreneurial — framings of climate change as an opportunity for fostering economic competitiveness and attracting investments.
(3) Transformative — efforts to use climate change strategies in cities as platforms for broader social, political and economic transformation.

A recent debate in the literature relates to whether climate urbanism depicts a new phenomenon, or merely describes "old capitalism with climate characteristics" (Shi, 2020a). This debate connects with the "climatisation" of concepts mentioned earlier. Is climate change influencing urbanism to the extent that a new climate urbanism is emerging, as argued by Castán Broto et al. (2020)? In Glasgow, climate change does not seem to be reshaping urban decision making. Instead, FRM and CCA are used to frame Glasgow as a green, modern and safe city, a fertile ground to attract external investments. Climate and environmental concerns are taken into account only insofar as they don't threaten economic interests. While these observations could be interpreted as a sign of entrepreneurial climate urbanism, a genealogical perspective shows continuity in the underlying processes of urban development in Glasgow. Rather than an entrepreneurial form of climate urbanism, then, our case study points to the repurposing of climate change discourse as a tool towards economic development in Glasgow. This distinction is important, as framing climate urbanism as a new phenomenon could prevent researchers from seeing the continuities and root causes of unequal phenomena. Further research is needed to avoid this pitfall and disentangle new climate urbanism from old urbanism with climate characteristics.

5.2.2 Maladaptation

In Glasgow, the economic growth and urban development of the eighteenth and nineteenth century have played a key role in reducing the risk of coastal and fluvial floods, for example by raising quay walls and dredging the riverbed. This has allowed constructions along the riverside, as well as an increased artificialisation of soil. As a consequence, people settled and valuable assets were placed on previously inhabitable land. At the same time that exposure was reduced, long-term vulnerability to flooding increased. With the economic decline of the

twentieth and twenty-first century, some of these infrastructures — such as the quay walls — were not maintained properly (Glasgow City Council, 2007). Similarly, the over-engineering of Victorian-era sewers' systems provided pluvial flooding protection to large parts of the city for decades. In the recent period of austerity, however, the state has been reluctant to invest in these protective infrastructures, raising the question of their potential maladaptive outcome in the future. By failing to reduce climate-related vulnerabilities — and even increasing them in the long-term — FRM and CCA measures have the potential to generate maladaptation (Barnett & O'Neil, 2010; Juhola, et al., 2016; Magnan, et al., 2016, pp. 646-647). Maladaptation is defined as the "result of an intentional adaptation policy or measure directly increasing vulnerability for the targeted and/or external actor(s), and/or eroding preconditions for sustainable development by indirectly increasing society's vulnerability" (Juhola, et al., 2016, p. 139). However, scholars do not agree on how to diagnose and assess maladaptation in the field (Noble, et al., 2014, p. 857). One of the main issues relates to the temporal scale of maladaptation (Juhola, et al., 2016). Adapting to climate change implies to better withstand climate-related shocks in the short term (Venton & La Trobe, 2008). At the same time, adapting also requires the ability to anticipate, recognise and learn from potential disrupting events in the long term (Becker, 2014, pp. 155-162). The question, then, is when to diagnose maladaptation. Does the emergence of negative outcomes in the long term justify qualifying an initially successful intervention as "maladaptive"? Will current FRM measures in Glasgow be adequately maintained in the future, or will they create new risks and vulnerabilities — just like the Victorian sewers and quay walls did?

To qualify a specific FRM or CCA measure as maladaptive is to pinpoint it as the origin of a later increase in vulnerability (Juhola et al., 2016). Thus, by providing a long-term analysis of the present, history is the ultimate judge of maladaptation. This further strengthens the argument presented above, namely that a historical lens has great potential for FRM and CCA research. At the same time, a genealogical approach warns us against such "search for origins" (Kearins & Hooper, 2002, p. 736). As our analysis shows, the past evolves in complex and convoluted ways. The construction of a weir along the Clyde in 1772, for example, was meant to protect a bridge from the damage of floods. By slowing down the current, constructions across the river slowed the water flow, thereby reducing the natural dredging of the river and increasing upstream flood risk. When the last weir was finally removed in 1880, however, large amounts of material were brought down into the harbour. This ended up increasing the damage generated by seasonal winter floods downstream. In 1901, a new weir was built to provide flood protection to the upper reaches of the river (The Scotsman, 1901, p. 10). Ultimately, this example also shows the subjective nature of maladaptation. To the question of whether the weir was an example of a maladaptive measure, it would perhaps have been considered so in 1879. One year later, however, the city magistrates claimed that removing the weir had "resulted in disaster" (Glasgow Herald, 1880b). In the same way that a range of stakeholders disagreed on whether the 1880 weir should be removed or not, different actors are likely to consider a given adaptation measure differently over time.

5.2.3 Green gentrification

In Glasgow, FRM measures have been used as part of a broader strategy to "regenerate" disadvantaged neighbourhoods. Our results suggest that FRM and CCA are used to promote a more green, resilient and sustainable city, which will not necessarily benefit the entire Glaswegian population. By making the built environment attractive, economically prosperous, resilient and green, urban planners risk fostering long-term negative impacts on socio-economically disadvantaged populations. For example, as several of our informants highlighted, improving areas by implementing blue-green infrastructures could raise property prices and exclude low-income inhabitants. In this context, our genealogy questions the role of green spaces as a tool for urban regeneration. Scholars studying green gentrification have displayed how nature-based infrastructure and urban greening projects can produce and reproduce urban inequalities (Anguelovski et al., 2017; Gould and Lewis, 2018; Keenan et al., 2018; Shokry et al., 2020). This mounting research shows that green investments are seldom achieved without cleaning up land, increasing property prices and causing displacement of socio-economically vulnerable groups (Gould and Lewis, 2018). Our study cannot prove that green gentrification is taking place with the current FRM measures and regeneration of Glasgow. That said, our analysis of power struggles and inequalities in history proves particularly relevant to the concept of green gentrification. Indeed, brandings of green infrastructure and CCA measures as 'no-regrets' solutions have been used in other contexts to justify the implementation of unequal and exclusionary investments (Anguelovski & al., 2019b). Accordingly, as argued by Anguelovski et al. (2019a, p. 16):

> *"Critical examination of urban histories of land use planning, segregation, and urban development [...] in urban greening projects needs to be undertaken in order to understand their conjoint role in creating exclusive experiences of green space access"*.

As shown in our analysis, however, nature-based solutions can generate a large range of consequences, gentrification being only one of them. By slowing down the run-off of water, green spaces are useful to mitigate flood risk for everyone (Zimmerman et al., 2016). At the same time, green spaces have different impacts on the urban fabric, depending on how and where they are implemented. Well maintained parks and attractive green spaces, such as Kelvingrove Park or Glasgow's Botanical Garden, can raise the price of nearby properties. However, when left disinvested — such as Cowlairs Park or Petershill Park — they can also provide shelter for illegal activities or reproduce stigmas and insecurities. To fully understand the mechanism of green gentrification, scholars must be aware of the ways in which the urban fabric has been shaped by various actors over time. By shedding light on these complexities, genealogy displays the political nature of FRM and CCA in Glasgow. As already mentioned, powerful economic interests have benefitted the most from the alterations of the Clyde. In this context, current visions and plans for regenerating the Clyde waterfront and providing Glasgow with protection against the increasing risk of flooding should be careful not to reinforce inequalities while making the area attractive for business, leisure and new homes. However,

our study found that Glasgow's FRM and CCA policies still lack a framework recognising that vulnerability is produced and reproduced through long-term historical processes.

5.2.4 Resilience and neoliberalism

Our genealogy points to narratives of resilience being used as ways to push responsibilities down to the individual. In Glasgow, homeowners have been responsible for protecting their property against flooding since at least 1958, with the Scottish Land Drainage Act. However, our study shows signs of a further push towards fostering responsible individuals capable of protecting themselves against floods. Under the concept of property flood resilience, individuals and communities are being promoted as the most capable of fending for themselves in the face of flooding and climate change. This correlates with a time where the state has less resources to protect its citizens from various risks and when austerity is being promoted as a natural, rational approach to state spending (Blyth, 2013). In turn, our study supports scholars' observation of an increased individualistic focus in recent years in the UK (Joseph, 2013, Bergström, 2018). This way of governing — making the individual more responsible for its own preparation and response to various risks — is similar in other liberal democracies such as Australia, the US of Sweden (Bergström, 2018; Becker, 2020; Joseph, 2013). That said, our genealogy supports Bergström's (2018, p. 37) argument that the promotion of resilience could in fact help to silence "the ethics and distribution of risk exposure, the acceptability of risk, and the need to care for the vulnerable." The question here is whether increased individual responsibilisation will lead to individual empowerment and tackle deep rooted inequalities, or whether it will exacerbate flood disadvantages under the rolling out of the state? Our study shows that there is a tendency toward the latter and identifies a lack of emphasis on individuals' differing capacities. Besides, the problematization of individual resilience's preconditions, such as wealth or physical capacities, are largely absent from FRM and CCA discussions in Glasgow.

This observation is in line with several studies relating resilience to neoliberalism. Indeed, researchers have argued that the two concepts share several fundamental characteristics, such as being against centralised control and promoting the responsibilisation of individuals (Walker and Cooper, 2011). Neoliberalism and resilience originate from different disciplines — with resilience arguably spanning out of the work of the ecologist C. S. Holling in the 1970s and neoliberalism promoted by the economist and philosopher Friedrich Hayek around the same period (Walker and Cooper, 2011; Bergström, 2018). Importantly, we agree with Bourbeau (2018) that searching for the origin of a concept has only limited benefits. An essential component of a genealogical approach is to recognize the existence of numerous interpretations, which "accept, highlight, and build on multiple conjunctures, branches and non-linear paths" (Bourbeau, 2018, p. 21). Resilience, like any other concept, is influenced and shaped by various factors. Resilience is also likely to be defined diversely by different actors. That said, in contemporary financial, urban and environmental security discourses, resilience has been argued to justify a broader neoliberal agenda (Walker and Cooper, 2011). This narrative has been used to justify state powerlessness in the face of complexity, so as to promote austerity measures (Joseph, 2013). Our study shows signs of resilience being used in such a way. Several of our informants connected the lack of public funding with a need for increased individual resilience and responsibilisation. This is visible, for example, in the recent push to implement

flood performance certificates to encourage property flood resilience measures instead of implementing larger flood protection infrastructures. The decision of whether or not to implement these measures will likely depend on complex power struggles. That said, a genealogical approach raises awareness on the importance of supporting traditionally disadvantaged communities in the process, so as to avoid reproducing historical inequalities.

6 Conclusion

The genealogy of FRM and urban development in Glasgow depicts a long and complex sequence of events, incidentally shaped by a variety of actors and external influences. By analysing the construction of FRM in a post-industrial city, this study unravels the complex and deeply political influence of past decisions on the present. This, in turn, helps us to better understand the current power struggles at play in FRM and CCA decisions, as well as their potential future impact on social and spatial urban inequalities.

While flood management played only a marginal role in the urban development of Glasgow, understanding its modern characteristics requires diving into the city's past. FRM in Glasgow emerges from a long history. In the early years of the formation of Glasgow, floods were considered a natural phenomenon with limited impacts on people's life. Up to the twentieth century, FRM was largely a by-product of other urban development decisions. For example, efforts to deepen and straighten the Clyde — mainly for the purpose of navigation and trade — ended up reducing coastal and fluvial flooding. Simultaneously, by building on natural floodplains, the urban expansion of Glasgow during the nineteenth and twentieth century increased future risks of floods. Urban development projects, such as quay walls or sewers, did provide some level of flood protection to Glasgow. With the turn of the twentieth century, however, economic decline and 21st century´s austerity measures meant these protection measures were not always maintained or adapted to increased needs. Raising concerns of climate change's impacts is now bringing flood risk in the spotlight, as part of the broader concept of CCA. Importantly, while such a chronological account is useful to depict the broad trend of FRM in Glasgow, the study has been able to show that it also silences the complexities, accidents and contradictions of the past.

Genealogy, by focusing on the concept of *descent*, helps to highlight the complex, incidental nature of the present. Our genealogy of FRM and urban development in Glasgow deconstructs the 'taken-for-grantedness' and 'newness' of current framing of FRM and CCA. Based on stakeholders' interviews and the analysis of current strategies and plans, we identify four key characteristics of modern FRM in Glasgow. First, FRM fosters cooperation between a variety of actors with differing responsibilities. Second, by generating co-benefits and improvising the built environment, it contributes to the regeneration of urban spaces. Third, it aims to rely on sustainable, low-carbon, nature-based measures. Finally, FRM encourages individuals and communities to rely less on the state and to play a more central role in flood prevention and mitigation. By identifying instances of *emergence* in the past, our genealogy shows how these four seemingly apolitical narratives tend to silence historical power relationships. In Glasgow, FRM decisions have benefited the most economically advantaged groups, from the tobacco lords and riparian owners of the eighteenth century to the shipbuilders of the nineteenth and early twentieth. These decisions were made by a small group of people — generally middle-aged white men — on the basis of the expertise of male engineers, later on narrated by the similarly restricted authorship of male historians. At the same time, floods seem to have disproportionately impacted the poorer parts of the population, who are simultaneously absent from the written history of FRM in the city. While flood disadvantage is exceptionally high in Glasgow (Kazmierczak et al., 2015), our interviews and document analysis found only a limited

concern for the unequal consequences of FRM and CCA measures. This is in line with Cotton's (2017) assessment of flood adaptation policy in the Glasgow City Region. While vulnerabilities and inequalities are frequently mentioned, we find that 'economic considerations first' continue to prevail. In this context, it is possible that contemporary CCA follows the same path as past FRM: reproducing and increasing, rather than decreasing, urban socio-economic inequalities.

By adopting a genealogical perspective, researchers can study the depth of the past to better understand moments of *emergence*, as well as the unintended consequences they may foster. As shown by our study, current FRM have emerged in Glasgow from a deep and complex past, made of accidents, contradictions and power struggles. Similarly, the present is likely to influence future risks in unexpected ways. While CCA scholars have gone a long way in including complex system thinking in studying the present, genealogy proves a useful conceptual tool to account for the intricacies of the past. In addition, current FRM has emerged from the power interplay of a broad range of actors. Current CCA decisions are equally enmeshed with political meaning, as the future will bear the mark of today´s powerful actors' influence. Accordingly, it is important to study the depth of history to facilitate mechanisms that avoid repeating past inequalities or generating new vulnerabilities.

In this regard, we see several promising areas for further research. First, the study of the past has much to bring to current CCA research and decisions. Researchers could develop new methodologies for assessing the impact of past adaptation measures, such as FRM, on the urban fabric. Such research could include, for example, analysing the influence of past projects on property prices or urban segregation. This is important, as the long-term consequences of CCA projects — often in their infancy — are challenging to observe directly. Second, genealogy can support a productive questioning of 'climate' concepts, such as climate urbanism or climate gentrification. How new are these concepts' underlying mechanisms? How is climate change modifying or perpetuating the historical reproduction of inequalities? By ignoring these important questions, we risk ignoring the lessons of the past and instead constantly reinventing the wheel. Finally, as our study shows, the voice of poorer parts of the population tends to be missing from historical accounts of FRM and CCA. While the management of natural hazards is often considered an engineer's question, these decisions usually unequally impact different parts of the population. It is therefore essential to develop alternative, critical histories of risk management in urban settings. By collecting a greater variety of past testimonies, scholars and other stakeholders would generate a more nuanced picture of the past. This would contribute to a deeper understanding of the impact of past FRM decisions on different parts of the population. Similarly, it is essential to include varied perspectives in contemporary knowledge production of FRM and CCA, so that future generations can better appreciate the incidental, complex, power-laden nature of their past.

7 References

Adamson, G. C., Hannaford, M. J., & Rohland, E. J. (2018). Re-thinking the present: The role of a historical focus in climate change adaptation research. *Global Environmental Change, 48,* 195-205.

Alves, A., Gersonius, B., Kapelan, Z., Vojinovic, Z., & Sanchez, A. (2019). Assessing the Co-Benefits of green-blue-grey infrastructure for sustainable urban flood risk management. *Journal of environmental management*, *239*, 244-254.

Angelo, H., & Wachsmuth, D. (2020). Why does everyone think cities can save the planet? *Urban Studies, 57*(11), 2201-2221.

Anguelovski, I., Shi, L., Chu, E., Gallagher, D., Goh, K., Lamb, Z., Reeve, K. & Teicher, H. (2016). Equity impacts of urban land use planning for climate adaptation: Critical perspectives from the global north and south. *Journal of Planning Education and Research*, *36*(3), 333-348.

Anguelovski, I., Connolly, J. J., Masip, L., & Pearsall, H. (2018a). Assessing green gentrification in historically disenfranchised neighborhoods: a longitudinal and spatial analysis of Barcelona. *Urban Geography*, *39*(3), 458-491.

Anguelovski, I., Argüelles, L., Baró, F., Cole, H., Connolly, J., García Lamarca, M., Loveless, S., Pérez del Pulgar, C., Shokry, G., Trebic, T., & Wood, E. (2018b). *Green trajectories: Municipal policy trends and strategies for greening in Europe, Canada and United States (1999-2016)*. Barcelona: BCNUEJ.

Anguelovski, I., Connolly, J. J., Garcia-Lamarca, M., Cole, H., & Pearsall, H. (2019a). New scholarly pathways on green gentrification: What does the urban 'green turn' mean and where is it going?. *Progress in human geography*, *43*(6), 1064-1086.

Anguelovski, I., Connolly, J.J., Pearsall, H., Shokry, G., Checker, M., Maantay, J., Gould, K., Lewis, T., Maroko, A. and Roberts, J.T. (2019b). Opinion: Why green "climate gentrification" threatens poor and vulnerable populations. *Proceedings of the National Academy of Sciences, 116*(52), 26139-26143.

Atteridge, A. & Remling, E. (2018). Is adaptation reducing vulnerability or redistributing it?. *WIREs Climate Change, 9*, 1-16.

Aven, T. & Renn, O. (2010). *Risk Management and Governance: Concepts, Guidelines and Applications*. Berlin: Springer.

Barnett, J. & O'Neil, S. (2010). Maladaptation. *Global Environmental Change, 20*(1), 211-213.

BBC (2019). Nicola Sturgeon declares 'climate emergency' at SNP conference. Retrieved from: https://www.bbc.com/news/uk-scotland-scotland-politics-48077802

Becker, P. (2014). *Managing Risk & Resilience for Sustainable Development*. Amsterdam: Elsevier.

Bergström, J. (2018). An archaeology of societal resilience. *Safety science*, *110*, 31-38.

Berke, P., Newman, G., Lee, J., Combs, T., Kolosna, C., & Salvesen, D. (2015). Evaluation of networks of plans and vulnerability to hazards and climate change: A resilience scorecard. *Journal of the American Planning Association, 81*(4), 287–302.

Blaikie, N. (2010). *Designing Social Research: The Logic of Anticipation*. Cambridge and Malden: Polity Press. 1-287.

Blyth, M. (2013). *Austerity: The history of a dangerous idea*. Oxford University Press.

Bourbeau, P. (2018). A genealogy of resilience. *International Political Sociology*, *12*(1), 19-35.

Castán Broto, V., Robin, E., & While, A. (Eds). (2020). *Climate urbanism: towards a critical research agenda*. Cham: Palgrave Macmillan.

Chu, E., Anguelovski, I., & Roberts, D. (2017). Climate adaptation as strategic urbanism: Assessing opportunities and uncertainties for equity and inclusive development in cities. *Cities*, 60, 378-387.

Collins English Dictionary. (n.d.). Jetty. In collinsdictionary.com dictionary. Retrieved from: https://www.collinsdictionary.com/dictionary/english/jetty

Collins English Dictionary. (n.d.). Moor. In collinsdictionary.com dictionary. Retrieved from: https://www.collinsdictionary.com/dictionary/english/moor

Collins English Dictionary. (n.d.). Urban Development. In collinsdictionary.com dictionary. Retrieved from https://www.collinsdictionary.com/dictionary/english/urban-development

Cook, H. F. (2017). *The protection and conservation of water resources.* John Wiley & Sons.

Cotton, I. (2017). *Identifying the challenges of a socially just approach to flooding adaptation policy: A case study for the Glasgow City Region.* Glasgow: Climate Ready Clyde.

Cleland, J. (1816). *Annals of Glasgow: Comprising an Account of the Public Buildings, Charities, and the Rise and Progress of the City* (Vol. 2). Glasgow: Hedderwick.

Climate Ready Clyde (2020). *Draft Glasgow City Region Climate Adaptation Strategy 2020-2030 - Choosing to flourish in our future Climate.* Retrieved from: http://climatereadyclyde.org.uk/our-adaptation-strategy-and-action-plan-v2/

Creswell, J., W. (2013). *Qualitative inquiry and research design: Choosing among five approaches*. Thousand Oaks and London: Sage Publications.

Crotty, M. (1998). *The foundations of social research: meaning and perspective in the research process*. London: Sage Publications.

Dalglish, C. & Driscoll, S. (2009). *Historic Govan: Archaeology and development.* Edinburgh: Historic Scotland.

Dean, M. (1992). A genealogy of the government of poverty, *Economy and Society, 21*(3), 215-251.

Dean, M. (2010). *Governmentality: Power and Rule in Modern Society*. Los Angeles: Sage.

Dow, K. & Downing, T. E. (2011). *The Atlas of Climate Change: Mapping the World's Greatest Challenge.* Los Angeles: University of California Press.

Encyclopaedia Britannica, (n.d.). Glasgow. In britannica.com dictionary. Retrieved from: https://www.britannica.com/place/Glasgow-Scotland

England, K., Morris, M., Wolstenholme, R. Allen., K. and Macpherson, D. (2018). *Towards a Climate Ready Clyde: A climate change risk and opportunity assessment for Glasgow City Region*. Glasgow: Climate Ready Clyde.

Evans, B., & Reid, J. (2014). *Resilient life: The art of living dangerously*. Cambridge: Polity Press.

Foucault, M. (1967). *Madness and Civilization*. London: Tavistock.

Foucault, M. (1970). *The Order of Things: An Archaeology of the Human Sciences*. London: Tavistock.

Foucault, M. (1975). *Discipline and Punish: The Birth of the Prison*. New York: Pantheon.

Foucault, M. (1977). Nietzsche, Genealogy, History. In D. F. Bouchard (Ed.), *Language, Counter-Memory, Practice: Selected Essays and Interviews*. Ithaca: Cornell University Press, 139–164.

Foucault, M. (1978). *The History of Sexuality: Volume 1*. New York: Random House.

Fraser, D. (2020). Reversing the flow of the Clyde story. Again. BBC news. Retrieved from: https://www.bbc.com/news/uk-scotland-scotland-business-54232887.

Garland, D. (2014). What is a "history of the present"? On Foucault's genealogies and their critical preconditions. *Punishment & Society, 16*(4), 365-384.

Gillespie, R. (1876). *Glasgow and the Clyde*. Glasgow: R. Forrester.

Gould, K. A., & Lewis, T. L. (2018). From Green Gentrification to Resilience Gentrification: An Example from Brooklyn. *City & Community*, *17*(1), 12–15.

Glasgow and the Clyde Valley Strategic Development Planning Authority (Clydeplan) (2017). *Strategic Development Plan - Delivering Growth in the Glasgow City Region*. Retrieved from: https://www.clydeplan-sdpa.gov.uk/strategic-development-plan/current-plan/current-strategic-development-plan-july-2017

Glasgow City Council (2007). *River Clyde Flood Management Strategy - River Corridor Supplementary Development Guide.* Retrieved from: https://glasgow.gov.uk/councillorsandcommittees/viewSelectedDocument.asp?c=P62AFQ2UT1T1Z3NT

Glasgow City Council, (2019). *Climate Emergency, implementation plan*. Retrieved from: https://www.glasgow.gov.uk/CHttpHandler.ashx?id=50623&p=0#:~:text=Glasgow%20declared%20a%20Climate%20and,political%20groups%20on%20the%20city.&text=The%20city%20further%20aims%20to,in%20line%20with%20national%20ambitions.

Glasgow City Council (2020). *Glasgow's Open Space Strategy*. Retrieved from: https://www.glasgow.gov.uk/CHttpHandler.ashx?id=47093&p=0

Glasgow Herald (1846, September 18). *Glasgow Bridge Trust*.

Glasgow Herald (1848, September 11). *The Clyde and Harbour of Glasgow*.

Glasgow Herald (1865a, March 08). *Clyde Trust Proceedings.*

Glasgow Herald (1865b, June 24). *Scotch Business in Parliament.*

Glasgow Herald (1870, June 23). *Clyde Lighthouses Bill*.

Glasgow Herald (1872b, February 07). *The Proposed Harbour & Graving Docks at Whiteinch.*

Glasgow Herald (1877, January 31). *Disastrous Storm.*

Glasgow Herald (1879, July 07). *Rambling Recollections of Old Glasgow.*

Glasgow Herald (1880a, April 23). *Great Flood on the Clyde*.

Glasgow Herald (1880b, May 04). *Glasgow Town Council*.

Glasgow Herald (1881a, February 01). *State of the Bed and the Banks of the Clyde.*

Glasgow Herald (1881b, February 02). *Wednesday Morning, February 2.*

Glasgow Herald (1881c, March 11). *Disastrous Floods*.

Glasgow Herald (1893, December 09). *Severe Storm*.

Glasgow Herald (1895, December 06). *The Storm*.

Glasgow Herald (1898b, December 28). *Severe Gale*.

Hansson, S., O. (2010). Risk: objective or subjective, facts or values, *Journal of Risk Research, 13*(2), 231-238.

Haase, D., Kabisch, S., Haase, A., Andersson, E., Banzhaf, E., Baró, F., Brenck, M., Fischer, L.K., Frantzeskaki, N., Kabisch, N., Krellenberg, K., Kremer, P., Kronenberg, J., Larondelle, N., Mathey, J., Pauleit, S., Ring, I., Rink, D., Schwarz, N., Wolff, M. (2017). Greening cities – to be socially inclusive? About the alleged paradox of society and ecology in cities. *Habitat International. 64*, 41–48.

Heylighen, F., Cilliers, P., & Gershenson, C. (2007). Complexity and Philosophy. In J. Bogg, & R. Geyer, *Complexity, science and society* (117-134). Oxford: Radcliffe Publishing.

IFRC. (2020). *World Disaster Report 2020: Come Heat or High Water*. Geneva: IFRC secretariat.

Iossifova, D., Doll, C. N., & Gasparatos, A. (Eds.). (2017). *Defining the urban: interdisciplinary and professional perspectives*. New York & London: Routledge.

IPCC (2012). Glossary of terms. In: *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation* [Field, C.B., Barros, V., Stocker, T.F., Qin, D., Dokken,

D.J., Ebi, K.L., Mastrandrea, M.D., Mach, K.J., Plattner, G.-K., Allen, S.K., Tignor, M., and Midgley, P.M. (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, 555-564.

IPCC (2018). *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change,* World Meteorological Organization: IPCC.

ISO 31000. (2009). *Risk management - Principles and guidelines*. International Electrotechnical Commission.

Jha, A. K., Bloch, R., & Lamond, J. (2012). *Cities and flooding: A guide to integrated urban flood risk management for the 21st century*. Washington, D.C.: World Bank.

Joseph, J. (2013). Resilience as embedded neoliberalism: a governmentality approach. *Resilience*, *1*(1), 38-52.

Juhola, S., Glaas, E., Linnér, B.-O. & Neset, T.-S. (2016). Redefining maladaptation. *Environmental Science & Policy, 55*(1), 135-140.

Kazmierczak, A., Cavan, G., Connelly, A., & Lindley, S. (2015). *Mapping flood disadvantage in Scotland 2015*. Edinburgh, UK: Scottish Government.

Kearins, K., & Hooper, K. (2002). Genealogical method and analysis. *Accounting, Auditing & Accountability Journal*, *15*(5), 733-757.

Keenan, J. M., Hill, T., & Gumber, A. (2018). Climate gentrification: from theory to empiricism in Miami-Dade County, Florida. *Environmental Research Letters*, *13*(5), 1-11.

Leal Filho, W. (Ed.). (2020). *Handbook of climate change resilience*. Berlin: Springer.

Long J., & Rice J. L. (2019). From sustainable urbanism to climate urbanism. *Urban Studies*, 56(5), 992-1008.

Long, J., Rice, J. L., & Levenda, A. (2020). Climate urbanism and the implications for climate apartheid. In [Castán Broto, V., Robin, E., & While, A.] (Eds), *Climate Urbanism* (31-49). Cham: Palgrave Macmillan.

Lund University Libraries. (n.d). LUBsearch. Retrieved from: https://www.lub.lu.se/en/find/lubsearch.

MacGeorge, A. (1880). *Old Glasgow: the place and the people.* Glasgow: Blackie and son.

Magnan, A. (2014). Avoiding maladaptation to climate change: towards guiding principles. *Surveys and Perspectives Integrating Environment and Society,* 7(1), 1-11.

Magnan, A., Schipper, E.L.F., Burkett, M., Bharwani, S., Burton, I., Eriksen, S., Gemenne, F., Schaar, J., & Ziervogel, G. (2016). Addressing the risk of maladaptation to climate change. *WIREs Climate Change, 5*(5), pp. 646-665.

Marcuse, P. (2015). Gentrification, Social Justice and Personal Ethics. International Journal of Urban and Regional Research, 39(6), pp. 1263-1269.

Marwick, J. (1898). *The River Clyde and the Harbour of Glasgow.* Glasgow: Glasgow Corporation.

Marwick, J., James, D. & Renwick, R. (1909). *The River Clyde and the Clyde Burghs: the City of Glasgow and its old relations with Rutherglen, Renfrew, Paisley, Dumbarton, Port-Glasgow, Greenock, Rothesay, and Irvine.* Glasgow: Scottish Burgh Records Society.

Marwick, J. (1911). *Early Glasgow, A History of the City of Glasgow From the Earliest Times to the Year of 1611*. Glasgow: J. Maclehose.

McKendrick, J.H., Asenova, D., MacRae, C., Reynolds, R., Egan, J., Hastings, A., Mooney, G. & Sinclair, S. (2016). Conceptualising austerity in Scotland as a risk shift: Ideas and implications. *Scottish affairs, 25*(4), 451-478.

Mees, H. L. P., & Driessen, P. P. (2011). Adaptation to climate change in urban areas: Climate-greening London, Rotterdam, and Toronto. *Climate law*, *2*(2), 251-280.

Merton, R. K. (1936). The Unanticipated Consequences of Purposive Social Action. *American Sociological Review, 1*(6), 894–904.

Moser, S. C., & Ekstrom, J. A. (2010). A framework to diagnose barriers to climate change adaptation. *Proceedings of the national academy of sciences*, *107*(51), 22026-22031.

Miller, P., & Rose, N. (2008). *Governing the Present: Administering Economic, Social and Personal Life.* Cambridge: Polity.

Newman, G., Dongying, L., Rui, Z., & Dingding, R. (2019). Resilience through regeneration: The economics of repurposing vacant land with green infrastructure. *Landscape architecture frontiers*, *6*(6), 10-23.

Noble, I. R., Huq, S., Anokhin, Y.A., Carmin, J., Goudou, D., Lansigan, F.P., Osman-Elasha, B., & Villamizar, A., Patt, A., Takeuchi, K., & Chu, E., (2014). Adaptation needs and options. 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: Cambridge University Press, 833-868.

O'Neill, S. J., Hulme, M., Turnpenny, J., & Screen, J. A. (2010). Disciplines, geography, and gender in the framing of climate change. *Bulletin of the American Meteorological Society*, *91*(8), 997-1002.

Olazabal, M., Chiabai, A., Foudi, S. & Neumann, M. B. (2018). Emergence of new knowledge for climate change adaptation. *Environmental Science and Policy, 83*, 46-53.

Olazabal, M., Gopegui, M. R., de, Tompkins, E. L., Venner, K., & Smith, R. (2019). A cross-scale worldwide analysis of coastal adaptation planning. *Environmental Research Letters, 14*(12).

Owen, D. (1995). Genealogy as exemplary critique: reflections on Foucault and the imagination of the political, *Economy and Society, 24*(4), 489-506.

Oxford Learner's Dictionaries. (n.d.). Grating. In oxfordlearnersdictionaries.com dictionary. Retrieved from:

https://www.oxfordlearnersdictionaries.com/definition/english/grating_1

Oxford Learner's Dictionaries. (n.d.). Revetment. In oxfordlearnersdictionaries.com dictionary. Retrieved from:

https://www.oxfordlearnersdictionaries.com/definition/english/revetment

Oxford Learner's Dictionaries. (n.d.). Weir. In oxfordlearnersdictionaries.com dictionary.

Retrieved from: https://www.oxfordlearnersdictionaries.com/definition/english/weir

Pagan, J. (1851) *Glasgow, Past and Present: Volume 1*. Glasgow: David Robertson & Co.

Pagan, J. (1856) *Glasgow, Past and Present: Volume 2*. Glasgow: David Robertson & Co.

Pagan, J. (1884) *Glasgow, Past and Present: Volume 3*. Glasgow: David Robertson & Co.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful sampling for qualitative data collection and analysis in mixed method implementation research. *Administration and policy in mental health and mental health services research*, *42*(5), 533-544.

Pelling, M. (2010). *Adaptation to climate change: from resilience to transformation*. London & New York: Routledge.

Pike, (2017). *Case Study Report Glasgow*. Retrieved from https://www.cityevolutions.org.uk/wp-content/uploads/171211-Working-paper-8-Glasgow-case-study-report.pdf

Potter, R. B., Binns, T., Elliott, J. A., Smith, D. (Eds.). (2008) *Geographies of Development: An Introduction to Development Studies*. Pearson Education Limited.

PWC. (2021). *Good Growth for Cities*. Retrieved from: https://www.pwc.co.uk/government-public-sector/good-growth/assets/pdf/good-growth-for-cities-jan-2021.pdf

Rostis, A. (2010). Genealogy. In A. J. Mills, G. Eurepos, & E. Wiebe (Eds.), *Encyclopedia of case study research*, 416–418. Los Angeles and London: Sage.

Riddell, J., F. (1979). *Clyde Navigation.* Edinburgh: John Donald.

Riddell, J. F. (2000). *The Clyde: The making of a river*. Edinburgh: John Donald.

Saldaña, J. (2015). *The coding manual for qualitative researchers*. Los Angeles & London: Sage.

Sayers, P.B., Horritt, M., Penning Rowsell, E., and Fieth, J. (2017). *Present and future flood vulnerability, risk and disadvantage: A UK scale assessment*. Watlington: Sayers and Partners LLP.

Scottish Environment Protection Agency (SEPA). (2015). *Flood Risk Management Strategy - Clyde and the Loch Lomond*. Retrieved from: https://www2.sepa.org.uk/frmstrategies/pdf/lpd/LPD_11_Full.pdf

Scottish Government. (2015). *Purpose of the Scottish Environment Protection Agency and its contribution towards sustainable development: statutory guidance.* Retrieved from: https://www.gov.scot/publications/statutory-guidance-general-purpose-scottish-environment-protection-agency-contribution-towards/

Shi, L., Chu, E., Anguelovski, I., Aylett, A., Debats, A., Goh, K., Schenk, T., Seto, K. C., Dodman, D., Roberts, D., Roberts, J. T., & VanDeveer, S. T. (2016). Roadmap towards justice in urban climate adaptation research. *Nature Climate Change*, 6, 131–137.

Shi, L., & Varuzzo, A. M. (2020). Rising seas, surging fiscal stress: Patterns and implications of municipal fiscal vulnerability to climate change in Massachusetts. *Cities 100* (102658), 1-13.

Shi, L. (2020a). The new climate urbanism: old capitalism with climate characteristics. In [Castán Broto, V., Robin, E., & While, A.] (Eds), *Climate Urbanism* (51-65). Cham: Palgrave Macmillan.

Shi, L. (2020b). From Progressive Cities to Resilient Cities: Lessons from History for New Debates in Equitable Adaptation to Climate Change. *Urban Affairs Review, 00*(0) 1-38.

Shaw, K. (2008). Gentrification: What it is, why it is, and what can be done about it. *Geography Compass*, *2*(5), 1697-1728.

Shokry, G., Connolly, J., & Anguelovski, I. (2018) From critical climate adaptation to green resilience gentrification and new social-ecological riskscapes. Conference Proceedings. Retrieved from: https://www.researchgate.net/publication/329910152_From_critical_climate_adaptation_to_green_resilience_gentrification_and_new_social-ecological_riskscapes

Shokry, G., Connolly, J. J., & Anguelovski, I. (2020). Understanding climate gentrification and shifting landscapes of protection and vulnerability in green resilient Philadelphia. *Urban Climate*, *31*, 100539.

Smith, R., & Wannop, U. (1985). S*trategic planning in action: The impact of the Clyde Valley Regional Plan, 1946-1982.* Aldershot: Gower.

Smout, T., C. (2000). *Nature Contested: Environmental History in Scotland and Northern England since 1600*. Edinburgh: Edinburgh University Press.

Scottish Index of Multiple Deprivation (SIMD). (2020). Retrieved from: https://simd.scot.

Sovacool, B. K., Linnér, B. O., & Goodsite, M. E. (2015). The political economy of climate adaptation. *Nature Climate Change*, *5*(7), 616-618.

Tamboukou, M. (1999). Writing Genealogies: an exploration of Foucault's strategies for doing research, Discourse: Studies in the Cultural Politics of Education, 20(2), 201-217.

The Metropolitan Glasgow Strategic Drainage Partnership (n.d). We are all responsible for protecting ourselves and our property from flooding. Retrieved from: https://www.mgsdp.org/index.aspx?articleid=21081

The Scotsman (1865, June 21). *Scotch Business in Parliament*, 6.

The Scotsman (1872a, February 12). *The Clyde - Past and Present*, 3.

The Scotsman (1875b, May 10). *Clyde Trust Operations - The New Graving Dock*, 4.

The Scotsman (1875c, October 08). *The Floods and Storms of Friday Last*, 3.

The Scotsman (1901, December 30). *New Tidal Weir at Glasgow*, 10.

The Scotsman (1910, August 30). *Glasgow District: Extraordinary Scenes*, 5.

The Scotsman (1919, June 13). *Three Hours´ Storm in Glasgow*, 6.

The Scotsman (1930, September 19). Glasgow Floods: *Street Like Rivers*, 9.

The Scotsman (1945, October 26). *No Sign of Gale Abating: Glasgow Flooding: Householders´ Night Vigil*, 5.

The Scotsman (1948b, September 16). *More Flooding: Glasgow´s Heaviest Rain Since 1945: Crops again Damaged*, 3.

Thomson Reuters Practical law. (n.d.). Riparian. Retrieved from: https://uk.practicallaw.thomsonreuters.com/8-575-0285?transitionType=Default&contextData=(sc.Default)&firstPage=true

Turner I, D. W. (2010). Qualitative interview design: A practical guide for novice investigators. *The qualitative report*, *15*(3), 754.

UNFCCC. (1992) United Nations Framework Convention on Climate Change - Article 1: Definitions. Retrieved from https://unfccc.int/resource/ccsites/zimbab/conven/text/art01.htm

Walker, J., & Cooper, M. (2011). Genealogies of resilience: From systems ecology to the political economy of crisis adaptation. *Security dialogue*, *42*(2), 143-160.

Werritty, A., & Hoey, T., B. (2002). Trends and Issues: Geomorphological Changes and Trends in Scotland – Trends in River Channels and Processes. Report to the Scottish Natural Heritage.

Werritty, A., & Chatterton, J. (2004). *Foresight Future flooding: Scotland*. Report to the Department of Trade and Industry.

Woodruff, S. C., Meerow, S., Stults, M., & Wilkins, C. (2018). Adaptation to resilience planning: Alternative pathways to prepare for climate change. *Journal of Planning Education and Research*.

Woroniecki, S., Krüger, R., Rau, A. L., Preuss, M. S., Baumgartner, N., Raggers, S., Niessen, L., Holländer, L., Beyers, F., Rathgens, J. and Wagner, K.C., Habigt, L., Krause, T., Wamsler, C., Wehrden, H., & Abson, D. (2019). The framing of power in climate change adaptation research. *Wiley Interdisciplinary Reviews: Climate Change*, *10*(6), 1-21.

WWF Scotland, (2002). *Turning the Tide on Flooding*. Glasgow: Environment Centre.

Zimmermann, E., Bracalenti, L., Piacentini, R., & Inostroza, L. (2016). Urban flood risk reduction by increasing green areas for adaptation to climate change. *Procedia engineering*, 161, 2241-2246.

Annex 1. List of analysed documents

1.A Books

Aird, A. (1894). *Glimpses of Old Glasgow.* Glasgow: Aird & Coghill

Cleland, J. (1816). *Annals of Glasgow: Comprising an Account of the Public Buildings, Charities, and the Rise and Progress of the City: in Two Volumes* (Vol. 1). Glasgow: Hedderwick.

Cleland, J. (1816). *Annals of Glasgow: Comprising an Account of the Public Buildings, Charities, and the Rise and Progress of the City: in Two Volumes* (Vol. 2). Hedderwick.

Cleland, J. (1840). *Description of the city of Glasgow: Comprising an account of its ancient and modern history, its trade, manufactures, commerce, health, and other concerns.* Glasgow: Smith Robertson and Bryce.

Dalglish, C. and Driscoll, S. (2009). *Historic Govan: Archaeology and development.* Edinburgh: Historic Scotland.

Eyre-Todd, G. (1911) *The Story of Glasgow From the Earliest Times to the Present Day.* Glasgow: Blackie.

Gillespie, R. (1876). *Glasgow and the Clyde*. Glasgow: Glasgow: R. Forrester.

Mackenzie, P. (1866). *Reminiscences of Glasgow and the West of Scotland*. Glasgow: J. Tweed.

MacGeorge, A. (1880). *Old Glasgow: the place and the people.* Glasgow: Blackie and son.

Marwick, J. (1898). *The River Clyde and the Harbour of Glasgow.* Glasgow: Glasgow Corporation.

Marwick, J., James, D. & Renwick, R. (1909). *The River Clyde and the Clyde Burghs: the City of Glasgow and its old relations with Rutherglen, Renfrew, Paisley, Dumbarton, Port-Glasgow, Greenock, Rothesay, and Irvine.* Glasgow: Scottish Burgh Records Society.

Marwick, J. (1911). *Early Glasgow, A History of the City of Glasgow From the Earliest Times to the Year of 1611*. Glasgow: J. Maclehose.

M'Dowall (1899). *The people's history of Glasgow: an encyclopedic record of the city from the prehistoric period to the present day.* Glasgow: H. Nisbet.

Muir, J. H. (1901). *Glasgow in 1901.* Glasgow: W. Hodge.

Newbigin, M. & Gunn, J. (1921). *The City of Glasgow: its origin, growth and development.* Edinburgh: Royal Scottish Geographical Society.

Pagan, J. (1851) *Glasgow, Past and Present: Volume 1*. Glasgow: David Robertson & Co.

Pagan, J. (1856) *Glasgow, Past and Present: Volume 2*. Glasgow: David Robertson & Co.

Pagan, J. (1884) *Glasgow, Past and Present: Volume 3*. Glasgow: David Robertson & Co.

Riddell, J., F. (1979). *Clyde Navigation.* Edinburgh: John Donald.

Riddell, J. F. (2000). *The Clyde: The making of a river*. Edinburgh: John Donald.

Small, D. (1896). *By-gone Glasgow: sketches of vanished corners in the city and suburbs*. Glasgow: Morison.

Smith, R., & Wannop, U. (1985). S*trategic planning in action: The impact of the Clyde Valley Regional Plan, 1946-1982.* Aldershot: Gower.

1.B Newspaper articles

Glasgow Herald (1846, September 18). *Glasgow Bridge Trust*.

Glasgow Herald (1848, September 11). *The Clyde and Harbour of Glasgow*.

Glasgow Herald (1853, August 12). *Glasgow Water Company's Bill*.

Glasgow Herald (1864, March 16). *The Floods in the River.*

Glasgow Herald (1865a, March 08). *Clyde Trust Proceedings.*

Glasgow Herald (1865b, June 24). *Scotch Business in Parliament.*

Glasgow Herald (1868, February 03). *The Storm - Alarming Floods*.

Glasgow Herald (1870, June 23). *Clyde Lighthouses Bill*.

Glasgow Herald (1872a, October 02). *Clyde Trustees*.

Glasgow Herald (1872b, February 07). *The Proposed Harbour & Graving Docks at Whiteinch.*

Glasgow Herald (1877, January 31). *Disastrous Storm.*

Glasgow Herald (1879, July 07). *Rambling Recollections of Old Glasgow.*

Glasgow Herald (1880a, April 23). *Great Flood on the Clyde*.

Glasgow Herald (1880b, May 04). *Glasgow Town Council*.

Glasgow Herald (1880c, May 05). *Clyde Trust*.

Glasgow Herald (1880d, September 03). *Glasgow Town Council*.

Glasgow Herald (1881a, February 01). *State of the Bed and the Banks of the Clyde.*

Glasgow Herald (1881b, February 02). *Wednesday Morning, February 2.*

Glasgow Herald (1881c, March 11). *Disastrous Floods*.

Glasgow Herald (1881d, March 12). *Floods on the Scotsh Rivers*.

Glasgow Herald (1881e, May 04). *Clyde Trust*.

Glasgow Herald (1884a, January 28). *Terrific Gale*.

Glasgow Herald (1884b, December 30). *Lord Blantyre and the Clyde Trust*.

Glasgow Herald (1885, March 04). *Lord Blantyre and the Clyde Trust*.

Glasgow Herald (1888, July 21). *Court of Session.*

Glasgow Herald (1888, November 26). *Severe Gale and Floods*.

Glasgow Herald (1889, November 16). *Lord Blantyre and the Clyde Trustees.*

Glasgow Herald (1891, October 15). *Details of the Storm*.

Glasgow Herald (1893, December 09). *Severe Storm*.

Glasgow Herald (1895, December 06). *The Storm*.

Glasgow Herald (1898a, November 03). *Violent Storm.*

Glasgow Herald (1898b, December 28). *Severe Gale*.

Glasgow Herald (1899a, April 27). *Scotch Private Bills in Parliament*.

Glasgow Herald (1899b, July 19). *Wednesday Morning*.

Glasgow Herald (1900, December 22). *The Storm*.

The Scotsman (1846, July 11). *Thunderstorm and Heavy Floods,* 5.

The Scotsman (1865, June 21). *Scotch Business in Parliament*, 6.

The Scotsman (1872a, February 12). *The Clyde - Past and Present*, 3.

The Scotsman (1872b, July 29). *Thunderstorms - Extraordinary Rainfall*, 4.

The Scotsman (1874a, March 20). *Severe Storm and High Tides*, 3.

The Scotsman (1874b, April 03). *The Weather - Heavy Floods*, 4.

The Scotsman (1875a, January 5). *Glasgow - Flood on the Clyde*, 5.

The Scotsman (1875b, May 10). *Clyde Trust Operations - The New Graving Dock*, 4.

The Scotsman (1875c, October 08). *The Floods and Storms of Friday Last*, 3.

The Scotsman (1875d, November 16). *High Tides and Floods: Great Destruction of Property*, 5.

The Scotsman (1875e, May 28). *Scotch Bills in Parliament*, 3.

The Scotsman (1887, September 01). *Thunderstorm and Heavy Rainfall*, 5.

The Scotsman (1888, November 23). *The Rivers in Spate and Extensive Damage*, 5.

The Scotsman (1897, January 01). *Destructive Floods in Scotland*, 5.

The Scotsman (1901, December 30). *New Tidal Weir at Glasgow*, 10.

The Scotsman (1903, October 29). *The Great Rainstorm*, 4.

The Scotsman (1910, August 30). *Glasgow District: Extraordinary Scenes*, 5.

The Scotsman (1912, November 27). *Glasgow and the West: Serious Damage*, 10.

The Scotsman (1917, November 11). *Abnormal Rainfall in Scotland*, 7.

The Scotsman (1919, June 13). *Three Hours´ Storm in Glasgow*, 6.

The Scotsman (1920, November 04). Severe Gale: *Damage to Property on Sea and Land*, 7.

The Scotsman (1923a, June 28). *Mechanical Engineers: Resumed Summer Meeting in Glasgow*, 8.

The Scotsman (1923b, August 22). *Flooding in Glasgow*, 6.

The Scotsman (1926, November 06). *Gale Sweeps Glasgow*, 9.

The Scotsman (1929, August 01). *Rainstorm in Glasgow; Glasgow Cloudburst*, 9.

The Scotsman (1929, October 03). *Hail and Rain in Glasgow*, 7.

The Scotsman (1930, September 19). Glasgow Floods: *Street Like Rivers*, 9.

The Scotsman (1932a, January 05). *Glasgow Cleans up: 11.000.000 Tons of Rain*, 9.

The Scotsman (1932b January 05). *Floods in Glasgow*, 8.

The Scotsman (1932c, August 01). Glasgow Cloudburst: *Low-Lying Areas Flooded: Motor Cars Marooned*, 10.

The Scotsman (1935, October 19). *Storm Mishaps: Edinburgh Woman Blown Down and Injured: Man Killed in Glasgow*, 15.

The Scotsman (1937, May 18). *Glasgow´s Freak Storm*, 14.

The Scotsman (1945, October 26). *No Sign of Gale Abating: Glasgow Flooding: Householders´ Night Vigil*, 5.

The Scotsman (1948a, September 03). *Thunderstorms in Scotland: Flooding at Stirling and Glasgow: Rivers Overflow*, 3.

The Scotsman (1948b, September 16). *More Flooding: Glasgow´s Heaviest Rain Since 1945: Crops again Damaged*, 3.

1.C Strategies and plans

Climate Ready Clyde (2020). *Draft Glasgow City Region Climate Adaptation Strategy 2020-2030 - Choosing to flourish in our future Climate.* Retrieved from: http://climatereadyclyde.org.uk/our-adaptation-strategy-and-action-plan-v2/

Glasgow City Council (2007). *River Clyde Flood Management Strategy - River Corridor Supplementary Development Guide.* Retrieved from: https://glasgow.gov.uk/councillorsandcommittees/viewSelectedDocument.asp?c=P62AFQ2UT1T1Z3NT

Glasgow City Council (2017). *Glasgow City Development Plan*. Retrieved from: https://www.glasgow.gov.uk/CHttpHandler.ashx?id=35882&p=0

Glasgow City Council (2020). *Glasgow's Open Space Strategy*. Retrieved from: https://www.glasgow.gov.uk/CHttpHandler.ashx?id=47093&p=0

Glasgow and the Clyde Valley Strategic Development Planning Authority (Clydeplan). (2017). *Strategic Development Plan - Delivering Growth in the Glasgow City Region*. Retrieved from: https://www.clydeplan-sdpa.gov.uk/strategic-development-plan/current-plan/current-strategic-development-plan-july-2017

Scottish Environment Protection Agency (SEPA). (2015). *Flood Risk Management Strategy - Clyde and the Loch Lomond*. Retrieved from: https://www2.sepa.org.uk/frmstrategies/pdf/lpd/LPD_11_Full.pdf

1.D Other documents analysed

BBC (2019). Nicola Sturgeon declares 'climate emergency' at SNP conference. Retrieved from: https://www.bbc.com/news/uk-scotland-scotland-politics-48077802

Cook, H. F. (2017). *The protection and conservation of water resources.* John Wiley & Sons.

England, K., Morris, M., Wolstenholme, R. Allen., K. and Macpherson, D. (2018). *Towards a Climate Ready Clyde: A climate change risk and opportunity assessment for Glasgow City Region*. Glasgow: Climate Ready Clyde.

Fraser, D. (2020). Reversing the flow of the Clyde story. Again. BBC news. Retrieved from: https://www.bbc.com/news/uk-scotland-scotland-business-54232887.

McKendrick, J.H., Asenova, D., MacRae, C., Reynolds, R., Egan, J., Hastings, A., Mooney, G. & Sinclair, S. (2016). Conceptualising austerity in Scotland as a risk shift: Ideas and implications. *Scottish affairs, 25*(4), 451-478.

Pike, (2017). *Case Study Report Glasgow*. Retrieved from https://www.cityevolutions.org.uk/wp-content/uploads/171211-Working-paper-8-Glasgow-case-study-report.pdf

PWC. (2021). *Good Growth for Cities*. Retrieved from: https://www.pwc.co.uk/government-public-sector/good-growth/assets/pdf/good-growth-for-cities-jan-2021.pdf

Scottish Government. (2015). *Purpose of the Scottish Environment Protection Agency and its contribution towards sustainable development: statutory guidance.* Retrieved from: https://www.gov.scot/publications/statutory-guidance-general-purpose-scottish-environment-protection-agency-contribution-towards/

Werritty, A., & Hoey, T., B. (2002). Trends and Issues: Geomorphological Changes and Trends in Scotland – Trends in River Channels and Processes. Report to the Scottish Natural Heritage.

Werritty, A., & Chatterton, J. (2004). *Foresight Future flooding: Scotland*. Report to the Department of Trade and Industry.

WWF Scotland, (2002). *Turning the Tide on Flooding*. Glasgow: Environment Centre.

Annex 2. Interview guide

- In your own words, how would you describe your role in your organisation?
    - And more broadly in relation to flood risk protection in Glasgow?
- Is flooding an issue in Glasgow, according to you? Why?
    - Who is primarily affected by flooding?
    - Has it always been this way?
- How have floods been managed in Glasgow in the past?
    - In broad lines what were the main influences, ideas and stakeholders that have shaped flood risk management in Glasgow?
    - According to you, how has your work evolved in the past 100 years? 200 years?
- In your opinion, what were the consequences of past flood risk protection projects?
    - What about unexpected consequences in terms of affordability, tenure type, property prices?
- How are floods currently managed in Glasgow?
    - How has it changed from the way it was managed in the past?
    - What is your opinion of current flood management in Glasgow?
- What potential unintended consequences do you think current flood management projects could have in the future?
    - Could flood risk management generate unintended positive consequences? If so, which ones?
    - Could flood risk management generate unintended negative consequences? If so, which ones?
    - Do you think flood risk management projects have the potential to cause gentrification (defined as the displacement of a lower-income population by a higher-income one)?
- According to you, how well are these considerations taken into account when designing current flood management strategies/development plans/climate adaptation strategies?
- How do you think climate change is impacting, or will impact, flood risk management in Glasgow?