

MSc Programme in Urban Management and Development

Rotterdam, the Netherlands

September 2021

Thesis title: **Mainstreaming and Implementation of Nature-Based Solutions for
Climate Change Mitigation, Adaptation and Resilience in Zambia**

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Report number: 1543
UMD 17

Summary

Climate change is one of the most profound urban challenges being faced globally and has adversely impacted the social, economic, and natural environments, costing billions of dollars in global damage, and collectively affecting many people worldwide. To address the problem of climate change, mitigate its impacts, and enhance adaptation and resilience, researchers, urban practitioners, and policymakers while working together have identified Nature-Based Solutions (NbS) as one of the best solutions to climate mitigation and adaptation challenges. This is because NbS can provide societal and ecosystem benefits simultaneously. The focus of this study, therefore, is to establish the extent to which the *institutional factors* influence the *mainstreaming* of NbS into Local Development Plans and actual *implementation* of NbS projects for climate change adaptation in Zambia based on a case study of Mumbwa Town Council. Various literature on concepts such as climate change adaptation, mitigation, and resilience building, NbS mainstreaming, and implementation and institutional factors were reviewed. Qualitative methods were applied in data collection and analysis. Nine (9) Key informant interviews guides were used to obtain primary data from 9 key informants and document review was conducted to complement data collection. AtlasTi was used to analyze the data. Research findings show that Mumbwa has mainstreamed the NbS in its District Development Plan and the Strategic Plan under 5 categories of initiatives namely, sustainable forest management, water ecosystem conservation, conservation agricultural wildlife ecosystem restoration, and urban greening have been implemented under various projects. In terms of the institutional factors that have facilitated the mainstreaming and implementation of the NbS mentioned above, the study identifies institutionalization, supportive local and national policies, holistic, flexible, and inclusive planning system, good governance, and stakeholder engagement, international funding among others as key facilitating factors. Major hindering factors include lack of local financial resources, climate variability through flooding, and droughts which have increased poverty levels poverty among the local people thereby pushing them to over exploit natural resources like forests resulting in high deforestation rates. In terms of the extent to which these factors have influenced NbS mainstreaming and implementation in Zambia, the study establishes a positive influence as the facilitating factors outweigh the hindering factors. However, the study still recommends that Mumbwa local authority should invest more in climate adaptation projects to help the community adapt to the impact of climate change and help reduce the poverty levels. The council should also invest more in local income generation ventures and be over dependant on international funding for NbS implementation. Also, more sensitization of the community members should be done to encourage them to participate in NbS protection and management.

Keywords

Nature-Based Solutions, Climate Change Mitigation, Adaptation and Resilience, Institutional Factors, Mainstreaming, and Implementation

Acknowledgments

Firstly, I wish to thank the Almighty God who made all things possible. Secondly, I would like to thank the institutions and individuals that gave me support in the course of this study. My gratitude goes to the Orange Knowledge Programme (OKP) Scholarship board for funding my study. My debt of gratitude is also extended to my employer the Local Government Service Commission for granting me the study leave and to Chinsali Municipal Council, in particular Mr. Joseph Zulu, Town Clerk for the recommendations and for facilitating my study leave. My sincere appreciation also goes to my duty station Mumbwa Town Council, for releasing me to further my studies especially at a time when my presence was greatly needed. To the Institute of Housing and Urban Studies, Erasmus University Rotterdam, thank you for offering me an opportunity to study at the faculty. I am also very grateful to the lecturers and tutors at IHS for introducing me to various concepts of Urban Management and Development and climate change and sustainability. I have had a great opportunity to learn the most recent trends and developments related to Sustainable, Smart, and Resilient cities and the most innovative analytical tools to transform these trends and developments into sustainable solutions which include; Nature-based Solutions, ICT-based solutions, and Climate mitigation and adaption actions among others. In particular, I would like to thank Elena Marie Enseñado under whose supervision this study was undertaken, for her guidance, support, and insightful comments that helped in shaping this study. My thanks are also extended to the second reader Dr. Marjie Van Eerd for reading and approving my work. I wish to also thank my course mates; Urban Management and Development (UMD 17) class with whom I found support, encouragement, and laughter amidst challenges. I send special thanks to members of my family, in particular my mother Rabbecca Chanda Kalapula, My father Dennison Mwansa Kalapula, my two elder sisters Hope Kalapula and Brendah Kalapula, and my one and only brother Dennyson Kalapula Jr for your unconditional support, encouragement, prayers, and sharing in my journey. May God continue blessing you all. Special thanks are also extended to my friend Felix Bartels for the constant encouragement and support. You have been a friend in need and truly, a friend indeed. I am very grateful. My sincere gratitude also goes to all the research participants. I am grateful for your contribution.

Foreword

This thesis is part of my master’s study in Urban Management and Development, specializing in Urban Environment, Sustainability, and Climate Change. It is also part of my contribution to the fight against climate change through research. My interest to focus on Nature-Based Solutions (NbS) as a way to mitigate climate change, foster adaptation, and build resilience at the local level was motivated by my passion for nature. Having grown up and worked mostly in the rural parts of Zambia where the local communities are heavily dependent on nature to sustain their livelihoods through the exploitation of forests, agriculture, fisheries, and wildlife, I have also seen how that has in the long run contributed to climate change through deforestation and natural environmental degradation including loss of biodiversity. During my course of study after learning about the NbS that they can regulate climate change while simultaneously providing social, economic, and environmental benefits, I got motivated hence my interest to promote them. But for a start, I needed to establish the extent to which my country Zambia has mainstreamed and implemented the NbS at the local level especially since I am an urban planner in the local government in Zambia. I am glad I did!

Abbreviations

7NDP	Seventh National Development Plan
AWARE	Accelerating Water and Agriculture Resource Efficiency
DDPs	District Development Plans
EU	European Union
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (Germany Development Agency)
GRZ	Government of the Republic of Zambia
IDPs	Integrated Development Plans
IHS	Institute for Housing and Urban Development Studies
IUCN	International Union for Conservation of Nature
NbS	Nature-Based Solutions
NDC	Nationally Determined Contributions
REDD+	Reduce Emissions from Deforestation and Forest Degradation
SCRiKA	Strengthening Climate Resilience in the Kafue Sub-Basin
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WWF	World Wide Funds for Nature

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CHAPTER 1: INTRODUCTION

1.1 Background

Climate change is one of the most profound urban challenges being faced globally and has adversely impacted the social, economic, and natural environments, costing billions of dollars in global damage and collectively affecting many people worldwide (Zhao et al., 2020; Allen et al., 2019). Zambia has not been spared from the adverse impacts of climate change and the country remains highly vulnerable (Government of The Republic of Zambia (GRZ), 2016). In Zambia, floods and droughts which alternate from year to year are the main climatic hazards experienced since time memorial, adversely affecting the economic sector, infrastructure, natural environment, livelihoods, and human wellbeing (GRZ, 2016; GRZ, 2017). Specifically, floods and droughts in Zambia have mainly affected the agricultural sector and natural resources which are the main source of livelihood for the majority of the population in rural and peri-urban areas, impacting food security at the community level thereby increasing poverty levels (Winsemius et al., 2018; Ochieng et al., 2017).

To address the problem of climate change, mitigate its impacts, and enhance adaptation and resilience, researchers, urban practitioners, and policymakers while working together have identified Nature-Based Solutions (NbS) as one of the best solutions to climate change challenges (Cohen-Shacham, 2016; Kabisch et al., 2016; Kalantari et al., 2018; Seddon et al., 2020). The European Commission defines NbS as “living solutions inspired by, continuously supported by and using nature designed to address various societal challenges in a resource-efficient and adaptable manner and to provide simultaneously economic, social and environmental benefits” (Maes & Jacobs, 2015). While the International Union for Conservation of Nature (IUCN) define NbS as, “actions to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits” (Cohen-Shacham et al., 2016, p.5). With nature being at a core, the goal of NbS is to provide societal and ecosystem benefits simultaneously (Cohen-Shacham et al., 2016). NbS for climate change mitigation, adaptation, and resilience also offers numerous environmental, social, and economic co-benefits which provide societally, and ecosystem benefits simultaneously (Cohen-Shacham, Walters, Janzen, & Maginnis, 2016; Frantzeskaki, 2019; Kabisch et al., 2016). Kabisch et al., (2016) define co-benefits as additional benefits that NbS offer to humans and the ecosystem when the initiatives were initially implemented for another purpose. NbS mainstreaming in this context of climate change means the integration of NbS into local policies for climate mitigation, adaptation, and resilience-building (Wamsler et al, 2017) while implementation entails applying NbS mitigation and adaptation initiatives into practice through the execution of NbS projects (Kabisch et al., 2016).

Zambia is one of the African countries that have embraced the concept of NbS as it has turned to nature to adapt to climate change impacts (UNEP, 2021). The country has integrated the NbS actions in its Nationally Determined Contribution (NDC) plans submitted to the United Nations Framework Convention on Climate Change (UNFCCC) as part of the international fight against climate change following the Paris Agreement (University of Oxford, 2021). The

country has also included some NbS approaches in its national climate policy and the seventh national development plan with some NbS projects being implemented at the national level (UNEP, 2021; GRZ, 2017; GRZ, 2016). At the local level, NbS have been mainstreamed in the Local Development Plans (LDPs) as part of the climate change mitigation, adaptation, and resilience strategies by the municipalities and other stakeholders operating at the local level and some of which have been and are being implemented through various NbS projects.

1.2 Problem Statement

In recent years, NbS have emerged with high recognition in urban planning and policy as a solution to climate change due to the growing evidence that they have the potential to help reduce vulnerability and enhance climate change adaptation and resilience of cities and communities (Kabisch et al., 2016; Mendez et al., 2016). Literature however reveals that, despite the growing relevance and wider adoption of NbS, there is still numerous challenges associated with mainstreaming and implementation of NbS across the sectors at global, regional, national, and local levels due to various institutional factors (Nelson et al., 2020; Sarabi et al., 2020; Wang et al., 2021). Various scholars have identified planning, policy and legal frameworks, actors, institutions, financial capacity, and Governance among others as the key institutional factors influencing the mainstreaming and implementation of NbS (Wang et al., 2021; Sarabi et al., 2020; Mendes et al., 2020; Nelson et al., 2020). These factors may act as enablers or barriers to the mainstreaming and implementation of NbS.

In Zambia, mainstreaming and implementation of NbS is challenging due to various institutional barriers. Kalantari et al., (2018) link the NbS mainstreaming and implementation barriers in Zambia to land-use planning problems which are associated with unsupportive policy and regulatory frameworks. They indicate that there is often a lack of supportive policy and legal frameworks which create a barrier for mainstreaming of NbS (Kalantari et al., 2018). The land-use planning is also usually poor and rigid, resulting in conflicting land uses lack of space to accommodate new NbS projects, and land ownership complexities which affect the effective implementation of NbS. According to Cooper, (2020), NbS in Zambia are also not institutionalized as decision-makers tend to prioritize grey infrastructure with immediate outcomes which are costly and may lack climate resilience. Actors also lack technical knowledge on how to mainstream the NbS and integrate them with grey infrastructure due to lack of technical guidance, tools and approaches (Cooper, 2020). This has for instance increased the climate mismatch between the design parameters of Zambia's Kariba Dam and a non-static climate (Cooper, 2020). Lack of financial capacity is another key barrier to the successful implementation of NbS in Zambia as most local authorities have limited funding options, most of which are dedicated to social service delivery and city development and do not have enough financial resources to invest in NbS (Acclimatise, 2020; Cooper, 2020). Thus, building local capacity to access finances is highlighted as key for future of NbS in the country (Acclimatise, 2020). In Zambia however, there is still a knowledge gap relating to the questions; To what extent have these institutional factors facilitated or hindered the mainstreaming and implementation of NbS in local development plans by the local authorities? Hence this study aims at clarifying this gap using the case study of Mumbwa Town Council, one of the 116 municipalities in Zambia.

1.3 Relevance of the Research

1.3.1 Scientific Relevance

This study will contribute to the scientific board of knowledge on NbS studies in Zambia and the institutional factors that affect the mainstreaming and implementation of NbS especially that there is less scientific research on NbS in Zambia and Africa at large as most studies are skewed towards developed countries, mostly in Europe and North America (Sarabi, et al., 2020; Bockarjova & Botzen, 2017). The study will also contribute to scientific knowledge on NbS mitigation, adaptation, and resilience co-benefits in Zambia besides the main benefits of NbS.

1.3.2 Social Relevance

This study is relevant to policymakers and urban practitioners as it will guide their policy and decision-making for mainstreaming and implementation of NbS projects in order to record successful stories regarding the implementation of NbS projects. The study will also reveal relevant information about the climate mitigation, adaptation, and resilience co-benefits of NbS. This will consequently improve the perception and attitude of the policy and decision-makers towards NbS and encourage its mainstreaming. This will also improve the perception citizens, the local business communities, and other stakeholders about NbS and encourage their participation in the financing, implementation and monitoring and maintenance of NbS.

1.4 Research Objective

The study aims to explain the extent to which the *institutional factors* influence the *mainstreaming* of NbS into Local Development Plans and actual *implementation* of NbS projects for climate change mitigation, adaptation, and resilience building in Zambia.

1.4.1 Specific Objectives

- i. To assess how NbS has been mainstreamed in Local Development Plans for climate change mitigation, adaptation, and resilience building.
- ii. To investigate the NbS projects that have been implemented as part of the Local Development Plans.
- iii. To assess the institutional factors facilitating and/or hindering the mainstreaming and actual implementation of NbS projects.
- iv. To assess the climate mitigation, adaptation, and resilience co-benefits of the NbS projects implemented at the local level.

1.5 Research Question

To what extent have the institutional factors influenced the mainstreaming of NbS into Local Development Plans and the actual implementation of NbS-related projects for climate change mitigation, adaptation, and resilience building in Zambia?

1.5.1 Specific Questions

- i. How has the NbS been mainstreamed in Local Development Plans for climate change mitigation, adaptation, and resilience building?
- ii. What are the NbS projects been implemented as part of the Local Development Plans?
- iii. What are the institutional factors that have facilitated and/or hindered the mainstreaming of NbS and actual implementation of the NbS projects?
- iv. What are the climate change mitigation, adaptation, and resilience co-benefits of the NbS projects implemented at the local level?

2 CHAPTER 2: LITERATURE/THEORY REVIEW

2.1 Introduction

This chapter provides an overview of existing literature on the main concepts and variables with regards to institutional factors influencing the mainstreaming and implementation of NbS as well as the NbS mitigation, adaptation, and resilience co-benefits. It provides foundation knowledge on the main concepts and variables of this study, identifies the gaps in knowledge, and demonstrates how this study will fit in the existing literature. The main concepts reviewed are NbS, climate mitigation, adaptation and resilience co-benefits, processes of mainstreaming and implementation of NbS as well as the institutional factors associated with mainstreaming and implementation of NbS. Lastly, a link between variables is provided through a conceptual framework.

2.2 Types and Approaches of NbS

NbS is an umbrella concept for a wide range of approaches aimed at addressing societal challenges effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits. Cohen-Shacham et al., (2016) cluster these approaches into five (5) main categories as shown in table 1 together with their examples.

Table 1: Categories and Examples of NbS Approaches

Category of NbS approaches	Examples
Ecosystem restoration approaches	Ecological restoration Ecological engineering Forest landscape restoration
Issue-specific ecosystem-related approaches	Ecosystem-based adaptation Ecosystem-based mitigation Climate adaptation services Ecosystem-based disaster risk reduction
Infrastructure-related approaches	Natural infrastructure Green infrastructure
Ecosystem-based management approaches	Integrated coastal zone management Integrated water resources management
Ecosystem protection approaches	Area-based conservation approaches including protected area management

Source: (Cohen-Shacham et al., 2016).

The approaches presented in table 1 above fall within three (3) types based on the categories of solutions they offer namely, protection, restoration, and creation of new ecosystems (Cohen-Shacham et al 2016; Cohen-Shacham et al., 2019). A typology of the 3 types of NbS in an X-Y axis diagram as shown in figure 1 was developed by Eggermont et al., (2015). Type 1 is concerned with nature conservation through protection, maintenance or improvement of the existing ecosystem such as wetland protection to increase fish stock. Type 2 is concerned with establishing long-term management strategies for managing and/or restoring ecosystems to improve their multifunctionality such as innovative smart agriculture while type 3 involves entails creation of new ecosystems and encompasses establishment of blue and green infrastructure such as green rooftops (Eggermont et al., 2015 Cohen-Shacham et al., 2016).

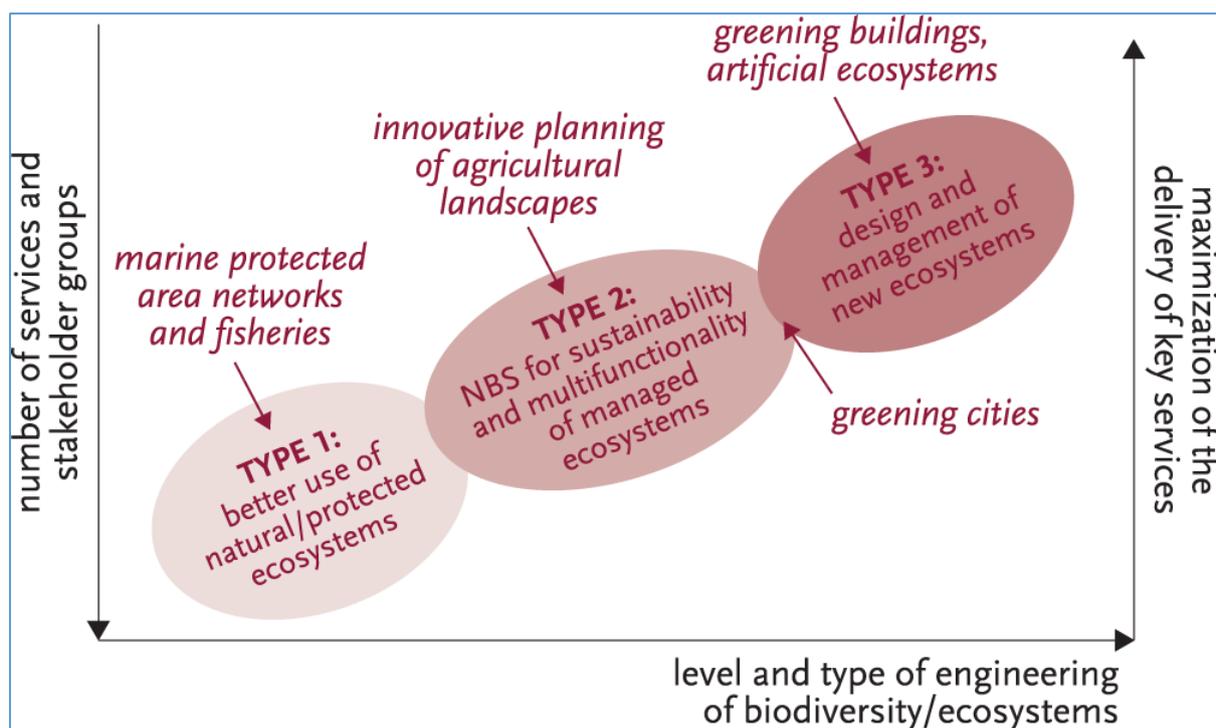


Figure 1: Types of NbS

Source: (Eggermont et al., 2015)

2.3 NBS for Climate Change Mitigation, Adaptation and Resilience Building

There is a growing awareness that NbS have significant potential to mitigate climate change impacts and can help people adapt to the effects of climate change and disasters and build resilience (Kabisch et al., 2016). UNEP 2021 defines Climate change mitigation as “efforts to reduce or prevent emission of greenhouse gases.” Field, (2015, p. 5) defines climate adaptation as, “the process of adjusting to actual or expected climate and its effects in order to moderate or avoid harm or exploit beneficial opportunities in human and natural systems.” Resilience on the other hand is defined as “the capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation” (IPCC, 2014). NbS contribute to global climate mitigation through their role in carbon sequestration, surface flooding control through absorption of storm water, coastal flooding protection by buffering coastal storms, water retention and soil erosion protection, air purification and pollution control and temperature buffering (Kabisch et al., 2016; Maes, Crossman, & Burkhard, 2016). This helps human beings adapt to effects of climate change and build resilience to climatic hazards such as flooding, droughts, strong winds and the heat island effects (Kabisch et al., 2016; Maes et al., 2016).

Seddon et al., (2020) however observe that, despite the growing evidence that NbS can strongly contribute to climate mitigation, adaptation and resilience, they have been underutilized due to a bias towards the engineered approaches globally. Thus, to demonstrate the important role of NbS in supporting climate mitigation, human adaptation to climate change and resilience building, Seddon and the co-authors used the IPCC vulnerability framework for social-ecological systems (**Figure 2**).

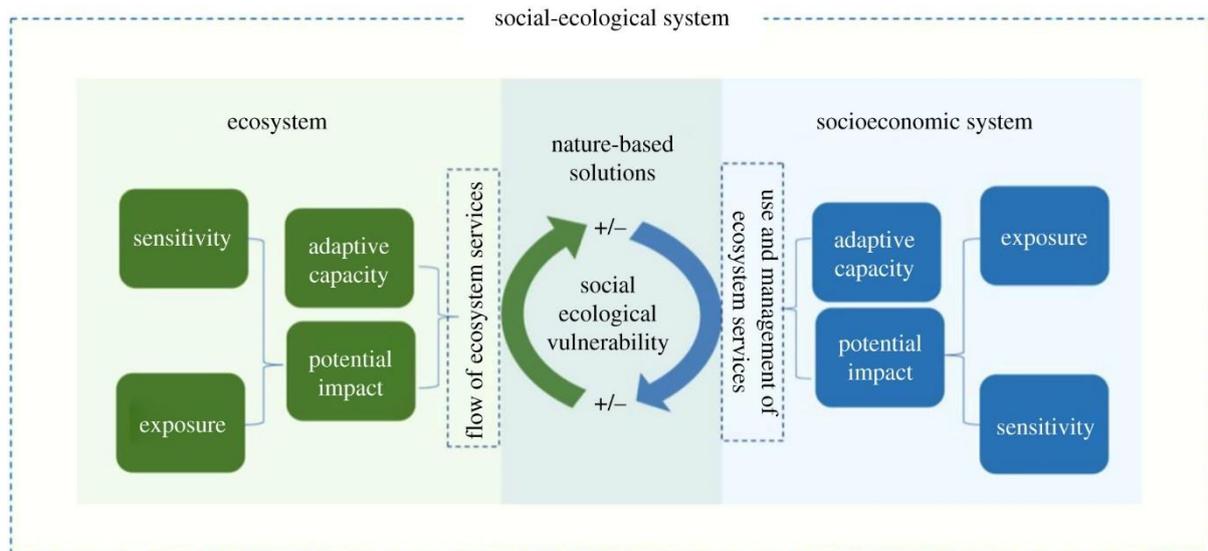


Figure 2: Integrating NbS to Climate Change Impacts into the Social-Ecological Vulnerability Framework

Source: (Seddon et al., 2020).

This conceptual framework places NbS at the interface of the socioeconomic system and the ecosystem to reduce socio-ecological vulnerability to climate change (Seddon et al., 2020). The framework recognizes three dimensions of vulnerability to climate change namely, *exposure* which entails the extent to which a region, ecosystem, resource, or community is impacted by climate change, *sensitivity* which is the degree to which a system is affected by, or responsive to, those effects and *adaptive capacity* which is the ability of the system to adjust or innovate in response to changing conditions. In this case, NbS is believed to bring all these elements together by enhancing the adaptive capacity of the system to buffer the potential impacts created by a combination of exposure and sensitivity. They, therefore, conclude that through the protection, restoration, and careful management of ecosystems, NbS can positively influence all three dimensions of socioeconomic vulnerability and promote climate mitigation, adaptation and resilience building (Seddon et al., 2020).

2.4 NbS and Climate Mitigation, Adaptation and Resilience co-benefits

Besides the climate mitigation, adaptation and resilience benefits, NbS also offer multiple environmental, social-cultural and economic co-benefits for biodiversity and human beings (Cohen-Shacham et al., 2016; Frantzeskaki, 2019; Kabisch et al., 2016). Kabisch et al., (2016) define co-benefits as additional benefits that NbS offer to humans and the ecosystem when the initiatives were initially implemented for another purpose. For instance, trees increasing green space in cities and foster human wellbeing by providing recreation and health benefits when they were initially planted for the purpose of carbon sequestration and temperature reduction. That's a co-benefit which is besides the main benefits and is one of the reasons for wide mainstreaming and implementation of NbS in policy and practice.

Raymond et al., (2017) developed a framework to assess the co-benefits of NbS. The framework depicts an interplay of four dimensions: i) co-benefits for human health and well-being; ii) integrated environmental performance; iii) trade-offs and synergies to biodiversity,

health, and the economy; and iv) potential for citizen participation in governance and monitoring. With this interplay, Raymond and the colleagues concur the views of other scholars such as Kabisch et al., (2016) and Cohen-Shacham et al., (2016) that NbS have environmental, social, and economic co-benefits besides the direct benefits and costs of NbS obtained from current ecosystem services. The framework also identifies 10 key societal areas of concern in which the NbS co-benefits occur. These include climate mitigation and adaptation, water management, coastal resilience, Green space management, air quality, urban regeneration, participatory planning and governance, social justice and social cohesion, public health and wellbeing and economic opportunities and green jobs (Raymond et al., 2017).

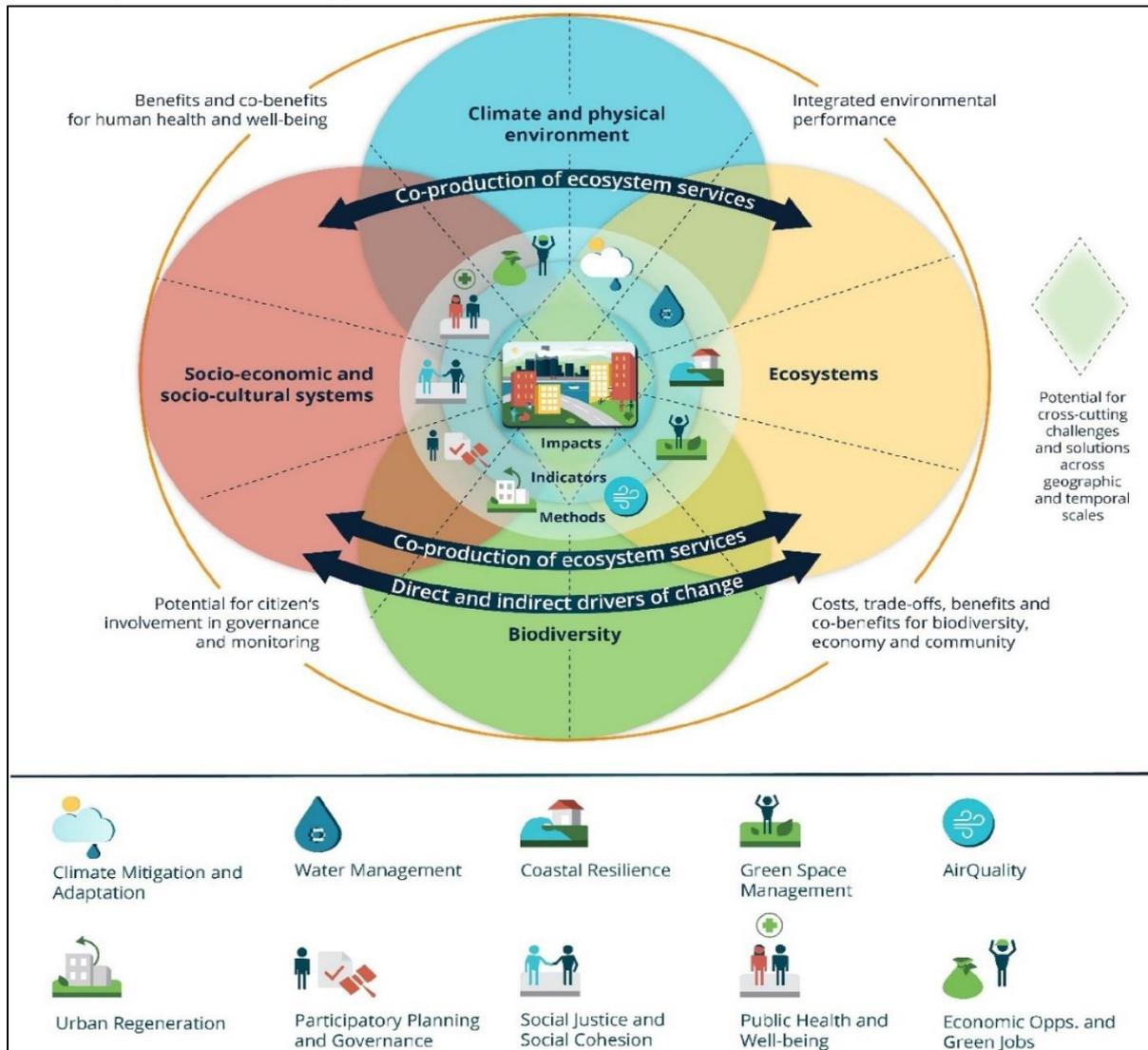


Figure 3: A framework for the assessment of NBS co-benefits
 Source: Raymond et al., (2017).

Like Raymond et al., (2017), various other scholars have identified a number of climate mitigation, adaptation and resilience co-benefits of NbS (Giordano et al; 2020; Raymond et al., 2017; Kabisch et al., 2016; Maes, Crossman, & Burkhard, 2016). Table 2 below presents these co-benefits categorized as environmental, social-cultural, and economic as identified by various scholars.

Table 2: Climate, Mitigation, Adaptation and Resilience Co-benefits of NbS

Category	Co-Benefits	Source
Environmental	<ul style="list-style-type: none"> • Integrated Environmental performance/environmental justice. • Natural habitat for species • Coastal resilience • Urban sustainability • Regulation air quality/Pollution Control • Water regulation • Urban regeneration • Urban Greenspace management and aesthetic • stormwater management & flood control • Ground water retention • Preserving soil fertility • Prevention of soil erosion • Pollination • Pest control 	(Giordano et al; 2020; Raymond et al., 2017; Kabisch et al., 2016; Maes, Crossman, & Burkhard, 2016)
Social-cultural	<ul style="list-style-type: none"> • Green space outdoor/Recreation • Eco-tourism • Social Cohesion • Social Justice • Human Health and wellbeing <ul style="list-style-type: none"> ○ Physical wellbeing ○ psychological well-being ○ Reduced rates of respiratory diseases or obesity. • Noise remediation • Food provision/Food security • Wood production • Production energy crops • Water production • Participatory planning and governance 	(Giordano et al; 2020; Raymond et al., 2017; Kabisch et al., 2016; Maes, Crossman, & Burkhard, 2016)
Economic	<ul style="list-style-type: none"> • Economic recovery • Boost Green economy/investment. • Green Jobs/employment • Green cities and infrastructure attracting more investors and create business opportunities. • Reduce health costs/expenses on public health. • Income generation • Agricultural production 	(Giordano et al; 2020; Raymond et al., 2017; Kabisch et al., 2016; Maes, Crossman, & Burkhard, 2016)

Source: Developed by Author 2021

2.5 Mainstreaming of NbS in Urban Plans and Policies for Climate Mitigation, Adaptation and Resilience Building

Mainstreaming of NbS in this context means the integration of NbS into local policies for climate mitigation, adaptation, and resilience-building (Wamsler et al, 2017). Literature shows that there is an increasing interest by the urban policymakers and practitioners to try to make NbS part of the “mainstream” of urban development, international policy, and urban research

agenda (Magni et al., 2020; Wamsler et al., 2017). This is because mainstreaming NbS into urban plans and policies provides sustainable solutions to address climate change mitigation and adaptation challenges (Magni, Musco, Litt, & Carraretto, 2020).

Mainstreaming of NbS into urban plans at the local level however is often challenging due to various institutional factors such as poor/rigid planning and governance (Magni et al., 2020) and lack of political will and a sense of urgency by the policymakers (Sarabi et al., 2020). Local authorities are also often not sure of the best approaches to use to systematically mainstream NbS into planning and urban governance (Wamsler et al., 2017). Thus, various scholars have attempted to find solutions to these challenges and barriers to NbS mainstreaming (Magni et al., 2020; Seddon et al., 2020).

Wamsler et al., (2017) for instance proposed a NbS mainstreaming framework involving four climate risk-reduction approaches within which NbS can be applied comprehensively. These are hazard exposure reduction, vulnerability reduction, effective response, and effective recovery. The framework presents two types of mainstreaming namely vertical and horizontal mainstreaming, with six mainstreaming strategies operating at three levels being local, institutional, and interinstitutional. Wamsler argues that in order to achieve a holistic and distributive governance system, climate mitigation and adaptation should be institutionalized at local, institutional and interinstitutional levels by uniting vertical and horizontal mainstreaming (Wamsler et al., 2017). Here, local level refers to the community or household levels and how the approaches are mainstreamed in the initiatives at grassroots level (Strategy I & II). Institutional level implies internal organization (Strategy III) which is the implementing organization and its cooperation with other departments (Strategy IV) and the internal policies and regulations governing their operation and cooperation (Strategy V) while interinstitutional level entails external cooperation (Strategy VI) or interconnections between the implementing organization and other players such as local, national, regional, international and the Citizens. Correspondingly, vertical mainstreaming in this case entails a top-down mainstreaming of mitigation and adaptation strategies from the interinstitutional level to local level while horizontal entails a bottom-up approach in which strategies are mainstreamed from the local level to interinstitutional levels. The framework aims at promoting, comprehensiveness, inclusiveness, and flexibility rather than dependence on a single approach with emphasis being placed on effective urban planning and holistic governance (Wamsler et al., 2017).

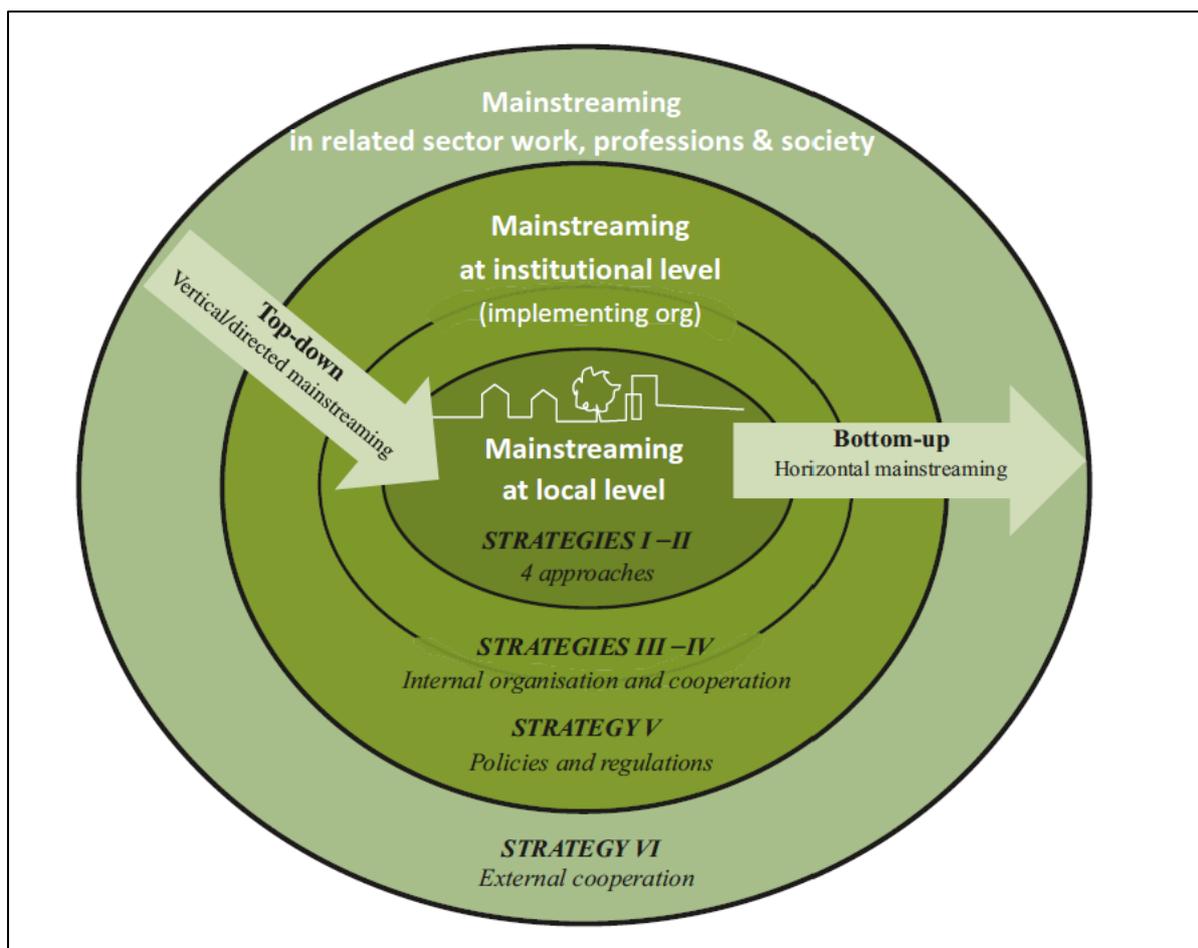


Figure 4: NbS Mainstreaming Framework

Source: Wamsler et al., (2017)

Magni et al., (2020) attempted to demonstrate how mainstreaming of NbS mitigation and adaptation actions into existing plans is possible at all levels of government. They conclude that, indeed this can be achieved through climate-proof planning by modifying planning tools and administrative practices. Seddon et al., (2020) also suggested coordination of stakeholders and modification of existing municipal plans as key to effective mainstreaming of NbS. Albert et al., (2020) also proposed a framework for planning and mainstreaming of NbS, outlining specific planning steps, methods, principles, and NbS criteria that provide an adaptable approach for NbS planning across multiple contexts. The six steps are co-define setting, understand challenges, create visions and scenarios, assess potential impacts, develop solution strategies, and realize and monitor.

2.6 Implementation of NbS

Implementation of NbS in this context entails applying NbS initiatives into practice through the execution of projects for climate mitigation, adaptation and resilience building, (Kabisch et al., 2016). Literature reveals that, despite the growing adoption of NbS in urban planning for climate mitigation, adaptation and resilience building, the implementation process is still a challenge due to several barriers (Raymond et al., 2017; Sarabi et al., 2020). Kabisch et al., (2016) identify some of the challenges associated with the implementation of NbS and explore solutions through institutional factors specifically urban governance as one of the enablers.

They indicate that effective urban governance is key for the successful implementation of NbS. Sarabi et al., (2020) identified and assessed fifteen (15) key barriers for successful implementation of NbS and conclude that institutional, political, and knowledge-related barriers as the most dominant barriers to NbS.

To promote successful implementation of NbS, Raymond et al., (2017) in their framework for assessing the co-benefits of NbS developed and proposed a seven-stage process for guiding NbS project implementation within policy. These steps include: 1) problem or opportunity identification; 2) selection and assessment of the NbS actions; 3) NbS implementation processes designing; 4) actual implementation of NbS; 5) regular stakeholders' engagement and co-benefits communication; 6) transferring and upscaling up of NbS, and 7) stage monitoring and evaluation of NbS co-benefits. Among these 7 stages, they incorporated institutional factors such as planning through problem and/or opportunity identification at the planning stage and assessment of NbS actions, and governance through the engagement of stakeholders as key for NbS implementation.

Frantzeskaki et al., (2019) conducted a cross-case comparative analysis in which they drew seven overarching lessons to the successful implementation of NbS which among them are the institutional factors such as collaborative governance. They indicate that urban practitioners need to have an open approach to collaborative governance of nature-based solutions that involves corporation with different urban actors and forming of new institutions to ensure inclusivity, livability, and resilience. This is because nature-based solutions require co-creation and trust among actors in the local government.

2.7 Institutional Factors Influencing Mainstreaming and Implementation of NbS

According to the literature, institutional factors play a key role in the mainstreaming and implementation of NbS. Different scholars have examined institutional factors for mainstreaming and implementation of NBS, and these factors can be categorized into planning, policy and legal framework (Mendes et al., 2020; Sarabi, et al., 2020), actors (Mendes et al., 2020; Sarabi, et al., 2020; Kabisch et al., 2016), institutionalization (Mendes et al., 2020; Nesshöver et al., 2017; Maes and Jacobs, 2015), financial capacity (Seddon et al., 2020; Sarabi, et al., 2020) and governance (Mahmoud & Morello, 2021; Zingraff-Hamed et al., 2020; Seddon et al., 2020; Wamsler et al., 2017; Kabisch et al. 2016; Sarabi et al. 2020). Each category is explained in detail in the following sub-sections.

2.7.1 Planning, Policy and Legal Framework

Mendes et al., (2020) states that, successful implementation of NbS requires holistic and inclusive urban planning and supportive policy and legal frameworks. Several scholars however identified lack of space to accommodate NbS and conflicting land use planning and land ownership complexities as key planning and legal barriers to successful implementation of NBS (Sarabi, et al., 2020, Kalantari et al., 2018). This is linked to rigid planning system. Urban planning and environmental policies at the municipal scale need to be institutionally and politically flexible to accommodate the NbS as they are key in enabling the incorporation of

NbS (Mendes et al., (2020). The legal requirements need to be promoted as they influence policy and planning (Mendes et al., 2020). Sarabi, et al., (2020) indicate that there is a lack of supportive policy and legal framework which creates a barrier for mainstreaming of NbS. In some cases, there are conflicting municipal, regional, and national policies and regulations which significantly hinder the implementation of NbS. More often there are inconsistencies between urban planning and municipal regulations with regards to NbS (Sarabi, et al., 2020).

2.7.2 Actors

Literature reveals that, for successfully mainstreaming and implementation of NbS, local authorities and urban planners need to have the necessary professional knowledge of NbS (Mendes et al., 2020; Sarabi, et al., 2020). Some of the major hindrances to the adoption of NbS in local development plans and policies is the lack of actors' knowledge on the NbS implementation process and uncertainties about the benefits and co-benefits of NbS (Sarabi, et al., 2020). The principle of NbS is not well understood by most local actors who are the implementers but rather by the scientific community, which tend to slow the adoption on NbS into planning and policy. In some cases, there are communication challenges between departments due to sectoral silos and/or conflicting mandates among different departments (Mendes et al., 2020; Sarabi, et al., 2020). NbS are multifunctional and may cut across sectors or institutions thus silos mentality provides a significant barrier to the successful implementation of NbS (Sarabi, et al., 2020; Kabisch et al., 2016).

2.7.3 Financial capacity

According to Sarabi, et al., (2020), lack of financial capacity is another institutional barrier faced with regards to implementation of NbS at the local level. Most local authorities have limited funding options, most of which are dedicated to social service delivery and city development and may not have enough financial resources to invest in NbS (Sarabi, et al., 2020). There is also resistance from the citizens and entrepreneurs to invest in NbS due to a lack of clear understanding of the benefits of NbS. The community and other stakeholders more often and may consider NbS to be a core responsibility of the local authorities (Sarabi, et al., 2020). There is also limited investment in NbS by international organizations and the private sector. NbS requires co-financing and risk-sharing by the public sector and the private sector and donors (Seddon et al., 2020). All these collectively provide financial barriers to implementation of NbS.

2.7.4 Governance

Various scholars indicate that successful implementation of NbS requires conventional models of governance that embrace co-creation, co-design, and co implementation of NbS interrelations which can be achieved through participation and collaboration Multi-stakeholder (Mahmoud & Morello, 2021; Wamsler, Pauleit, Zölch, Schetke, & Mascarenhas, 2017; Zingraff-Hamed et al., 2020). Zingraff-Hamed et al., (2020) indicate that governance models in the context of NbS have not been fully explored as most studies in governance have been in theoretical terms in the field of environmental policy, water management, and ecosystem approaches. They, therefore, concluded that, investigation in governance for effective implementation of NbS. Other scholars have however, observed some governance barriers which hinder effective implementation of NbS (Kabisch et al. 2016; Sarabi et al. 2020; (Seddon

et al., 2020). Specifically, Seddon et al., (2020) observe a lack of established urban governance to promote NbS implementation at local level.

2.7.5 Institutions

Institutions play an important role in NbS mainstreaming and implementation. Eshuis & Gerrits, (2021, p. 278) define institutions as “the formal and the informal rules influencing and structuring behaviour.” Formal institutions involve formal laws and regulations, and informal institutions include social norms, conventions, codes, rituals, routines, and roles (Eshuis & Gerrits, 2021). In the context of NbS, institutions entail processes and institutional arrangements that can hinder or enable the mainstreaming of NbS and related concepts in urban planning and policy in institutions and organizations (Nesshöver et al., 2017); Mendes et al., 2020,). Mendes et al., (2020) observed that institutionalization of NBS at the local level is unclear and not fully explored. They state, “there is a lack of literature pointing towards the importance of institutions and administrative units to promote efficient incorporation of NbS” (Mendes et al., 2020, p.16). They further indicated that, “Quantitative approaches that solidify the interest of NbS for technicians and decision-makers are important, but we cannot forget to adapt institutions and forms of governance in order to foster the incorporation of NbS into urban planning” (Mendes et al., 2020, p.16). Nesshöver et al., (2017) and Maes and Jacobs, (2015) indicate that as NbS needs to be embedded in the spatial planning, policy and practical application, the institutional arrangement needs to evolve for necessary change to occur. This is because institutional processes affect the mainstreaming and implementation of NbS as they may foster or hinder the success of the NbS. Thus, there is need to reflect on institutional arrangements (Nesshöver et al., 2017).

2.7.6 Common Institutional Factors as Drivers and Barriers to NbS Mainstreaming and Implementation

Literature reveals that the institutional factors can be both drivers and barriers to NbS mainstreaming and Implementation. Table 2 below presents the common drivers and barriers that have been examined by various scholars.

Table 3: Common Institutional Factors as Drivers and Barriers to NbS Mainstreaming and Implementation

Institutional Factors	Drivers	Barriers	Source
Planning, Policy and Legal Framework	<ul style="list-style-type: none"> • Holistic, flexible, and inclusive urban planning, • Supportive policy and legal frameworks 	<ul style="list-style-type: none"> • Poor and rigid land use planning conflicting land uses. • Lack of space to accommodate new NbS projects. • Land ownership complexities • Lack of supportive policy and legal framework • Conflicting municipal, regional, and national policies and regulations • Inconsistencies between urban planning and municipal regulations • Misalignments between short-term administration/office tenure and long-term planning goals • Cities focus on economic growth rather than on sustainable targets 	(Acclimatise, 2020; Albert et al., 2020; Cooper, 2020; Mendes et al., 2020; Sarabi, et al., 2020; Seddon et al., 2020; Frantzeskaki, 2019; Kalantari et al., 2018; Nesshöver et al., 2017; Maes and Jacobs, 2015)
Actors (Urban planners/managers, and policy makers)	<ul style="list-style-type: none"> • Actors' professional <ul style="list-style-type: none"> ◦ knowledge of NbS planning and design, implementation, monitoring and maintenance. • Actors' knowledge of the co-benefits of NbS • Teamwork • Clear NbS guidelines and tools 	<ul style="list-style-type: none"> • Lack of professional knowledge on how to mainstream NbS among the professionals. • Actors Uncertainties regarding the benefits of NbS • Lack of design standards and guidelines for implementation, monitoring and maintenance of NbS • Silo mentality • Communication challenges between departments • Conflicting mandates among actors of different departments • Lack of sense of urgency among policymakers • NbS not prioritized. 	
Institutions	<ul style="list-style-type: none"> • Clear and defined institutional arrangements and administrative structures. 	<ul style="list-style-type: none"> • Lack of institutionalization of NbS at the local level 	

Financial Capacity	<ul style="list-style-type: none"> • Availability of local financial resources • Adequate funding options (co-financing and risk-sharing, Community and private stakeholders investment in NbS, Increasing financial support from donors and financial institutions) 	<ul style="list-style-type: none"> • Lack of available financial resources • Lack of financial incentives • Limited investment in NbS by the international organizations and the private sector • Resistance from the citizens and entrepreneurs to invest in NbS due to a lack of clear understanding of the benefits of NbS. 	
Governance	<ul style="list-style-type: none"> • Good governance • Multi-stakeholder engagement and collaboration • Conventional models of governance (co-creation, co-design, and co implementation of NbS) • Citizens and Stakeholders' awareness and Knowledge of NbS 	<ul style="list-style-type: none"> • Lack of established urban governance system • Lack of stakeholders' participation and collaboration • Wrong communitys' and other stakeholders' perception that NbS is core responsibility of the local authorities 	

Source: Developed by Author, 2021

2.8 The Interrelationship between Institutional Factors, NbS Mainstreaming and Implementation and Climate, Mitigation, Adaptation and Resilience Co-benefits.

The literature reviewed an interrelationship between institutional factors, mainstreaming and implementation of NbS and the climate mitigation, adaptation and resilience co-benefits. The interrelationship reveals that, effective mainstreaming of NbS in planning, policy and practice can be achieved if institutional factors such as supporting policies, knowledgeable actors, availability of financial resources, and collaborative governance were in place (Mahmoud & Morello, 2021; Wamsler et al., 2017; Zingraff-Hamed et al., 2020). A lack of these institutional factors becomes a hindrance to NbS mainstreaming and implementation (Seddon et al., 2020). When NbS are effectively mainstreamed in practice, a wide range of climate mitigation, adaptation and resilience co-benefits to humans and biodiversity can be achieved (Raymond et al., 2017).

2.9 Conceptual Framework

The conceptual framework in figure 5 below presents the planning, policy/legal framework, actors, institutions, financial capacity, and governance as the institutional factors that may positively or negatively influence the mainstreaming of NbS into local development plans and implementation of NbS projects. Mainstreaming and implementation of NbS not only bring about climate mitigation, adaptation and resilience benefits but co-benefits as well.

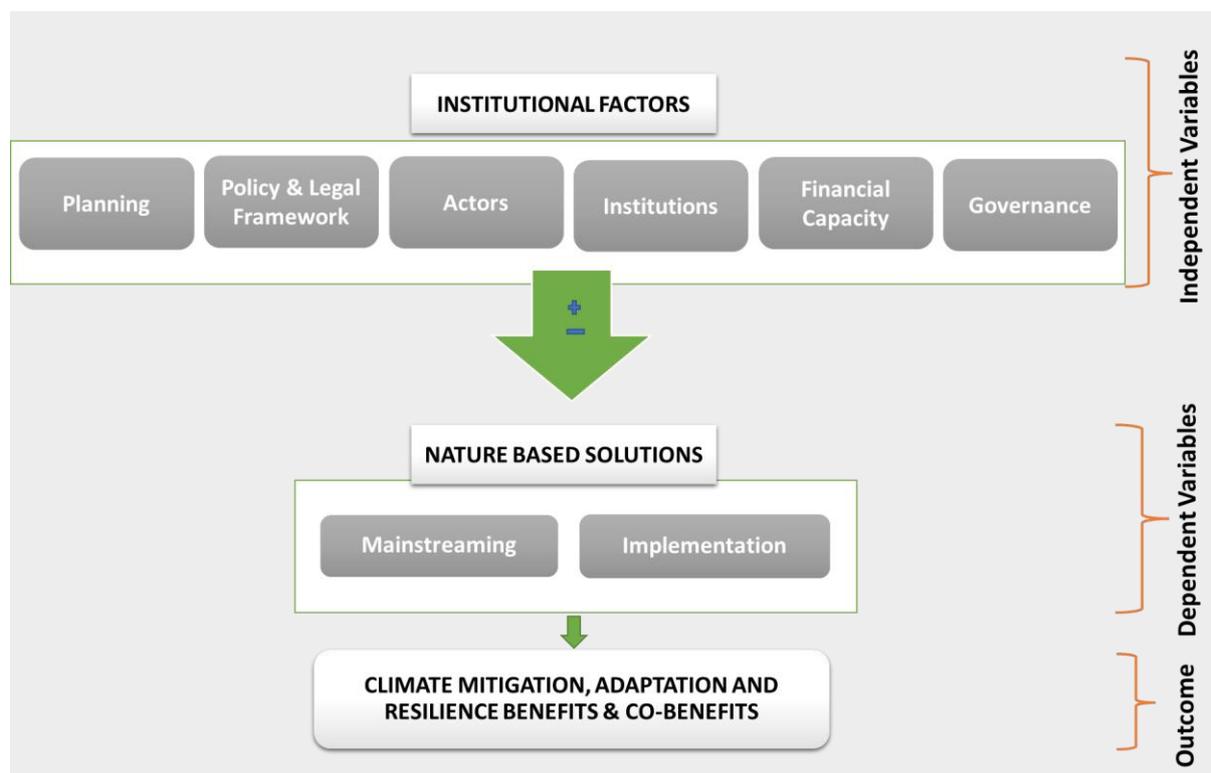


Figure 5: Research Conceptual Framework

Source: Developed by Author, 2021

3 RESEARCH METHODOLOGY

3.1 Research Strategy

This study is qualitative based on deductive reasoning. A case study was used as an overarching strategy. According to Starman, (2013, p. 21) a case study allows, “an in-depth exploration of an individual, group or phenomenon from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in a ‘real-life’”. This is the core reason for using this strategy in this study so as to gain in-depth knowledge on the extent to which the institutional factors have influenced the mainstreaming and implementation of NbS at the local level in Zambia. The case study strategy was complemented by the desktop research design in which relevant documents were reviewed.

3.2. The Case Study

The study involved a single case study of Mumbwa Town Council of Zambia that was selected as a sample from a population of 116 local authorities of Zambia. Mumbwa was selected purposively being one of the local authorities that have mainstreamed NbS for climate change mitigation and adaptation actions in its District Development Plan (DDP). Mumbwa Town Council is situated in Mumbwa District, Central Province of Zambia and approximately about one hundred and fifty kilometres (150km) from Lusaka, the capital city of Zambia. Mumbwa shares borders with Ngabwe and Kasempa in the north, Itezhi-Itezhi, Shibuyunji and Namwala in the South, Chibombo in the north-east, and Nkeyema in the west. Figure 6 shows the location map of Mumbwa District.



Figure 6: Location of Mumbwa Town in Central Province, Zambia

Source: Mumbwa Town Council

3.2 Data Collection

Both primary and secondary data was used in this study. 9 interviews were conducted with the key informants. Interview guides with semi-structured interviews questions were used to collect primary data from the key informants who were selected purposively and by snowball sampling as shown in table 4 below. According to Evans & Lewis, (2018), using semi-structured interview guides with open-ended questions enable the respondents to express their

views on their terms. Due to the corona pandemic, a research assistant was employed to assist with conducting physical interviews with some key informants as the researcher was not able to travel to the study area (Zambia). With the consent of the interviewees, all interviews that were conducted were recorded.

To complement primary data, secondary data was collected through review of the Mumbwa District Development Plan (DDP), Mumbwa Strategic Plan, Mumbwa layout plans, the Zambia National Climate Change Policy, Zambia Seventh National Development Plan (7NDP), The Zambia Updated 2020 Nationally Determined Contribution Report, The Constitution of Zambia of 2016 and the Urban and Regional Planning Act of 2015 of the laws of Zambia. The project documents for the SCRiKA, REDD+ and AWARE projects were also reviewed. A saturation point in data collection was reached when all the question were answered based on the research operationalization.

Table 4: List of Respondents

Primary Respondents			
Department	Respondent	Number	Sampling method
Mumbwa Town Council	Respondent 1 from the Municipality (R1M), Respondent 2 from the Municipality (R2M) and Respondent 3 from the Municipality (R3M)	3	Purposive Sampling
Secondary Respondents			
Devolved Ministries	Respondent from Forestry Department (RFD)	1	snowball sampling
	Respondent from Agriculture Department (RAD)	1	snowball sampling
Central Government	Respondent from District Administration Office (DRAO)	1	snowball sampling
Community	Respondent 1 from the Community (R1C), Respondent 2 from the Community (R2C) and Respondent 3 from the Community (R3C)	3	snowball sampling

Source: Developed by Author 2021

3.3 Data Analysis

The data that was collected in this study was coded and qualitatively analyzed in AtlasTi by co-occurrence analysis. But before the data was analyzed, the recorded interviews were transcribed into interview scripts by verbatim method (word by word). The reason for transcribing the interviews according to Widodo (2014) is because it helps organize the data and enable easy access to the information making it easier to code and analyze.

3.4 Operationalization

In table 5 below, the main concepts and variables related to the study that is presented in the conceptual framework in chapter 2 are defined to clarify the process of operationalization. Sub-variables, their indicators and sub-indicators are also identified to give direction to the study by highlighting exactly what was studied and the measurement of the indicators.

Table 5: Research Operationalization

Concepts	Variables	Sub-Variables	Indicators	Measurable Sub-Indicators	Type of Data	Target Respondent/ Data source
NbS <u>Definition</u> NbS are approaches that use nature as a solution to climate mitigation and adaptation challenges while addressing biodiversity and societal challenges simultaneously (IUCN, 2016)	Mainstreaming <u>Definition</u> Means integration of the NbS into the local development plans for climate mitigation, adaptation and resilience.	NbS mainstreamed into the local development plans	NbS mainstreamed in IDPs, DDPs, Strategic plans	Whether there are NbS mainstreamed in the local development plans	Qualitative	-Review of the local development plans -Interview with the council officials
			Types of NbS mainstreamed	What type of NbS have been mainstreamed in the local development plans <ul style="list-style-type: none"> • Type 1 (nature conservation, maintenance, or improvement of the existing ecosystem) • Type 2 (Management and restoration of ecosystems) • Type 3 (Creation of new ecosystem, modification of ecosystems) 	Qualitative	
			NbS strategies being mainstreamed (Strategies I-VI)	whether <ul style="list-style-type: none"> • Strategies I-II (Community or household levels) • Institutional level -internal organization (Strategy III) • Institutional level -Internal cooperation(Strategy IV) • Institutional level -Internal policies and regulations (Strategy V) 	Qualitative	

				<ul style="list-style-type: none"> • Interinstitutional level - external cooperation (Strategy VI) 		
	Implementation <u>Definition</u> Means effecting the NbS into actual projects (Sarabi, et al., 2020)	NbS strategies that have resulted in actual projects implementation	NbS project implemented	Whether there are NbS projects being implemented as part of the development plans	Qualitative	-Interview with the council officials and other stakeholders
			Types of NbS being implemented	NbS Type 1, 2, or 3	Qualitative	-Review of the project documents
			NbS strategies being Implemented	(Strategies I-VI)	Qualitative	
	Institutional factors <u>Definition</u> These are institutional drivers and barriers that may facilitate or hinder the mainstreaming and implementation of NbS respectively (Kabisch et al., 2016)	Institutions	Institutionalization	Whether the NbS have been institutionalized at local level	Qualitative	-Interview with the council officials
			Institutional arrangements	Whether there are clear institutional arrangements for the implementation of NbS	Qualitative	-Interview with the council officials and other stakeholders
			Responsibility Sharing/ Conflicting mandates	Whether there are conflicting mandates between departments/ institutions with regards to implementation of NbS		
		Governance system	Good governance system	Presence of an established urban governance system.		
			Political will and decision-making with regards to NbS prioritization	Whether NbS are prioritized or not by political decision-makers		

			Stakeholders' awareness, Knowledge and Perception of NbS Stakeholders	Whether the stakeholders are aware of what NBS are and their co-benefits				
				Whether the citizens have negative perception of NbS				
			Stakeholder engagement and collaboration	Whether the citizens and other stakeholders participate in NbS planning and designing				
				Whether the citizens and other stakeholders participate in NbS implementation, monitoring and maintenance				
		Planning	Land use planning and City focus	Whether the planning system is holistic, flexible and inclusive	Qualitative	-Interview with the council officials and other stakeholders -Review of the local development plans		
				Whether Cities focus on economic growth rather than on sustainable targets				
				Availability of planning and design standards/guidelines for implementation, monitoring and maintenance of NbS				
				Availability of space to accommodate new NbS			Qualitative	Interview with the council officials
				Whether there are Conflicting land use				
				Whether there are land ownership complexities/conflicts				
Policy /Legal framework	Supportive Policy /Legal framework	Whether the Policy /Legal framework are supportive	Qualitative	Interview with the council officials				

						Review the available local/municipal policies
			Conflicting and inconsistent municipal policies with national/regional policies and regulations	Whether the municipal policies and regulations conflict with otr are consistent with the national/regional policies	Qualitative	Compare the local/municipal policies with the National plans and policies
		Actors	Actors' professional knowledge and skills on NBS and their co-benefits	Whether actors' knowledge and understanding of NbS (knowledge on planning and design, mainstreaming and implementation process, monitoring and maintenance)	Qualitative	Interview with the council officials and other stakeholders
				Whether actors have knowledge on the climate mitigation, adaptation and resilience benefits and co-benefits of NbS		
		Silos mentality among actors		Presence or absence of good communication and information sharing among officers between departments within the Town Council	Qualitative	Interview with the council officials
				Presence or absence of collaboration and teamwork among officers within the Town Council		
		Financial capacity	Availability of financial resources for implementing NbS	Availability of local resources		
				Availability of government financial incentives		

			Participation of stakeholders in financing of NbS	Availability of international investment/ support		
				Participation of local private sector in NbS financing	Qualitative	Interview with the council officials/local community
				Participation of the citizens/ local community in NbS financing		
			Co-Financing and risk sharing	Availability of projects under co-financing (Funding agencies, Local Private sector, Citizens)	Qualitative	Interview with the council officials and stakeholders \
Climate adaptation <u>Definition</u> "The process of adjusting to actual or expected climate hazard and its effects in order to moderate or avoid harm or exploit beneficial opportunities in human and natural systems" (Field, 2015). Climate Mitigation	Co-benefits <u>Definition</u> Additional benefits to Humans and the environment that NbS offer when these were initially implemented for another purpose (kabisch et al., 2016).	Environmental co-benefits	Whether the implemented initiatives provide or intend to provide any of the possible environmental co-benefits	Possible environmental co-benefits <ul style="list-style-type: none"> • Integrated Environmental performance/environmental justice. • Natural habitat for species • Urban sustainability • Regulation air quality • Water regulation • Urban regeneration • Urban Greenspace management and aesthetic • stormwater management & flood control • Ground water retention • Preserving soil fertility • Prevention of soil erosion • Pollination • Pest control 	Qualitative	Assess the co-benefits of the implemented projects or the intended co-benefits of the ongoing projects and compare with the co-benefits reviewed in existing literature

<p><u>Definition</u> “Refers to efforts to reduce or prevent emission of greenhouse gases” (UNEP, 2021)</p> <p>Resilience <u>Definition</u> “The capacity of social, economic, and environmental systems to cope with a hazardous event or trend or disturbance, responding or reorganizing in ways that maintain their essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation” (IPCC, 2014).</p>		Social-cultural co-benefits	Whether the implemented initiatives provide or intend to provide any of the possible Social-cultural co-benefits	<p>Possible Social-cultural co-benefits</p> <ul style="list-style-type: none"> • Green space outdoor/Recreation • Eco-tourism • Social Cohesion • Social Justice • Human Health and wellbeing <ul style="list-style-type: none"> ○ Physical/psychological well-being ○ Reduced rates of respiratory diseases or obesity. • Noise remediation • Food provision/Food security • Wood production • Production energy crops • Water production • Participatory planning and governance 		
		Economic co-benefits	Whether the implemented initiatives provide or intend to provide any of the possible Economic co-benefits	<p>Possible Economic co-benefits</p> <ul style="list-style-type: none"> • Economic recovery • Boost Green economy/investment. • Green Jobs/employment • Green cities. • Reduce health costs/expenses on public health. • Income generation • Agricultural production 		

Source: Author 2021

3.5 Ethics, reliability, and validity

This research abides by the five (5) ethical rules as provided by Thiel, (2014) namely, beneficence, veracity, privacy, confidentiality, and informed consent which were clarified to the respondents before and after each interview. The research ensured that the identity of the respondents is protected and remain anonymous and the data collected was kept confidential and was only used for academic purposes. To achieve validity and reliability, the study employed a triangulation strategy by combining methods of data collection (semi-structured interviews and desktop document review). According to Thiel, (2014, p. 92), triangulation which is “a way of collecting or processing information by using different operationalizations, data sources, researchers or methods”, is a verified way of developing reliability and validity. The data collection tools were also tested on other student researchers before they were used. Besides, all the steps of the study and data sources was documented, and a data base has been maintained so that the whole process can be reviewed afterwards whenever need arises.

3.5.1 Challenges and Limitations Encountered

First, the researcher was unable to get to the study area due to covid. Instead, a research assistant based in the study location at the time of data collection was hired to help with physical interviews with key stakeholders. Second, data collection took place during the election season in Zambia, when the parliament and council were dissolved pending the election of new political leaders. As a result, no politician was interviewed.

4 CHAPTER 4: RESEARCH FINDINGS AND ANALYSIS

4.1 Introduction

This chapter presents the findings of the research as well as the analysis of the findings. In this chapter, the interview responses after undergoing co-occurrence analysis to establish relationships are presented as themes based on the variables, sub-variables, and indicators described in the operationalization.

4.2 NbS Mainstreaming

4.2.1 Mainstreaming of NbS the in Local Development Plans

The findings reveal that Mumbwa Town Council has mainstreamed the NbS for climate mitigation and adaptation into its 2017-2021 District Development Plan (DDP) and the 2018-2022 Strategic Plan. The DDP is a local development plan adapted from the Seventh National Development Plan (7NDP). For climate change mitigation, the major NbS initiatives mainstreamed in the DDP are sustainable forest management and water ecosystem conservation. Table 6 below shows an extract of some initiatives mainstreamed in the DDP.

Table 6: Extract of Planned NbS Related Activities from the Mumbwa District Development Plan 2017-2021

Strategy 1: Climate Change and Disaster Risk Reduction										
Programme	Programme Outputs	Output Indicator	Baseline	Activity	Plan Target	Annual Target				
						2017	2018	2019	2020	2021
a) Climate Change Adaptation	Surveillance systems for climate related risks improved	Proportion of risks addressed based on information from integrated surveillance system (%)	0	Establishment of an integrated surveillance system	5	0	0	3	1	1
		Number of meteorological observations stations per year	Rainfall stations: 3	Installation of Rainfall stations	5	0	0	3	1	1
	Meteorological stations: 3		Installation Meteorological stations	5	0	0	3	1	1	
	Utilization of climate data and information improved	Proportion of institutions utilizing climate data and information systems (%)	13	Increase access to climate data and information	17	0	0	17	17	17
Number of sectors implementing climate change adaptation projects/ programmes		5	Increase number of sectors implementing climate change adaptation projects	5	0	0	5	5	5	
b) Climate Change Mitigation	Sustainable forest Management Strengthened	Area with forest management plans (hectares)	3(21,052ha, 15,289ha and 4,812ha)	Formulation of forest management plan for Luba south, Nambala and Luba north local forests	3	0	0	3	3	3
		Hectares put under regeneration management	3ha	Identify zone areas for regeneration management	3	0	0	1	1	1
		Number of additional hectares of forest estates gazette	0	Identification of areas to be put under reservation proposal	1	0	0	0	1	0
		Number of forest hectares planted	0	Plantation of trees at each project site in Nalubanda, Sichanzu and Mumba wards	15ha	0	0	5ha	5ha	5ha

Source: Mumbwa DDP 2017-2021

Sustainable forest management is also mainstreamed in the Mumbwa Strategic 2018-2022 through the establishment of exotic tree plantations. Sustainable forest management is also a measure for climate adaptation as forests are a source of livelihood for most people in Mumbwa through the numerous forest products they provide such as wood and charcoal for cooking energy, mushroom and caterpillar harvesting, bee keeping for honey production, building carpentry materials and others economic uses forests which promote their resilience to climate change effects.

Water conservation through protection and improvement of water catchment areas is another NbS initiatives mainstreamed in both the DDP and the Strategic Plan for climate mitigation and adaptation. In the DDP, it is stated that,

“Water conservation and water-related disaster management coordination will also be incorporated in all strategies to mitigate effects of climate change and variability.....The Government will promote protection and improvement of catchment areas, to protect recharge zones and river sources” (Mumbwa DDP 2017, p 8).

Construction of dams which is a blue-grey infrastructure is also mainstreamed for surface water resources infrastructure development but also has climate mitigation and adaptation co-benefits.

Conservation Agricultural which includes crop production, livestock, and fisheries or aquaculture is another adaptation measure mainstreamed in the DDP. Frequent flooding and droughts that Mumbwa continues to experience from year to year have affected agriculture which is the source of livelihood for about 91.8% of the district inhabitants (Mumbwa DDP 2017, p 26). Hence the Council’s initiative to invest in conservation agriculture that is climate-resistant to enhance adaptation and resilience.

Wildlife Ecosystem Restoration through Management of Game Reserve Areas is another NbS related initiative mainstreamed in the Mumbwa Strategic Plan. In the DDP, it is indicated that climate change has threatened wildlife resulting in loss of biodiversity habitat, extinction of some animal species, and human-animal conflict as they compete for natural space. Thus, one of the initiatives in the strategic plan is to relocate citizens from the game reserves to other safe places within the municipal areas where it is even easier for them to access municipal services. This in return will foster wildlife ecosystem restoration and/or biodiversity habitat restoration which also has climate mitigation benefits.

Urban Greening is another NbS initiative that has been mainstreamed in the Strategic plan. It is incorporated into land use and planning mainstreamed under the strategic outcome number 2 of attaining a “well connected modern green city.” This is a local initiative inspired by the garden city concept which is one of the old concepts governing land use planning system in Zambia, adopted from the British urban planning system as Zambia is a former British Colony. Under this concept, the council leaves green open spaces in the newly planned areas to be developed as recreational parks. Open spaces are also left along the sidewalks of the road for tree planting purposes. In an interview, R3M stated;

“We mainstreamed Nature-based Solutions in the planning, in the creations that we did in the newly opened areas where we incorporated the Garden City concept, and it has been implemented after the plan was done..... When we're planning, we don't exhaust every piece of land that is available for planning. We incorporate a lot of greeneries like the open spaces even along the filter lanes. We leave some space for Planting trees, vegetation, and whatnot as a sustainable approach” We have a lot of greeneries that were left in the settlement.”

4.2.2 Types of NbS Mainstreamed in the Local Development Plans

A co-occurrence analysis was conducted to ascertain the relationship between the type of NbS mainstreamed and the initiatives mainstreamed in the local development plans. Table 7 below illustrates this.

Table 7: Co-occurrence table of the NbS mainstreamed in the local development plans and the Types of NbS mainstreamed

	Conservation agriculture	Sustainable forest management	Urban Greening	Water resource conservation	Wildlife ecosystem restoration
Type 1- Existing Ecosystem Protection, Maintenance and Improvement	2	2	1	3	1
Type 2-Ecosystem Management and Restoration	1	3	2	2	3
Type 3-Ecosystem Modification/New Ecosystem Creation	1	0	2	2	0

Source: Developed by Author 2021

The co-occurrence table above shows 5 main NbS initiatives mainstreamed which are conservation agriculture, sustainable forest management, urban greening, water resource conservation, and wildlife ecosystem restoration as described in the previous section. In terms of the type of NbS, it shows that most of them fall mainly in Type 2 which focuses on ecosystem management and restoration NbS, then type 1 NbS which is about protection, maintenance, and improvement of the existing ecosystem with a few falling in type 3. Sustainable forest management and wildlife ecosystem restoration reflect higher values of 3 under type 2 NbS. This is because the initiatives are focused on ecosystem restoration: For instance, sustainable forest management has activities such as forest regeneration management and reforestation

which are type 2 NbS with a purpose of curbing deforestation. Conservation agriculture reflects a high of values (2) in type 1 because its is focused on agricultural practices that promote permanent soil cover maintenance, have less soil disturbance, and promote diversification of plant species. Water resource conservation also reflects a higher value of 3 under type 1 NbS because it is focused on the protection of the water catchment areas while its values of 2 under type 2 and type 3 represent dam construction program which a combination of natural and artificial systems (blue-grey infrastructure) falling at the intersect of type 2 and 3 NbS. Also, urban greening falls at an intersection of Type 2 and Type 3 NbS. Overall, it can be said that the projects mainstreamed in Mumbwa Local development plans fall in all three types of NbS.

4.2.3 NBS Strategies Mainstreamed

In order to establish the relationship between the NbS mainstreamed in the local development plans and their strategic level, a co-occurrence analysis was conducted. Table 8 below illustrates the findings.

Table 8: Co-occurrence table of the NbS mainstreamed in the local development plans and the NbS Strategies Mainstreamed

	Conservation agriculture	Sustainable forest management	Urban Greening	Water resource conservation	Wildlife ecosystem restoration
Strategies I-II: Local level- Household levels/Community	5	8	0	4	5
Strategy III: Institutional level -Internal Organization	5	8	3	4	5
Strategy IV: Institutional level-Internal Cooperation	5	8	0	4	5
Strategy V: Institutional level-Internal Policies and Regulations	5	8	3	4	5
Strategy VI: Interinstitutional Level -External cooperation (National Govt, inter NGO, Citizens)	5	8	3	4	5

Source: Developed by Author 2021

The findings reveal that the NbS mainstreamed in Mumbwa fall under all the 6 strategic levels (I-VI): As shown in the table above, all the initiatives cut across all the strategies (I-VI) except for urban greening through the provision of green recreational parks and road sideways which are seen as sole responsibilities of the council, hence it is not mainstreamed at household level (Strategies I&II) and cooperation level (strategy IV). According to the study, except for urban greening, which is institutional, all the initiatives mainstreamed are local initiatives (Strategies I&II) and mainstreamed institutionally by the local authority (strategy III) within the council policies and regulations (strategy V). Under the decentralization policy, however, the local authority works in cooperation with other government departments (strategy IV) which have

been devolved to the local authority which are forestry, agriculture, water resource management, and the wildlife authority, and the communities at the ground root level for the benefits of the community and households (Strategies I&II). However, the initiatives were adapted from the national plans and policies with consultation from stakeholders at the national level (strategy VI). The values under each initiative represent the number of responses each was mentioned.

Correspondingly, Mumbwa has a combination of both vertical mainstreaming which entails a top-down mainstreaming involving of adaption of strategies from the interinstitutional level to the local level and horizontal mainstreaming which entails a bottom-up approach in which strategies are mainstreamed from the local level to interinstitutional levels. For instance, the response given by R1M reflected a vertical mainstreaming approach in which national policies are adapted at the local level to guide the implementation of NbS. He stated;

R1M: *“Mainly for us, we are basing on the National Climate Adaptation Plan, which was a masterpiece to guide in terms of how we would Orient our district climate adaptation policy. So basically, that was our masterpiece that we are using in line with the 7th National Development Plan, of course.”*

Simultaneously, the bottom-up approach has been used as well in which a community-driven approach was used where the community themselves were the ones who identified the initiatives which were adapted by the Town Council at the institutional level.

R1M: *“Actually beginning from the initiation part we took the **community participatory approach** trying to look at this process, beginning from the planning, the procurement stage, the implementation, the monitoring, and evaluation process.*

4.3 Implementation of NbS

4.3.1 NBS Projects Implemented

The findings reveal that the NbS projects implemented in Mumbwa are in line with the NbS initiatives that are mainstreamed in the Local Development Plans. These projects include;

i) Strengthening Climate Resilience in the Kafue Sub-Basin (SCRiKA) Project 2018-2020.

This is one of the NbS related projects being implemented by the Mumbwa Municipal Council and the community mainly for climate adaptation and resilience-building though it also incorporated mitigation measures through forest tree planting. The project is funded by the African Development Bank under the Climate Investment Fund and was aimed at strengthening the adaptive capacity of the people in the Kafue sub-basin especially those in peri-urban and rural communities and helping them respond better to the impact of climate change. The project incorporates adaptive mechanisms in the agricultural and other natural resources management practices such as gardening and fruit tree planting as well as afforestation and reforestation of community forest plantations which is part of the initiatives mainstreamed in the local development plans. Three participating communities were identified under this project in which the tree planting activities are being undertaken. These include Muleke, Chilaleta, and Mumba. **Photograph 1** below shows the nursery trees for the SCRiKA project under the Muleke community. During interviews, **R1C**, a community member who participated in this project indicated;

“Our project is funded under the SCRiKA Project. We do tree planting and gardening.”



Photograph 1: Muleke Community Tree planting project under the SCRiKA Project, Mumbwa

Source: Field data, 2021

ii) Reduce Emissions from Deforestation and Forest Degradation (REDD+) Project is another NbS project being implemented in Mumbwa. It is a UN-funded project focusing on sustainable forest management through afforestation and reforestation and enhancement of forest carbon stocks. The goal is to reduce emissions from deforestation and forest degradation in developing countries of which Zambia is a beneficiary. Though the main implementing department is the Department of Forestry, this project falls within the NbS initiatives mainstreamed in the Mumbwa Town Council’s development plans under sustainable forest management. Besides, the Forestry Department is devolved from the central government to the local authority under the decentralization policy. Photograph 2 below shows a community forest under REDD+.



Photograph 2: Community-Led Reforestation Project Under REDD+ Project

Source: Field Data, 2021

iii) Accelerating Water and Agriculture Resource Efficiency (AWARE) is another NbS project being implemented in Mumbwa. The implementing department for this project is the Department of Agriculture which is also a devolved department from the central government to local government under the decentralization policy. This project is co-financed by the European Union and GIZ (Germany Development Agency). The main objective of the project is to increase agricultural resource efficiency through sustainable management of water. This is because climate change hazards such as droughts that are experienced in some parts of Mumbwa have affected water availability thereby affecting agricultural production as well. The project has several activities as stated by RAD that;

*“We are doing water catchment protection measures. We have selected sites that we are going to work on. There are several interventions that we want to undertake. We are going to start with what we call **reforestation** and then we are going to do **soil bands** in areas that are eroded. We are also going to do **stone pitching** to reduce erosion in areas that are tributaries to major streams and at the same time will be doing what we call **trenching** so that water is collected in trenches and then that water seeps down into the ground as groundwater. We were looking at how best we can conserve water by way of training farmers how to use water efficiently”*

The project also involves setting up demonstration sites for sustainable irrigation and rainwater harvesting through trenching as shown in **Photograph 3** below:



Photograph 3: Trenching Demonstration Site under the AWARE project, Mumbwa

Source: Field Data, 2021

iv) Water Resource Management Project

This project is also under the Department of Forestry as the implementing department and is being funded by the World Wide Funds for Nature (WWF) which is an international organization working in nature preservation. This project focuses on promoting the natural regeneration of the ecosystem in the Kafue river catchment areas and its tributaries. It also fits

into the activity of water catchment area protection mainstreamed in the strategic plan. During an interview, RFD indicated.

“For the water resource management under the WWF, we are looking at the aspect of the assisted natural regenerations. We want to assist those small tree species which are trying to regenerate, to protect them from fire and also to protect the health of the rivers.”

V) Urban greening is another NbS project being implemented in Mumbwa. In an interview, R1M indicated;

“And as the Town Council at the organization level, we are also spearheading these. We are planting trees in terms of urban greening for these activities.”

In terms of implementation progress, however, this project has not been fully developed. So far, the municipality has only reserved open spaces for greenery and recreational parks yet to develop them when resources are available. Figure 7 below shows the Nambala land use map highlighting green open spaces.

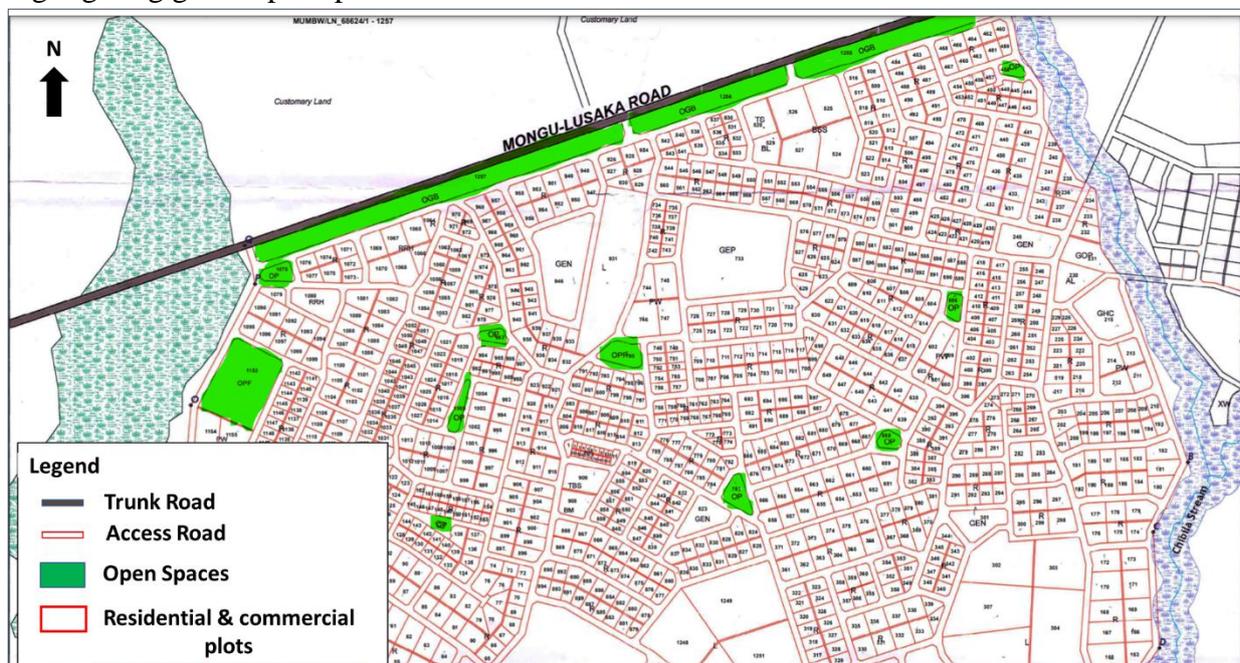


Figure 7: Extract of the Nambala Hill Extension Land Use Plan highlighting Green Open Spaces reserved for recreational parks and green road sideways

Source: Mumbwa Town Council

Vi) Keep Zambia Clean and Green and Plant a Million Trees campaigns are also the sister projects being implemented simultaneously as national strategies which have been adapted at the local level under sustainable forest management and urban greening initiatives mainstreamed in the local development plans. **R1M** stated;

“At the National level, we have the Plant a Million Tree Campaign that is being implemented in tandem with the Keep Zambia Clean and Green campaign.”

4.3.2 Types of NbS Implemented

The table below presents the results of the co-occurrence analysis of the type of NbS implemented.

Table 9: Co-occurrence table of the Type of NbS and the NbS Projects Implemented

	AWARE	Urban Greening	Keep Zambia Clean and Green	Plant a Million Trees campaigns	REDD+	SCRIKA	Water resource management
Type 1- Existing Ecosystem Protection, Maintenance and Improvement	2	0	1	2	1	2	1
Type 2-Ecosystem Management and Restoration	3	1	3	3	3	2	2
Type 3-Ecosystem Modification/New Ecosystem Creation	0	1	1	0	0	0	0

Source: Developed by Author 2021

As can be seen from the table above, the NbS being implemented fall in all the 3 NbS types though most of them fall under type 1 and 2 with type two 2 having more initiatives. This means that most of the initiatives are focused on ecosystem management and restoration type 2 and protection and maintenance of the ecosystem type 1. For instance, the AWARE, the REDD+, Keep Zambia Clean and Green Campaign, Plant A million Trees Campaign all have higher values under type 2 because they have reforestation programs to curb deforestation. At the same time, they have some afforestation programs focusing on establishing new forest plantations. In an interview, RFD stated;

*“So within these projects, which are being done in Mumbwa, there’s REDD+ project and for the REDD+ project the concept is to **manage** our natural resources and the other thing is to **restore** what we have damaged to the natural resources in terms of deforestation, in terms of land degradation.”*

The scores under type 3 are from urban greening and keep Zambia clean and green projects because urban greening falls at an intersect of type 2 and type 3. It is believed that as you green the cities, new ecosystems are also created in the urban environment.

4.3.3 NbS Strategies Implemented

A co-occurrence analysis was conducted on the NbS strategies implemented as shown in table 10 below.

Table 10:Co-occurrence table of the NbS Strategies and the NbS Projects Implemented

	AWARE	Urban Greening	Keep Zambia Clean and Green	Plant a Million Trees campaigns	REDD+	SCRiKA	Water resource management
Strategies I-II: Local level- Household levels/Community	2	0	3	3	2	4	1
Strategy III: Institutional level -Internal Organization	2	2	3	3	2	4	1
Strategy IV: Institutional level-Internal Cooperation	2	0	3	3	2	4	1
Strategy V: Institutional level-Internal Policies and Regulations	2	2	3	3	2	4	1
Strategy VI: Interinstitutional Level - External cooperation (National Govt, inter NGO, Citizens)	2	0	3	3	2	4	1

Source: Developed by Author 2021

The table above indicates most of the project implemented cut across all the 6 strategic levels except for urban greening through the provision of open spaces for recreational facilities which is only implemented by the local authority. The values under each project represents the number of responses. For instance, 4 respondents; R1M; R2M; R3M and R1C all mentioned that they are implementing the SCRiKA project hence the value 4. Accordingly, the SCRiKA project is implemented at household/community level (Strategies I & II) by the Mumbwa Town Council as the main implementing institution (Strategy III) while working with the technocrats from the other government departments like forestry, agriculture and fisheries (Strategy IV) and the project is internationally funded by the African Development Bank through external cooperation (Strategy VI). This reflects a combination of strategies I, II, III, VI, V and VI. The same applies to other projects urban greening which is implemented by the Council only within its internal policies and regulations. As for the plant a million trees and Keep Zambia Clean and Green campaigns, they are not funded by the international community but are national strategies (interinstitutional level-strategy VI) that have been localized to fit the local level and are being implemented at all levels.

4.4 Institutional Factors

4.4.1 Facilitating and hindering factors for the NbS Mainstreaming and Implementation

Institutional factors outlined in the operationalization under chapter 3 of this study were examined to establish which ones among them have facilitated the mainstreaming and implementation of NbS and those that are hindering factors. Tables 11 and 12 below provides a summary of the facilitating factors and hindering factors respectively. But the question is, to what extent have these institutional factors facilitated or hindered the mainstreaming and implementation at local level? This is answered in the subsequent section.

Table 11: Facilitating Factors for NbS Mainstreaming

Institutions	Institutionalization
	Institutional arrangements
Planning	Holistic, Flexible and inclusive planning system
	City's focus on both economic and sustainability goals
	Availability of specific NbS planning and design standards
Policy and legal framework	Supportive local policies
	Consistency local policies with National Policy/legal framework
Actors	Actors' professional knowledge and skills on NBS and their co-benefits
	Lack of Silos mentality among actors (Teamwork and good communication and information sharing)
Governance	Good governance system
	Political will and NbS prioritization
	Stakeholder engagement and collaboration (Co-implementation)
Financial capacity	International support/funding
	Co-Financing and risk sharing

Source: Developed by Author 2021

Table 12: Hindering Factors for NbS Mainstreaming

Planning	Lack of available land to accommodate new NbS
	Conflicting land uses
	Land ownership Complexes
Governance	Stakeholders (Community) perception of NbS
Financial capacity	Lack of local financial resources
	Inadequate government incentives
	Lack of participation in the financing of NbS by the private sector and the local citizens

Source: Developed by Author 2021

4.4.2 Extent to which the Institutional Factors have Influenced the Mainstreaming and Implementation of NbS for climate change mitigation, adaptation, and resilience in Zambia.

Based on the findings as presented in tables 11 and 12 above, a co-occurrence analysis was conducted to establish the extent to which the institutional factors have influenced the mainstreaming and implementation of NbS local development plans. As can be seen from the tables, there are more facilitating factors as compared to hindering factors which reflect a positive influence.

4.4.3 Co-Occurrence Analysis of the major factors for NbS Mainstreaming

In terms of NbS mainstreaming, table 13 below shows the co-occurrence analysis results of the major facilitating factors.

Table 13: Major Facilitating Factors for the Mainstreaming of the NbS

	Actors Knowledge of Nbs	Commun and Information Sharing	International financial Support	Good and Inclusive governance system	Political will and Nbs prioritization	Stakeholder / Citizen Engagement and Collaboration	Institutional Arrangements	Institutionalization/City Focus	Design Standards and Guidelines	Holistic, Flexible and Inclusive planning	Local Policy and Regulations	National Policy support
Conservation agriculture	3	1	1	2	1	3	0	4	4	3	4	4
Sustainable forest management	4	2	1	2	2	2	1	6	6	5	6	6
Urban Greening	4	1	0	2	1	2	0	5	5	4	5	5
Water resource conservation	3	1	1	2	1	3	0	5	4	3	4	4
Wildlife ecosystem restoration	3	1	2	1	1	2	0	4	4	3	4	4

Source: Developed by the Author

Institutionalization

From the table above, institutionalization, reflect the highest values which is an indication that it has higher influence on NbS mainstreaming. This is due to the fact that, the Mumbwa Town Council has institutionalized the NbS as a norm of the Town which is also reflected in the long-term vision of the Council. During interviews, R1M indicated.

“So actually, when you even look at the vision for Mumbwa Town council, it's vividly actually outlined there were maintaining the nature-based solution, the greeneries is actually one of the targets that we are looking at.”

Considering the Council’s vision as stated in the Mumbwa Strategic Plan, it states, “*A Safe, Inclusive, Interconnected and Productive Modern **Green Town***”. In this vision, urban greening

is one of the values of Mumbwa. It is built on the concept of '*Garden City*' which is one of the old concepts that guide planning system in Zambia.

Supportive Local Policies and Regulations, National Policy Support, Design Standards and guidelines, also reflect higher figures which shows high influence. This is followed by the strong local policies which are in consistency with the national policies, and they reflect same values. This is because the local policies were adapted from the national policies. R1M stated,

R1M *“As a local authority, Uh, basically the local policy is what was adopted from the national policy.”*

The local development plans, (DDP and Strategic plan) and the National development plans and policies also serve as the general guidelines for the mainstreaming and implementation of the NbS. During interviews, R2M indicated;

R2M: *“OK, so to ensure that the principle of developing in a sustainable way, in a way that doesn't harm nature, there are several instruments used. So, there are policies that were put in place that provide guideline and these are the District Development Plan, the 7th National Development Plan and strategic plan.”*

Holistic and Inclusive Planning System and City Focus.

Holistic and inclusive planning system is one key factor that has facilitated the mainstreaming of NbS in Mumbwa. The findings reveal that Mumbwa town has a holistic planning system that not only focus on economic development but also incorporates issues of climate change, NbS and environmental sustainability in its local development plans. Currently, the council has the DDP and the strategic plan as the two key local development plans which were developed in an integrated manner in collaboration with various stakeholders. In the foreword for the DDP for instance, it is indicated that;

“It took up a multi-sectoral approach in order to have integrated development in the district that has a consideration of climate change in the planning process.”

To make the planning system even more holistic and inclusive, the Mumbwa Town Council is currently working on an Integrated Development Plan (IDP) which is an all-encompassing plan incorporating all sectors of development.

Other facilitating factors

Other factors such as Actors' professional knowledge and skills on NBS and their co-benefits, *lack of silos mentality among actors which is reflect in teamwork and good communication and information sharing have also helped in facilitating the mainstreaming of NbS but have had minimal influence.* For instance, the Council has a commitment to good and honest communication and teamwork as part of its fundamental values and principles outlined in the strategic plan. It is indicated.

“We are one company, one team. We are committed to a teamwork environment where every person is a valued member, treated with respect, encouraged to contribute and recognized and rewarded to his/her efforts”

“A commitment to common goals based on open and honest communication while showing concern and support for each other.”

These values are also upheld in practice as R2M during interviews indicated that;

“The teamwork is good. We do collaborate, knowing that the officers know the roles and responsibilities they have to play. So if for example, I as a planner I have my normal duties and responsibilities and I'm working with the surveyor, this affair is supposed to bring in his expertise. so there's teamwork, there's collaboration, We work together.”

4.4.4 Co-Occurrence Analysis of the Facilitating Factors the NbS Implementation Hindering Factors

A co-occurrence analysis was conducted for the hindering factors of NbS implementation as shown in table 14.

Table 14: Major Facilitating Factors the Implementation of NbS

	Actors Knowledge of NbS	Commun and Infor Sharing	International Financial Support	Good and Inclusive governance system	Political will and NbS prioritization	Stakeholder and Citizen Engagement and Collaboration	Insitutional Arrangements/Conflicting mandates	Institutionalization and city focus	Planning: Design Standards and Guidelines	Holistic, Flexible and Inclusive planning/city focus	Supportive Municipal Policy and Regulations	Municipal policies consistent/Conflicting with National Policies
AWARE	2	1	5	4	1	5	0	1	1	1	2	2
Urban Greening	4	1	0	5	1	2	1	5	2	2	2	2
Keep Zambia Clean and Green	2	0	0	5	4	5	1	3	2	2	1	3
Plant a Million Trees campaigns	3	0	0	5	4	5	1	3	2	2	1	3
REDD+	4	1	5	4	3	5	0	2	0	0	1	1
SCRICA	2	1	5	5	5	5	1	1	3	3	3	2
Water Resource Management	2	0	5	4	1	5	0	1	1	1	1	1

Source: Developed by the Author

Good Governance System and Stakeholder Engagement and Collaboration

In the co-occurrence table above, good governance system and stakeholder engagement and collaboration show the highest values to indicate having higher influence when it comes to NbS implementation. The study reveal an inclusive governance system in which the Mumbwa Town council work in collaboration with various stakeholders such the politicians, other government departments such as forestry and agriculture, local NGOs, international organizations and the citizens through co-creation, co-design and co-implementation of the NbS. This has been made possible through the decentralization policy that the council has been implementing, which allows them to work hand in hand with various stakeholders and the citizens at ground level as indicated by R1M that;

“we are undertaking decentralization that is a multi-sectoral approach and integrated”

Under the decentralization policy, the Town council plays a role of a coordinating institution. During interviews, RDAO indicated that;

“Mumbwa Town Council becomes now the coordinator. They have been coordinating a lot of activities dealing with the other stakeholders like Amatheon Agric, those are the ones that have found in agricultural issues, then other stakeholders like COMACO I'm talking about, the former ZAWA, which is now the Department of National Parks and Wildlife and other stakeholders.”

The Council is also mandated to form sub-district structures at ward level called the Ward Development committees (WDCs) responsible for undertaking the planning, monitoring and evaluation projects and activities at community level which also include NbS activities. The Council also engagement of the local communities or citizens in the implementation of NbS projects.

Availability of International Investment and Co-Financing and Risk Sharing

International Investment/Support is second to good governance and stakeholder engagement which also indicate higher influence. The study reveals that, most of the NbS projects being implemented in Mumbwa are financed by the international organizations. For instance, the SCRiKA project is financed by the African Development Bank, REDD+ project is financed by the UNITED Nations (UN), the Water Resource Management is financed by WWF and the AWARE project is being co-financed by GIZ and the European Commission. This is also linked to co-financing. The study found that, the international organizations have also co-financed one of the projects being implemented in Mumbwa which is the AWARE project being co-financed by the European Union and GIZ. This has made it possible to implement various activities under the project.

Political Will and NbS Prioritization

This is also linked to political will as it is the politicians and the national government that lobbied for international funding that Mumbwa has been a beneficiary. According to the findings, the politicians not only support the mainstreaming of NbS but also participate in the financial resource mobilization by engaging the international organizations through the office of the mayor which connect with the office of the members of parliament, the ministers and finally the office of the president. In an interview, R1M indicated;

“If it wasn't for political will, then it was not going to be possible to actually access international funds for implementation of the Projects.”

4.4.5 Co-Occurrence Analysis of NbS Implementation Hindering Factors

In terms of hindering factors, no specific factors were mentioned to have hindered the mainstreaming of NbS. Most of the hindering factors were pointed out to implementation. The co-occurrence table illustrates the findings.

Table 15: Major Hindering Factors for NbS Implementation

	Lack of Local Financial Resources	Citizen Perception and Awareness	Limited Space for New NbS	Conflicting land use	Land Ownership Complexities	Environmental Factors	Social-Economic Factors (Poverty and low income community)
AWARE	5	2	0	0	0	4	4
Keep Zambia Clean and Green	6	3	1	2	2	3	3
Plant a Million Trees campaigns	4	3	1	2	2	3	3
REDD+	5	5	0	0	0	2	6
SCRIKA	4	1	1	2	2	4	2
WWF -Water Resource Management	5	1	0	0	0	2	5
Urban Greening	6	5	2	2	2	0	0

Lack of Local Financial Resources to invest in NbS

As can be seen from the table above, lack of local financial resources has higher values indication that it is the major hindering factor to implementation of NbS. Most of the projects being implemented are funded by the international organizations as the Council and other governments departments and the community implementing them do not have the financial capacity to invest in NbS. The study reveals that, when mainstreaming the NbS in the local development plans, the Mumbwa Town Council assigned some budget to the NbS initiatives as shown in tables 16 and 17 but these funds are not available for project implementation.

Table 16: Extract Budget for NbS initiatives from the Mumbwa DDP

STRATEGY 2: CLIMATE CHANGE ADAPTATION, DISASTER RISK REDUCTION AND MITIGATION						
Programme	Cost per year					TOTAL
	2017	2018	2019	2020	2021	
Afforestation and reforestation	0	0	60,000	70,000	80,000	210,000.00
Formulation of Forest management plan	0	0	120,000	130,000	138,000	388,000.00
Enhancement of natural regeneration management	0	0	50,000	70,000	90,000	210,000.00
Installation of two (2) Meteorological stations	0	0	0	180,000	180,000	360,000.00
Total			230,000.00	450,000.00	488,000.00	1,168,000.00

Source: Mumbwa DDP, 2017-2021, P,62

Table 17: Budget Extract highlighting Total Costs Estimates for Climate Change Adaptation, Disaster Risk Reduction and Mitigation

TOTAL COST ESTIMATES						
Programme	Cost per year					Total
	2017	2018	2019	2020	2021	
Enhanced welfare and livelihoods of the poor and vulnerable	0	0	41,830,475.00	46,540,475.00	49,250,975.00	137,621,925.00
Climate Change adaptation, disaster risk reduction and mitigation for reduced vulnerability	0	0	230,000.00	450,000.00	488,000.00	1,168,000.00
Reduced vulnerability associated with high HIV/AIDS prevalence	0	0	1,230,000.00	1,310,000.00	1,320,000.00	3,860,000.00
Total			43,290,475.00	48,300,475.00	51,058,975.00	142,649,925.00

Source: Mumbwa DDP, 2017-2021, P,62

The study also reveals that, the national government also does not support the implementation of NbS. There are grants that the national government sends to the Council and other government departments for operations and project implementation but not specifically for NbS. R3M indicated.

“Basically, in organizations like local authorities, funding is one of the major concerns. Funds do not come at the right time when you need them, but once they do come, we do divert them to the relevant sections.”

Most of the projects being implemented are funded with the support from the international organization while some initiatives like urban green through the provision of green recreational parks have not been implemented due to lack of financial resources. There is also very little financial support from the government. The community do not support the financing of NbS due to their poor economic status of the community.

Social-Economic Factors

Social-economic factors have second highest scores in the co-occurrence table above. To begin with, the local communities in Mumbwa do not participate in the funding of the NbS projects because of their low economic status. They are usually the beneficiaries of the projects, and they participate in implementation and maintenance but not in financing. Not even co-financing. The study reveals that the poor socio-economic status, of the local people which is characterized by **poverty and inadequate household income options** has been another major hindrance to the implementation of NbS. For instance, poverty and low economic status of the

local people push them to over exploit the ecosystem by cutting trees for charcoal and timber production as a source of income. This has led to high rate of deforestation in Mumbwa The general community continues to over exploit the natural resources and cutting trees for various economic gains such as charcoal production, which has a negative effect on the effective implementation of NbS. On the other hand, the mains hindering factors is lack of local financial resources factors as it reflects higher values. **R3M stated**

The major challenge has been in the sensitization process. As we know, it is quite difficult to sensitize a person who doesn't really understand the benefits of NbS, for example, reforestation, what they will look at now is the current need. A good example is that they cut down trees for charcoal. What they are not realizing is they are deforesting that area. To them, what they really want is money, but in the long run we all know that ecosystem would be destroyed. Yeah, so that has been the major challenge.”

Citizen’s Perception and Awareness

The Citizens perception that it’s the duty of the government to find solutions to climate change hinders them to participate NbS implementation. For instance, urban greening is considered as a sole responsibility of the Council even when they can manage to create and manage recreational parks. The council preserve open spaces for recreational services, but they remain undeveloped as long as the council does not have finances to develop them. Generally, Mumbwa is a poor community with most of the inhabitants being heavily dependent on subsistence farming and charcoal production hence their inability to participate in NbS financing.

Environmental Factors

Environmental factors defined by the geographical locations, ecological rainfall zones and climate variability, which is reflected in inconsistent climate patterns were also cited as one of the hindering factors for the implementation of NbS. Mumbwa was said to have been experiencing extreme climate variability reflected in flooding and droughts, which alternate from year to year and this hinders effective implementation of NbS. R1M stated,

“Yeah, because most of nature-based solutions as you can hear the word nature, they are environmentally oriented, so they need constant supply of water. Mumbwa has two extreme climate patterns, dynamics, dynamical changes. Yeah, that is drought and flooding. So in those periods where you have droughts, it's very difficult to sustain some of these projects.”

Conflicting Land Uses, Land Ownership Complexes and Limited Space to Accommodate New NbS

As can be seen from the table, Conflicting Land Uses Land Ownership Complexes and Limited Space to Accommodate New NbS are also hindering factors but have minimal influence. For instance, due to population increase and rural urban migration, some residents have illegally inhabited the places that were initially reserved for NbS such as local stream/river catchment areas. R1M stated;

“So some of the areas that were initially planned for nature-based solution have been inhabited illegally by some of these settlers. But, as the local authority, we also do some frequent monitoring inspections just to see and try to actually maintain this. But

however, there are these challenges because you also end up putting a human eye to it because of the circumstances and it is a bit political”

Also because of the dual land tenure system that Zambia upholds in which the majority of the land in the district is customary land owned by the traditional authority and only limited land is owned by the state/Local Authority. This affects the availability of land for new NbS as each time the Town Council wants to open up new areas for development including areas for new NbS, they have to negotiate for land from the traditional authorities. In most cases, the local authorities are cooperative and would offer land freely to support the implementation of projects while in other cases, the traditional leaders tend to be resistant to release land. There are also cases where some traditional leaders allocate land reserved for NbS such as water catchment areas to the local people for residential occupation.

4.5 Climate Mitigation, Adaptation Co-Benefits of NbS

The findings reveal some anticipated environmental, economic and social cultural co-benefits of the NbS projects being implemented in Mumbwa. They are anticipated in the sense that no evaluation has been conducted yet to assess the actual benefits and co-benefits of the projects being implemented as most of them are ongoing. The table below highlights some of the environmental, economic, and social -cultural co-benefits of various projects being implemented as highlighted by the respondents.

CO-BENEFITS		Urban Greening (Green Open spaces for recreation, Tree planting along the streets) Keep Zambia Green and Clean Campaign	Integrated Forest Management (SCRiKA, REDD+, part of AWARE project and Plant a Million trees Campaign)	Water Resource Management and (AWARE and WWF projects)
Environmental Co-benefits	Carbon Sequestration	✓	✓	✓
	Urban Regeneration,	✓		
	Stormwater Management & Flood Control	✓	✓	✓
	Ground Water Retention	✓	✓	✓
	Prevention of Soil Erosion	✓	✓	
	Natural Habitat for Species	✓	✓	✓
	Urban Sustainability	✓		
	Air Purification	✓	✓	✓
	Water Regulation			✓
	Climate change mitigation		✓	✓
	Climate change adaptation		✓	✓
Rainfall regulation		✓	✓	
Economic Co-benefits	Increased Agriculture Production		✓	✓
	Livelihood improvement		✓	✓
	Increased household income		✓	✓
	Game ranching		✓	✓

	Increased foreign direct investment		✓	✓
	Increased agricultural export base			✓
	Increased income from Tourism		✓	✓
Social Cultural Co-benefits	Recreation	✓		
	Social Cohesion	✓		
	Human health benefits	✓	✓	✓
	Increase wildlife and national parks and game reserves parks		✓	✓
	Tourism		✓	✓
	National food security			
	Social and economic Infrastructure development		✓	✓

5 Chapter 5: Conclusions and Recommendations

5.1 How have the NbS been mainstreamed in Local Development Plans for climate change Mitigation, adaptation and Resilience?

NbS have been mainstreamed in the local development plans in Mumbwa in the District development plan and the Strategic plan. The main initiatives mainstreamed are sustainable forest management, tree planting, water resource restoration, wildlife ecosystem restoration urban greening and sustainable agriculture. All these fall within the 5 approaches of NbS by Cohen-Shacham et al., (2016). In relation to the types of NbS by suggested by Eggermont et al., (2015), the NbS initiatives mainstreamed in the Mumbwa local development plans fall in all the 3 type but mainly under type 2 and type 1 NbS which focus on protection, maintenance and improvement of the existing ecosystem and ecosystem management and restoration NbS respectively while urban greening (green cities) fall at an intersect of type 2 and type 3 which is creation of new ecosystems. **Recommendation:** As most of the NbS mainstreamed fall under type 1 and 2, there is need for the Council to invest in research and development to also explore some type 3 NbS that can be mainstreamed and implemented in future.

In terms of the strategies as presented under the NbS mainstreaming Framework by Wamsler et al., (2017), the NbS mainstreamed and implemented in Mumbwa fall under all the 6 strategic levels which are strategies I and II (Household/community), III (Institutional level), IV (cooperation organization), V (implementing organization and its internal policies) and VI (the interinstitutional level). Correspondingly, Mumbwa has a combination of both vertical mainstreaming which entails a top-down mainstreaming involving of adaption of strategies from the interinstitutional level to local level and horizontal mainstreaming which entails a bottom-up approach in which strategies are mainstreamed from the local level to interinstitutional levels.

5.2 What are the NbS projects been implemented as part of the Local Development Plans?

The main NbS projects implemented in Mumbwa are SCRIFA, REDD+, AWARE, water resource management under the WWF, urban greening, Keep Zambia Clean and Green campaign and Plant a Million Trees Campaign. All these projects are in line with the initiatives mainstreamed and in relation to the NbS types by Eggermont et al., (2015), most of them fall under type 2 and type one with urban greening falling at an intersect of type 3. As for the strategies, they are implemented at all the 6 strategic levels. With regards to Raymond et al., (2017) and Sarabi et al., (2020) that the implementation process for NbS is still a challenge due to several barriers, this was also observed in Mumbwa as a number of barriers like lack of financial capacity to implement NbS projects were observed.

5.3 What are the institutional factors that have facilitated and/or hindered the mainstreaming of NbS and actual implementation of the NbS projects?

For the institutional factors, there are divided into facilitating factors and the hindering factors.

5.3.1 Facilitated factors

Overall, institutionalization, supportive local and national policies and holistic, flexible and inclusive planning system are the main facilitating factors for the mainstreaming of NbS in Mumbwa while good governance, stakeholder engagement and international financial support are among the key facilitating factors for NbS implementation.

5.3.2 Hindering factors

Lack of financial capacity, environmental factors such as climate variability and socio-economic factors are the main hindering factors.

5.4 Extent to which the institutional factors have influenced the mainstreaming and Implementation of implementation of NbS-related projects for climate change mitigation, adaptation, and resilience in Zambia?

The case study of Mumbwa revealed a positive influence as there are more facilitating factors as compared to hindering factors. Institutionalization of NbS has been one of the main facilitating factors as Mumbwa has made it a norm to plant trees and go green to mitigate climate change, adapt to its impacts and build resilience. This is in contrary to literature which indicates that NbS is not institutionalized at local level (Cooper, 2020). Supportive local and national policies which are also consistent with each other is another key facilitating factor for the mainstreaming of NbS. For instance, sustainable forest management has been one of the key NbS initiative mainstreamed in both the local and national policies. It is also one of the mitigation action programs prioritized in the Zambia's updated 2020 Nationally Determined Contributions. This also is in contrary with literature which states that there is a lack of supportive policy and legal framework which creates a barrier for mainstreaming of NbS (Kalantari et al., 2018). Good and inclusive governance system has also was found to be a key facilitating factor for NbS implementation and is linked to the decentralized system of governance in which the local authority works hand in hand with other stakeholders and the communities at grass root level. This is in line with the literature that successful implementation of NbS requires conventional models of governance that embrace co-creation, co-design, and co-implementation of NbS interrelations which can be achieved through participation and collaboration Multi-stakeholder (Mahmoud & Morello, 2021; Wamsler, Pauleit, Zölch, Schetke, & Mascarenhas, 2017; Zingraff-Hamed et al., 2020).

In terms of **hinderances**, lack of financial capacity is the main hindering factor for the effective implementation of NbS in Zambia as most projects being implemented are funded by the international organizations. This proves the arguments by Acclimatise (2020) and Cooper (2020) that most municipalities have limited funding options, most of which are dedicated to social service delivery and city development and do not have enough financial resources to invest in NbS. Thus, also there is inadequate government incentives to support NbS implementation. This study upholds the recommendation made by Acclimatise (2020) that there is need to build local capacity to access finances as it is key for future of NbS in the country. **Recommendation:** Since the implementation of most projects has been possible to international support, there is need for the local authority to engage more in cooperation with

the international funding agencies and lobby for more funding for NbS especially under urban greening.

Another recommendation is that, the national government and the politicians should continue supporting the local authority in NbS implementation and should strengthen collaboration with the international funding agencies and lobby for more financial and technical support for NbS mainstreaming and implementation. The Council should consider joining international networks dealing in climate change and NbS mainstreaming and implementation like ICLEI-Local Governments for Sustainability for more support.

There is also need for the Council, the national government and international community to enhance climate change adaptation actions like SCRiKA that can help strengthen citizen adaptive capacity and enhance their resilience to climate change effects. This is because the communities are heavily dependant of charcoal production and selling as a source of income thereby contributing to deforestation

5.5 What are the climate mitigation, adaptation and resilience co-benefits of the NbS projects implemented at the local level?

The anticipated co-benefits of the NbS being implemented fall under environment, social and economic co-benefits. The anticipated environmental co-benefits integrated environmental performance/environmental justice, natural habitat for species, urban sustainability, urban regeneration, urban greenspace management and aesthetic regulation air quality/pollution control, prevention of soil erosion and reserving soil fertility, water regulation, stormwater management & flood control, prevention of soil erosion and ground water retention. The anticipated economic co-benefits include agricultural production, income generation, economic recovery, boost green economy/investment, green jobs/employment, green cities and infrastructure attracting more investors and create business opportunities and reduce health costs/expenses on public health. The anticipated social-cultural benefits include; green space outdoor/recreation, eco-tourism, social cohesion, social justice, human health and wellbeing, physical wellbeing, psychological well-being, reduced rates of respiratory diseases or obesity, noise remediation, food provision/food security, wood production, water production and participatory planning and governance

5.6 Final Consideration

With the lessons learnt from the NbS mainstreaming and implementation in Zambia, an adjustment has been made to the conceptual framework stated in chapter 2 to suit the situation in Zambia. The proposed conceptual framework in figure 11 below highlights specific indicators of institutional factors facilitating and hindering NbS mainstreaming and implementation.

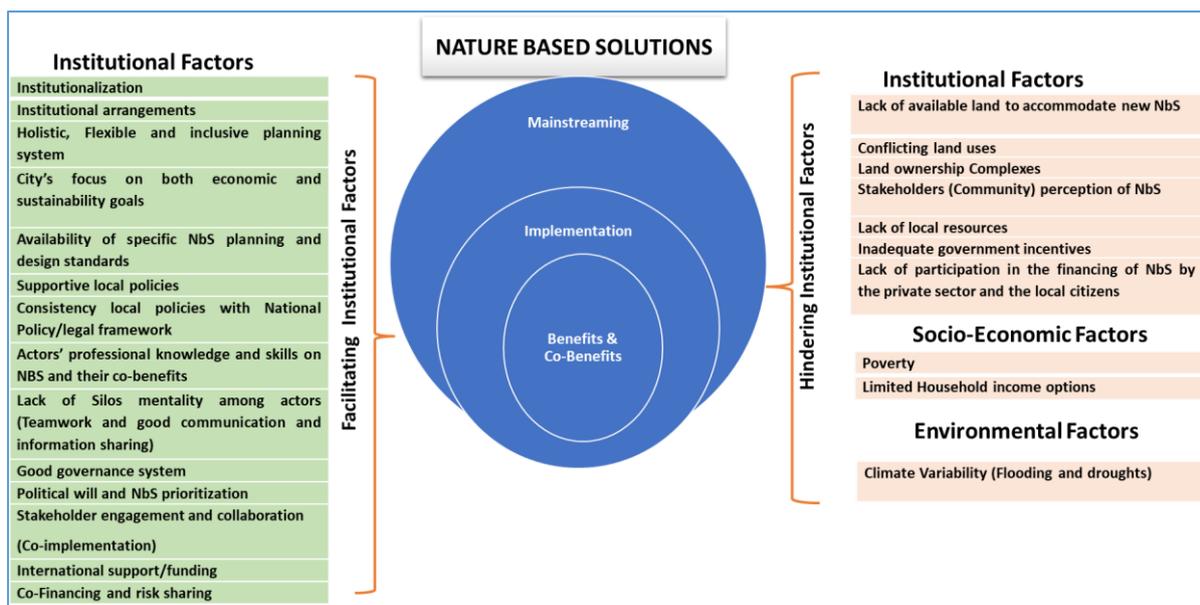


Figure 8: Institutional Factors that have Influenced the Mainstreaming and Implementation of NbS

Source: Developed by the author.

In this framework, NbS mainstreaming, and implementation are placed in a stacked venn diagram to indicate an overlapping relationship between the two. With mainstreaming placed in the outer circle and implementation in the inner circle, it gives an indication that initiatives are effectively implemented when they are part of the mainstream. However, there is also room for implementing projects outside what is mainstreamed in the plans and policies in case of ad hoc projects. This is why the implementation circle is not a complete subset of the mainstreaming circle. This Conceptual framework also places NbS benefits and co-benefits as a subset of implementation to indicate that, the benefits and co-benefits of NbS are not realised merely by mainstreaming them in the local development plans. It only when the initiatives are effectively implemented that their full benefits and co-benefits can be realised.

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6 Annex 1: Research Instruments

ERASMUS UNIVERSITY ROTTERDAM (EUR)

INSTITUTE OF HOUSING AND URBAN DEVELOPMENT STUDIES (I H S)

MSc. URBAN MANAGEMENT AND DEVELOPMENT (UMD-17)

June /July 2021

Research topic: **Mainstreaming and Implementation of Nature-Based Solutions for Climate Change Adaptation in Zambia.**

1. Interview protocol: **District Planning Officer/Town Planner/ Environmental Planner**

Hello. My name is Kalapula Marrien, I am a student at Erasmus University in Rotterdam, Netherlands. I am pursuing a Master of Science degree in Urban Management and Development, and I am conducting this interview as part of my program. My research aims to investigate the extent to which **institutional factors** (*Planning, Policy and Legal frameworks, Actors, Institutions, Financial capacity and Governance*) influence the mainstreaming of Nature-Based Solutions (NbS) into Local Development Plans and actual

implementation of NbS projects for climate change adaptation in Zambia. This research is purely academic and so I would like to assure you that all the information that will be collected from you will be treated strictly confidential and kept safely and will not be shared with any third party. The final report will only be submitted for grading in the school-protected learning platform (CANVAS). I would also like to inform you that your identity will be kept anonymous, and your name will not be mentioned anywhere in the report. The interview will take around 30-45 minutes of your time. I would also like to seek your consent to participate in my interview and I would request if I can record the session. The purpose for recording the interview is only to ensure that I do not miss any point from the interview. This will help me during data analysis and interpretation.

Part I: Introductions

1. Could you please briefly introduce yourself?
 - Name:
 - Occupation:
 - Role in the municipality:
 - Level of education:

Part 2: Knowledge and perception of NbS/Co-benefits

2. How would you explain your understanding of the principle of NbS?
3. Have you ever participated in NbS planning and design? How would you explain your knowledge on the planning and design processes?
4. How would you explain your knowledge on NbS mainstreaming and the implementation process?
5. How would you explain your knowledge on the climate adaptation benefits of NbS?
6. How would you explain your knowledge on the other co-benefits of NbS besides climate adaptation benefits? And would you give examples of these benefits?
7. How would you explain the availability of design standards and guidelines for mainstreaming, implementation, monitoring and maintenance of NbS?

Part 3: Mainstreaming and implementation of NbS

1. Would you explain to me the type of NbS projects/strategies you have mainstreamed in your Local Development Plans?
2. Would you explain to me the type of NbS projects/strategies you are implementing, or you have already implemented and their purposes?
3. When were the mentioned projects implemented?
4. Would you explain the progress (of the project implementation)?
5. At what level are the initiatives being implemented?
 - i. **Household level**
 - ii. **Community level**
 - iii. **Institutional level**
 - iv. **Cooperation/organization level**

v. Interinstitutional (National, Regional or International)

6. What are the specific environmental, social-cultural and economics co-benefits of the you have implemented?

Part 4: Planning and Policy

1. What specific plans do the council have in which the NBS initiatives have been mainstreamed?
2. What is the timeframe for the plan under which the initiatives were mainstreamed?
3. Would you explain whether there have been any changes in the administrative office tenure since the plan was launched?
4. Did the change in the administrative office tenure affect the implementation of NbS initiatives?
5. Would you explain to me the availability of land to accommodate new NbS?
6. Would you explain whether there have been cases of new NbS project implementation conflicting with existing land uses?
7. Would you explain whether there are cases of land ownership complexities with regards to land for NbS implementation?
8. What local/council policies are available at your council that influence the mainstreaming of NBS?
9. What National/International policies influence the mainstreaming of NBS at your council?
10. Do the local/council policies/legal framework support the NbS mainstreaming and implementation?
11. Do the local/council policies conflict with the national/regional policies/
12. Are the Local/council policy and regulations consistent with the national/regional policies/legal framework?

Part 5: Institutionalization and Communication within the municipality Would you explain to me whether the NbS are prioritized as part of this council's culture?

1. Would you explain to me whether there are administrative structures to manage NbS?
2. How would you explain the division of responsibility in NbS implementation?
3. Would you explain to me how the information is shared and communicated amongst officers within the planning department at this council?
4. Would you explain to me how the information is shared and communicated between the planning department and other council departments?
5. How would you describe teamwork and collaboration with officers within the planning department at this municipality?
6. How would you describe teamwork and collaboration with officers between the planning department and other departments at this council?
7. How would you explain the existence of conflicting mandates between different departments at the municipality exist?
8. Would you explain to me about the political decision-makers prioritization of NbS?

Part 6: Collaboration with Stakeholders (Governance)-Participation of other stakeholders and society

1. Who are the key Stakeholders you collaborate with, with regards to mainstreaming and implementation of NBS?
2. How would you explain the citizens and stakeholder's awareness of the NbS and their direct and indirect benefits?
3. Would you explain to me the perception of the citizens and stakeholders about the NbS?
4. Would you explain how Citizens and stakeholders participate in NbS planning and designing?
5. Would you explain how Citizens and stakeholder participate in NbS implementation?
6. Would you explain how Citizens and stakeholders participate in NbS monitoring and maintenance?

Part 4: Financing NbS

1. Would you explain to me the availability of **local financial resources** to invest in NbS?
2. Would you explain to me the availability of **government incentive/grants** to finance NbS ?
3. Would you explain to me the participation of the **Local NGOs** in financing NbS?
4. Would you explain to me the participation of the **Local companies/business community** in financing NbS?
5. Would you explain to me the participation of **citizens/community** in financing NbS?
6. Would you explain to me whether there are projects being implemented under **co-financing**?
7. Would you explain to me the availability of **international support /Investment** regarding NbS?
8. Would you tell me who the main financial sponsor of the NBS projects you are implementing?

Rating

1. Which factors are the main facilitating factors for the mainstreaming and implementation of NBS?
2. Which factors are the main hindrances of NbS mainstreaming and implementation?

Closing Question

I would also like to know if you have any questions for me with regards to the interview?

Closing remarks

I would like to thank you for participating in my interview. Like I indicated in the beginning, the purpose of this interview is purely academic and all the information you have provided

will be used strictly for academic purposes and will be kept protected and will not be shared with any third party. I would also like to know if you would be interested in receiving the interview transcript and the final report once they are finalized.

7 Annex 2: IHS copyright form

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