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Comparative policy analysis of delta cities Rotterdam, New Orleans and Freetown: Justice in climate change mitigation and adaptation plans

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Spatial Planning and Design Bachelor Thesis

University of Groningen
Faculty of Spatial Sciences

January 2022

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Contents

A B S T R A C T

In this thesis policy documents on climate change action plans are compared for the delta cities Rotterdam, New Orleans, and Freetown. These policy documents are being researched to see whether and how justice dimensions are included in the cities' climate adaptation and mitigation strategies. The method used in this thesis is comparative policy analysis. It becomes clear from comparison that procedural discourses of justice are more prevalent in Freetown's and New Orleans' plans than in Rotterdam's. On the other hand, in Freetown, the protection of marginalized residents is still insufficient, and not enough is being done to ensure that they are adequately protected from floods and landslides. The lack of institutional capacity and financial resources, which is common in cities in the Global South, is one of the reasons for this.
This is not the case in Rotterdam, which has various climate adaptation plans and other measures in place to reduce the city's vulnerability. Adaptation initiatives in New Orleans result in 'acts of commission,' in which marginalized populations are displaced as a result of infrastructure improvements or new protected zones.

1. Introduction

Background

The effects and impacts of climate change will be experienced all over the world. However, the impacts are unevenly distributed and experienced by people and places around the world (Goh, 2020). Developing countries, with poor and working-class people, will suffer first and most from the impacts of climate change and can be further harmed by climate actions. ‘’Climate justice’’ is a concept that acknowledges that climate change can have diverse social, economic, public health, and other negative effects on disadvantaged communities (Simmons, 2020). The term is now widely used seeking to address related injustices throughout society. Bulkeley et al. (2013) concluded that although issues of justice have been central to debates of climate change, very few analyses of urban climate change responses took their justice dimension into account. Next to that, significant differences are appearing between urban responses to adaptation and mitigation with regards to justice. This is due to, among other things, the fact that notions of justice cannot be spatially agnostic and need to be related to place-specific political arenas and economies (Bulkeley et al. 2013). It is therefore necessary to go from general concepts of climate justice to its manifestation in specific locations. This is in line with Okereke's (2010) research, which indicates that further research is urgently needed to strengthen the emerging literature on how to translate justice ideals and principles into effective and politically feasible measures. I will first introduce my research problem on climate change adaptation plans regarding justice. Then I explain why certain cities are chosen for comparison, and what method is best used to compare these cities and get an answer to the research question.

Research problem

The focus of this research is to analyse and compare if and how justice dimensions are being implemented in different cities. This will be done by analysing and comparing policies on climate change adaptation plans of three cities that are at the forefront of climate change adaptation planning. Cities in both the Global North and South are selected because of their major contrasts in terms of political arenas, historical urbanization trajectories, and socio-economic and demographic profiles, which are expected to be the main cause for differences in climate change responses with regards to justice. These cities are Rotterdam in the Netherlands, New Orleans in the United States of America, and Freetown in Sierra Leone. All three cities are located near the sea and in a river delta, as seen in Figure 1. As a result, these cities are extremely vulnerable to the effects of climate change, such as rising sea levels and more extremes in river discharges. These three cities are members of C40, a global network of 97 cities committed to combating climate change. C40 enables cities to work together effectively, share knowledge, and take meaningful, measurable, and sustainable climate action (C40, 2021).

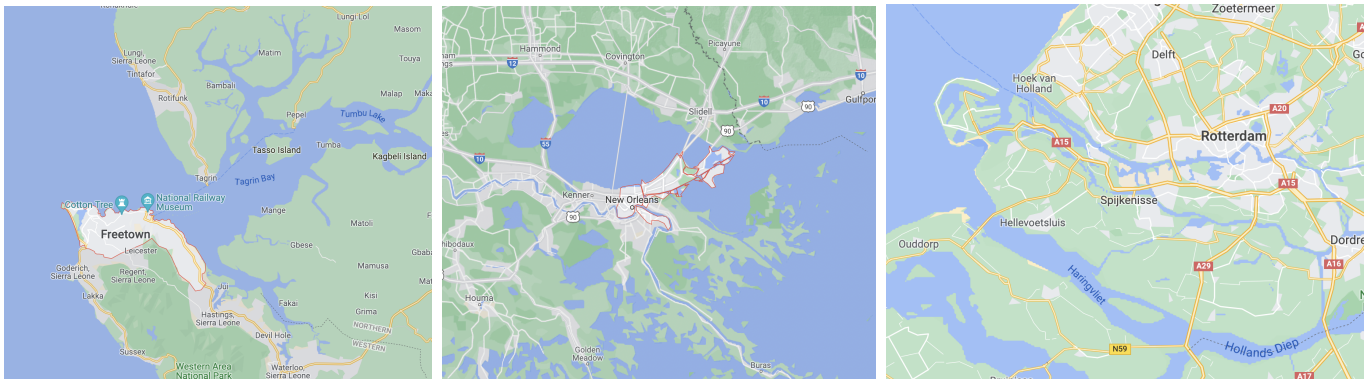

Figure 1: Maps from left to right: Freetown, New Orleans, and Rotterdam (Google Maps, 2021).

The main research question of this thesis is:
How do notions of climate justice differ between the cities Rotterdam, New Orleans, and Freetown, and how does this affect the execution of current climate change mitigation and adaptation programs?

I will answer this research question with the help of the following sub-questions:

- What are the vulnerabilities and problems that each city faces in terms of climate change?
- How are residents in each city involved in the process of decision-making for climate change plans?

The next part of this research is the theoretical framework. In this part, different concepts and theories of climate justice relevant to this research will be explained. Then, in the methodology, I explain why a comparative policy analysis was the chosen method for this thesis and how it will be used to answer the research questions. Following that, a summary of the policy documents used in this thesis is presented. In the findings section, I will start by giving context and explaining current and future climate vulnerabilities for each case. First, I will provide background information on Freetown, then New Orleans, and finally Rotterdam. After this, the results will be presented in the form of each city's adaptation and mitigation plans regarding justice. Similarities and/or differences in these plans will be highlighted. The paper ends with a conclusion, in which the results will be summarized, conclusions will be drawn, limitations of this thesis are addressed, and recommendations for further research are given.

2. Theoretical framework

As previously stated, issues of justice have frequently been at the centre of academic and policy debates on climate change. In this theoretical framework, I will first explain different concepts of justice. In the article by Bulkeley et al. (2013), the authors distinguish between distributive - and procedural justice. Distributive justice is usually understood as the fair distribution of environmental benefits and burdens. This refers to greenhouse gas emission 'rights' and 'responsibilities,' as well as the perceived fairness of outcomes or resource allocations (Adams, 1965; Walster, Walster, & Berscheid, 1978). Procedural justice refers to the perceived fairness of rules and decision processes used to determine outcomes (Lind & Tyler, 1988; Thibaut & Walker, 1975). The question here is who should make decisions about what, via what means and on behalf of whom. As a result, the right to participate is emphasized significantly (Bulkeley et al. 2013).

In recent research, Newell et al. (2021) talk about transformative climate justice. The authors refer to transformative climate justice as a concept that includes, but goes beyond, the immediate and proximate challenges of cost and benefit distribution from climate interventions (mitigation and adaptation) by linking them to a historical understanding of place-based movements. A transformative approach considers how social, economic, and political structures are part of the problem in climate change vulnerability. This is useful for this thesis as these structures are very different for each city, a good understanding of these structures for each case is therefore necessary. This corresponds with McKendry (2016), who concludes that understanding city climate programs and their social justice implications requires an examination of the larger political and economic contexts in which cities operate.

According to Bulkeley et al. (2014), climate justice debates have primarily taken place at the international level. This implies that countries have the rights and responsibilities to either be protected from the effects of climate change or to take action to reduce greenhouse gas emissions or support climate change adaptation. This two-dimensional view of climate justice, where obtaining justice is considered as a process of balancing rights and responsibilities via distributive and/or procedural means, has a fundamental weakness: it assumes that nation-states are the main actors, resulting in structural patterns of inequality within nations being neglected (Bulkeley et al. 2014). Instead of this, there should be a focus on actors at a range of scales. On an urban level, for example, there are significant differences within the city in terms of where climate change vulnerabilities are, and priorities should be placed. Additionally, cities as actors may have responsibilities and rights that differ from those of the countries in which they are located. As a result, it is essential to consider how the application of justice principles in urban climate change responses results in unequally distributed costs and benefits in cities. Bulkeley et al. (2014) therefore argue that climate justice must engage with the notion of justice as recognition. This sees social-economic injustices as inextricably related to cultural or symbolic injustices, in which certain marginalized groups, such as women, the working class, or racial or ethnic groups are failed to give adequate recognition (Fraser 1997, cited by Bulkeley et al. 2014).

Anguelovski et al. (2014) expand on Bulkeley et al. (2014)'s argument that there should be an emphasis on actors at a range of scales (particularly cities) in achieving justice, by stating that municipalities and cities have a key role to play in adaptation planning. This is because cities must address climate change while also maintaining basic urban infrastructure and service-providing functions. The challenges caused by climate change are considerably more pressing in vulnerable and growing cities since planners and policymakers must take urban sprawl, growth patterns, and the conditions and locations of the urban poor into account (Anguelovski et al., 2014). The effects and consequences of climate change are typically more severe in cities in the Global South than in cities in the Global North. This is because municipalities in developing countries tend to have ineffective local governments and insufficient services, housing, and infrastructure. Cities also often lack the institutional capacity and financial means to adapt to climate change (Satterthwaithe et al. 2007; Hardoy et al. 2011, cited by Anguelovski et al. 2014). To increase political salience and financial feasibility, climate change adaptation projects frequently stress co-benefits with other development goals (Anguelovski et al., 2016). It is however important to consider if these adaptation efforts through land-use planning tools effectively prioritize the needs of marginalized groups or if they just reproduce uneven risk exposure and socio-economic vulnerability. Anguelovski et al. (2016) distinguish

between two types of injustices: acts of commission and acts of omission. When marginalised groups are relocated as a result of infrastructure investments or new protected areas, this is known as an act of commission. Plans that prioritize economically valued areas over low-income or minority neighbourhoods are known as acts of omission.
In the following section, I will visually represent the research's theories and concepts in the form of a conceptual model.

Conceptual model

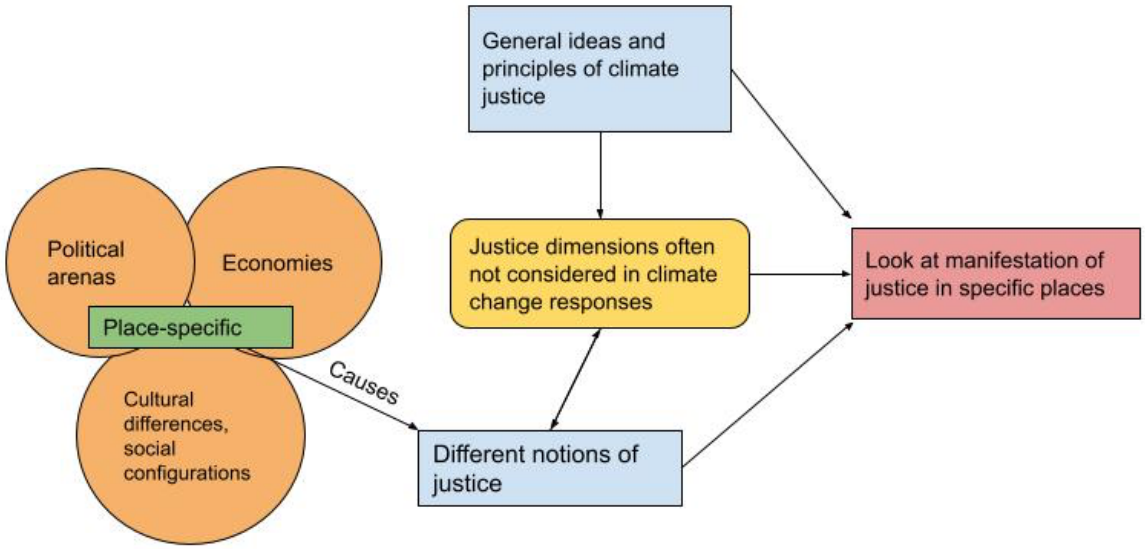

Figure 2: Conceptual model

The research problem can be observed in the middle of this conceptual model, which is that climate change responses often do not consider justice, or that socio-spatial inequalities are even exacerbated by adaptation efforts since they are embedded in the institutions and development processes that reproduce injustices. Differences in climate change responses with regards to justice are among other things caused by different notions of justice in specific places. Dependent variables can be seen on the left, these are context-dependent and therefore different for all cities. Social, political, and economical structures are often part of the problem in climate change vulnerability. It is therefore necessary to have a good understanding of these structures for each case. For the justice dimensions to be considered more, it is essential to move from general ideas and principles to the manifestation of justice in specific places.

Methodology

Comparative policy analysis will be conducted to address the research topic. Comparative policy analysis is a method of studying public policies and their origins to better understand the causes, factors, and institutional or actor constellations that lead to various policy decisions (Schmitt, 2012). Scholars of comparative public policy compare the events and contexts that enable policymakers to agree on similar or divergent policies to increase our understanding of the processes and determinants of public policymaking. These analyses contain comparisons across time and/or across units in this line (comparing, for example, national, state, or local governments). I will compare recent municipal policy documents on climate

adaptation of the three cities mentioned before. I will examine and research all the city's climate change plans to see if and how notions of justice are discussed or incorporated, and then compare them between the cities. An overview and background of the policy documents that are used for this thesis can be seen in table 1.

Action plan(s) & year of publishing	Transform Freetown	Resilient New Orleans (2015)	Climate Action for A Resilient New Orleans: 50% by 2030 (2017)	Rotterdams WeerWoord (2020)	Rotterdam Climate Agreement (2019)
Author(s)	Freetown City Council	City of New Orleans	City of New Orleans	Rotterdams WeerWoord	Energieswitch
Timeframe	2019-2022	2015-2050	2017-2030	2020-2025	2020-2030
Main themes	Adaptation, four key clusters; Resilience, Human development, Healthy city and Urban mobility	Adaptation, three visions; Adapt to thrive, Connect to opportunity and Transform city systems	Mitigation; reducing carbon footprint	Adaptation, climate-proof by 2025	Mitigation; reducing carbon footprint

Table 1: Overview of policy documents

3. Presentation of case studies

3.1. Freetown

Freetown is the capital and largest city in the West African country of Sierra Leone, with a population of 1.056 million people. The city is located on a peninsula and is a major port city on the Atlantic Ocean, which is vital to the economy of Sierra Leone. Freetown generates 30% of Sierra Leone's GDP despite having only 15% of the country's population (World Bank, 2018). Therefore, ensuring Freetown's effective management and developing measures to adapt to its climate change challenges is of national importance.

Because of several factors, Freetown is one of the world's most vulnerable cities to the effects of climate change (GFDDR, 2020). First of all, Freetown has long been put under considerable pressure by the urbanization process. The population of the city has expanded nearly tenfold in the last 50 years, whereas similar-sized European cities required 150 years to achieve the same increase (World Bank, 2018). Freetown's expansion has resulted in a sprawling and fragmented city, with poor infrastructure, poor management of road space, and inadequate public transport, as stated by its mayor in 2019. This is because the city's growth rate exceeds the capacity of the geographical area of the city, which is surrounded by mountains. Freetown's growth has not only resulted in a fragmented city but also in a large increase in informal slums because of the lack of affordable housing (World Bank, 2018). These slums are often in risk-prone areas. According to World Bank (2018), approximately 38% of the built-up expansion has taken

place in either medium or high-risk areas, as can be seen in figure 3. For example, since 2008, Kroo Bay, one of the city's largest slums, has been flooded every year. This further discourages investments, increasing environmental risks even more for the city's most vulnerable and poorest residents.

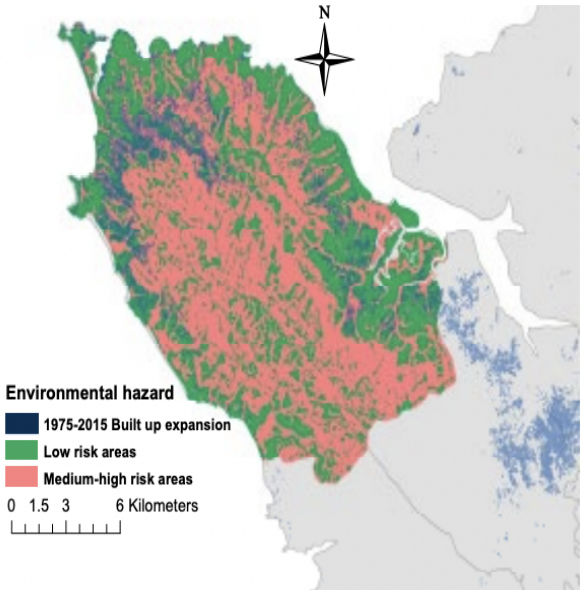

Figure 3: Environmental hazards and urban expansion on the 1990-2015 period (World Bank, 2018) and GHSL 1975-2015 (2018 update)

The Transform Freetown initiative was launched in 2019 in response to socioeconomic issues and environmental vulnerabilities. The Freetown City Council works within a framework that identifies 11 priority sectors grouped into four key clusters: Resilience, Human Development, Healthy City and Urban Mobility. In this research, the focus will be on resilience and justice in the climate adaptation plans of Freetown.

3.2. New Orleans

New Orleans is the capital of Louisiana, as well as the state's most populated city, with a population of around 384.000 people. New Orleans is located in southeastern Louisiana, on the Mississippi River's banks, south of Lake Pontchartrain and about 170 kilometres upstream from the Gulf of Mexico. New Orleans has grown to be a significant port city and an important economic hub in the Gulf Coast region as a result of these geographical features.

These features also make New Orleans one of the most vulnerable cities to disasters and floods (Abbatista et al. 2020). The city has a low elevation, much of the city is at or below sea level and is protected by levees. Furthermore, it is located in an area prone to storms and hurricanes that develop in the Atlantic Ocean and the Gulf of Mexico. This also happened in 2005, when Hurricane Katrina struck the Gulf Coast and many of New Orleans' levees and seawalls failed to protect the city from flooding, killing over 1500 people (Appleton, 2009). A study by Masozera et al. (2007) suggests that low-income neighbourhoods were more vulnerable to hurricane Katrina during the response and recovery phase. Socio-economic factors played a

significant role, those with the fewest resources and the least mobility suffered disproportionately in the aftermath of Hurricane Katrina.

Climate change is expected to increase the frequency and intensity of storms, which, along with rising sea levels, would result in greater coastal inundation (Knutson et al., 2019). With a projection of a 1.5m rise in sea level, this will have a direct impact on New Orleans' vital shipping industry, as several port facilities in the Mississippi River's lower reaches will no longer exist (Abbatista et al. 2020).
Furthermore, populations who are predominantly black or African American, or those that are low-income, are still disproportionately vulnerable to flooding caused by rising sea levels or storms (Abbatista et al. 2020).

In response to the threat of climate change, New Orleans launched ‘Resilient New Orleans’ in 2015 and ‘Climate Action for a Resilient New Orleans’ in 2017. New Orleans' plan combines local expertise with global best practices to address the city's most pressing challenges, adapt the city to its changing natural environment, invest in equity, create flexible and reliable systems, and prepare for future vulnerabilities.

3.3. *Rotterdam*

Rotterdam is a city in the west of the Netherlands in the province of Zuid-Holland at the mouth of the Nieuwe Maas channel leading into the Rhine-Meuse-Scheldt Delta. With approximately 650.000 inhabitants it is the second-largest city in the country. Rotterdam is the largest harbour city in Europe, which makes the port of huge economic and logistic importance. As a delta city, Rotterdam, like Freetown and New Orleans, is vulnerable to the consequences of climate change such as high-water levels and extreme weather conditions.
Rotterdam has a long history of flood management. It has among other things projects like the Delta Works which protects the city from the sea and makes it one of the safest delta cities in the world (Management team of Rotterdam Climate Proof, 2013). Despite the many measures throughout recent centuries the city is still being disrupted and damaged by extreme rainfall. Furthermore, parts of the city are still very vulnerable because of their low elevation, which is often below sea level. Next to that many parts of Rotterdam, including the port, are located outer dikes (Management team of Rotterdam Climate Proof, 2013). The risk of flooding in various areas of the city will increase in the next decades. To avoid harm to Rotterdam's economy, safety, and health, it is vital to address these vulnerabilities.
The municipality of Rotterdam came up with climate action plans in which they want to make Rotterdam climate-resilient and water-robust by 2025. Next to that, there is the Rotterdam Climate Agreement, which consists of concrete measures that together will reduce CO2 emissions to 50% before 2030 (Energieswitch, 2019). Because of its industry and the port, the municipality of Rotterdam still accounts for about 20% of total CO2 emissions in the whole country (Groendendijk, 2021).

4. Findings

4.1. Transform Freetown

According to the Freetown City Council’s Development Planning Officer, the scale of the research that has gone into planning Transform Freetown is unique. ‘’The scale of it allowed for more inclusion and more participation than anything we have done before’’. This was accomplished through zonal meetings, which

included a comprehensive needs assessment of residents' perspectives on service delivery (Freetown City Council, 2019). These meetings were attended by ward committee members, various community stakeholders, councillors, youth groups, religious groups and women's groups. In addition, because not all citizens have access to official channels of feedback, there were possibilities for online participation, one-on-one meetings, an open-door policy, and a community walkout program.
In this way, the Freetown City Council is providing inclusion and opportunity for a voice for the (marginalised) residents in Freetown. In the climate plans of Freetown, the collective right of being included in the decision-making process can be regarded as a form of procedural justice.

Because of a lack of affordable housing, many of Freetown's poorest and most vulnerable citizens live in informal settlements, increasing their environmental risks (World Bank, 2018). The Freetown City Council, in collaboration with the Urban Development Consortium, upgraded two of these slums in 2020 to reduce dangers (Freetown City Council, 2021). This was done by among other things: demarcating zones based on hazard and risk mapping, designing housing options and getting input and experiences of the people living in these settlements. Next to upgrading these slums, there are targets to ''build >5.000 quality low-cost housing units for Freetown in collaboration with Western Area Rural District Council by 2022'' and ''Develop the Freetown Zonal Plan and ensure the >90% of new buildings and structures constructed abide by the plan and appropriate regulations by 2020'' (Freetown City Council, 2021).
However, while the Local Government Act of 2004 provides for the devolution of functions to local governments, not all functions have been devolved to date (Macarthy et al. 2019). This is also the case for several urban planning-related activities that have yet to be devolved, such as land surveying, strategic local plans, and the granting of building licenses (Freetown City Council, 2021).
Because these activities are still executed at the national level, the inclusion of Freetown's residents is rarely seen as a priority (Macarthy et al. 2019).

Therefore, one of the key problems in the planning process is that while having a decentralization law and devolved urban management, Freetown lacks the capacity to adopt the legal rules and establish a planning infrastructure (EU, 2019). This is also because only two urban planners were working in Freetown in 2014 (Cham & Kai-Banya 2014, cited by Lynch et al. 2020, p. 10).
Even though Freetown is working and planning to improve living conditions for its (marginalised) residents, they still live in regions where floods and landslides are an enlarged risk, and in dwellings that are not planned or built according to proper regulations. As a result, it can be argued that the perceived fairness of the city's poorest people's protection from these hazards is still lacking.

4.2. Resilient New Orleans

In 2015, New Orleans launched the strategy ''Resilient New Orleans'' in response to the threat of climate change. Considering that social injustice exacerbates climate change concerns, the city combined this with the launch of the Climate Action Equity Project, which is a partnership between the City of New Orleans, the Greater New Orleans Foundation, and the Deep South Center for Environmental Justice (C40, 2019). CAEP's mission is to involve citizens of colour, low-income residents, and immigrant communities in making equity a priority in New Orleans' climate action strategy implementation.
Six community leaders and four individuals with advocacy experience and expertise in areas of the city's climate action plan make up the CAEP's advisory board. Residents of New Orleans who were nominated by community-based organizations in each city council district, as well as residents with expertise in energy,

transportation, waste reduction, and workforce/small business development, make up this advisory board (CAEP, 2019). Residents were given a place to learn about the advisory board's suggestions through public meetings. The meetings provided residents with an opportunity to express their thoughts on how to achieve equity in the plan, provided room for discussions about potential barriers and the feasibility of the recommendations, and assisted residents in developing an equity platform and giving them a voice in the city's climate change policies (C40, 2019). Similar to Freetown, it becomes clear that New Orleans is also focussing on giving all of its residents a voice and implementing equity in the decision-making process. Therefore, procedural justice, the fairness of rules and decision processes, really comes forward in the climate change plans of New Orleans as well in Freetown.

When it comes to mitigating climate change and limiting its contribution to climate change, New Orleans has plans to reduce its annual greenhouse gas emissions by 50% (City of New Orleans, 2017). This will be done through several actions in the coming years. Investments in alternative energy and energy efficiency, waste management and transportation upgrades, as well as greening and conservation programs, are among these actions (City of New Orleans, 2017).

New Orleans is preparing itself with an ‘’multiple lines of defence’’ approach to adapt to and respond to rising sea levels and more intense storms. This is done by: ‘’Advancing coastal protection and restoration, investing in comprehensive and innovative urban water management and incentivizing property owners to invest in risk reduction’’ (City of New Orleans 2014, p.14). Big investments were made in seawalls, flood gates, seawalls and pumps. This has resulted in less risk of flooding and better preparedness for storm surges. However, defence systems will never be able to eliminate the flood risk because of uncertainties in for example magnitudes of storms. Therefore, an efficient evacuation plan is also necessary for adapting to climate change. To help those who otherwise are not able to evacuate when it's needed, a city-assisted Evacuation system is established. In this way, the adaptation to climate change is both physical and behavioural (City of New Orleans, 2017). However, according to Anguelovski et al. (2016), poor African American communities will likely continue to be disproportionately vulnerable despite adaptation efforts. This is due to the fact that neither the levee alignments nor the city's land use patterns have changed significantly. Instead, marginalized groups are relocated away from hazard-prone locations in the urban centre to equally hazard-prone places on the outskirts of protected zones

4.3. *Rotterdam Climate Agreement & Action Plan*

In their article, Bulkeley et al. (2013) talk about distributive climate justice in terms of ‘rights’ and ‘responsibilities’. Debate on these is mainly about who has the right to emit greenhouse gases and who should take responsibility for climate change impacts, generally in terms of reducing greenhouse gas emissions. As previously mentioned, Rotterdam has a huge industry due to its function as Europe's largest port. This also makes them major pollutants, accounting for 20% of total CO2 emissions in the Netherlands in 2017. To meet the Paris Climate Agreement's energy transition goals, Rotterdam will cut CO2 emissions in half between 2017 and 2030 and has the ambition to become the most sustainable port city in the world. Together with more than 100 companies and civic organizations, the Rotterdam Climate Agreement was made (Energieswitch, 2019). According to the port, total carbon emissions have already decreased by 27% between 2016 and 2020. During this period, nationwide greenhouse gas emissions fell by 14%. In the year 2020, emissions in the city of Rotterdam decreased by 12%, in the Netherlands as a whole this was 8% (Port of Rotterdam, 2021). Despite its large industry and port, Rotterdam's emissions are decreasing at a

faster rate than the national average. As a result, it can be argued that Rotterdam takes responsibility for climate change impacts and is working to mitigate them, thus addressing distributive climate justice.

In Rotterdams WeerWoord, the climate action plan of the municipality of Rotterdam, the emphasis is mainly on adapting to climate change. Rotterdam is not yet sufficiently prepared for heavy rainfalls, given the reports of floods they still get from residents (Rotterdams WeerWoord, 2020). A tool was used to identify potential vulnerabilities in the city. This is called BlueLabel, which is the world's first digital model for mapping the danger of flooding in areas or houses due to heavy rain. Based on the risk of flooding the houses get ranked with a label ranging from A to E (Rotterdams WeerWoord, 2020).
Several strategies are implemented to decrease this risk. First of all, there are large-scale public projects such as the construction of water squares or rain gardens. This will increase the storage capacity and can retain the water when it is needed. However, public projects alone will not be sufficient. That is why residents are encouraged to take action themselves. This is part of the Rooftop Revolution project, where flat rooftops are transformed into green oases, energy generators and smart water systems. This project is in collaboration with the municipality and the residents of four neighbourhoods that are at risk of floods. To stimulate and make it possible for people to take measures themselves, residents and businesses can be subsidized for greening gardens and rooftops or collecting rainwater (Rotterdams WeerWoord, 2020). In this way, it is a fair project for Rotterdam's residents as everyone can take action if they want to with the help of subsidies.

The Port of Rotterdam has also conducted risk assessments on coastal and river flooding for its entire port complex. The flood risk and corresponding direct and indirect economic damages to the port and its industrial sites are mapped for the current situation and projected for expected scenarios in 2050 and 2100 (Royal Haskoning, 2020). Based on these models, a multi-level safety approach was designed. This approach consists of prevention, adaptation, emergency response and resilience measures.

Finally, it is mentioned that in collaboration with inhabitants, owners and entrepreneurs, local initiatives are supported (Rotterdams WeerWoord, 2020). This is done by conducting risk dialogues in neighbourhoods, joining active social networks, creating a communication platform and working together on creating optimal designs for people's own living environments. However, there is no particular mention of whether and how residents are being involved in the decision-making process as is the case with Freetown and New Orleans. Notions of procedural justice are less frequently mentioned in Rotterdam's climate plans as opposed to the other two mentioned.

4.4. *Discussion*

Comparing these findings makes it clear that the effects and consequences of climate change indeed are more severe in cities in the Global South than in those in the Global North, as argued by Anguelovski et al. (2014). This is because municipalities in underdeveloped countries frequently have weak local governments and insufficient services, housing, and infrastructure, as is the situation in Freetown. Cities also often lack the institutional capacity and financial means to adapt to climate change. In Freetown, for example, several planning-related activities have yet to be devolved, resulting in the inclusion of Freetown's citizens not being prioritized often. Furthermore, as with the relocation of marginalized populations in New Orleans, it becomes obvious that adaptation attempts though land-use planning tools do not necessarily prioritize the needs of marginalized groups, but instead reproduce socio-economic vulnerability.

5. Conclusions

Freetown, New Orleans, and Rotterdam are all among the world's most vulnerable cities to the effects of climate change due to comparable geographical conditions. These effects are, in particular, sea-level rise and extreme precipitation, and next to that also the risk of storms in New Orleans. The cities are vulnerable because of their location in low-lying delta areas near the sea. Each city came up with adaptation and mitigation strategies to be better prepared for climate change and its effects.

Procedural justice, the perceived fairness of rules and decision procedures used to determine results, was addressed more frequently and explicitly in the climate plans of Freetown and New Orleans than in Rotterdam. In Freetown, residents are provided inclusion and opportunity for voice in decision making through zonal meetings, one-on-one meetings, a community walkout program and options for online participation. This is the same in New Orleans, where the 'Climate Action Equity Project' was launched in combination with the city's action plan 'Climate Action for a Resilient New Orleans'. The goal of this project is to involve marginalized communities in making equity a priority in the implementation of New Orleans' climate plans. This is again done by public meetings and giving residents a voice in the city's climate change policies. Rotterdam is also conducting risk dialogues and creating communication platforms for its residents. However, the process of including residents in the decision-making process is not particularly mentioned in Rotterdam's plans. Next to that, less attention is paid to procedural justice in Rotterdam's climate plans, in comparison to the other two.
This is different for distributive justice, the perceived fairness of outcomes or resource allocations.
In Rotterdam's adaptation plans, innovative models are used for mapping the danger of flooding in specific houses and areas. The municipality is reducing the risk of flooding in the city by building public projects that serve as water storage, but it also provides individual homeowners with the option of taking action on their own with the support of subsidies. In this way, everyone who wants to act can, not only those who have the financial means to do so. New Orleans is also taking a lot of adaptation measures to adapt and respond to its climate risks and vulnerabilities. This is done by big investments in seawalls, flood gates, and pumps. In addition to these adaptation efforts, there is an efficient evacuation plan to help those who otherwise are not able to evacuate. However, these adaptation efforts result in 'acts of commission', where marginalized groups are being relocated as a result of infrastructure investments or new protected areas.
Freetown is working on upgrading slums to reduce danger. Furthermore, they are trying to provide affordable housing and developing zonal plans to ensure that new buildings and structures are constructed to abide by the plan and appropriate regulations. However, several urban planning-related activities are not devolved yet and are still executed at the national level. Because of this, many residents still live in regions and houses where floods and landslides are an enlarged risk. This means that justice in terms of protection from hazards is still lacking for Freetown's marginalized residents. The Problem is that Freetown lacks the capacity to adopt legal rules and establish a planning infrastructure, which is also because there were only two urban planners working in Freetown in 2014. Therefore, it must be a priority to increase the number of trained planners in Freetown as well as the rest of Sierra Leone (Lynch, 2020).

The debate on 'rights' and 'responsibilities' in distributive justice is mainly about who has the right to emit greenhouse gases and who should take responsibility for climate change impacts, generally in terms of reducing greenhouse gas emissions (Bulkeley et al. 2013). All three cities are major port cities with large economic value for their region. These ports and the industries that come with them are the cause of a large

share in emissions. Both Rotterdam and New Orleans are taking responsibility and are cutting CO2 emissions by 50% for 2030 to meet the Paris climate agreement transition goals. In the plans of Freetown, there was no mention of climate mitigation strategies in terms of energy transition. It can be assumed that energy transition in Freetown is not a priority at the moment, as Sierra Leone is one of the world's most impoverished and least developed countries (The Heritage Foundation, 2021).

In this research, several policy documents for each city were analysed. The only types of data used were secondary data and grey literature. In the results, I mentioned that there is less emphasis on notions of procedural justice in Rotterdam's climate plans in comparison with Freetown and New Orleans. It can however be that this is different in reality. This is also the case for adaptation efforts, to get a better understanding of how notions of justice are being prosecuted in these cities and if they actually prioritize the needs of marginalized residents, interviews could be conducted with residents, municipal officials, and planners.

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