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Rustenburg Local Municipality

# Rustenburg Local Municipality Adaptation Action Plan

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# List of Acronyms and Abbreviations

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| CSIR | Council for Scientific and Industrial Research |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DFFE | Department of Forestry, Fisheries and the Environment |
| DHS | Department of Human Settlements |
| DRR | Disaster risk reduction |
| HDA | Housing Development Agency |
| IPCC | Intergovernmental Panel on Climate Change |
| IVRS | Interactive Voice Response Systems |
| JOC | Joint Operations Committee |
| LRT | Let's Respond Toolkit |
| PHSHDA | Priority Human Settlement and Housing Development Area |
| PHS | Priority Human Settlement |
| PHDA | Priority Housing Development Area |
| RBM | Rustenburg-Boipetong-Marikana |
| RLM | Rustenburg Local Municipality |
| SOP | Standard Operating Procedure |
| SPLUMA | Spatial Planning and Land Use Management Act, 2013 (Act No.16 of 2013) |

# Glossary of Terms

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| Adaptation actions | A range of planning and design actions that can be taken by local government to adapt to the impacts of climate change, reduce exposure to hazards, and exploit opportunities for sustainable development (CSIR, 2019). |
| Adaptation planning | The process of using the basis of spatial planning to shape built-up and natural areas to be resilient to the impacts of climate change, to realise co-benefits for long-term sustainable development, and to address the root causes of vulnerability and exposure to risk. Adaptation planning assumes climate change as an important factor while addressing developmental concerns, such as the complexity of rapidly growing urban areas, and considers the uncertainty associated with the impacts of climate change in such areas – thereby contributing to the transformational adaptation of urban spaces. Adaptation planning also provides opportunities to climate proof urban infrastructure, reduce vulnerability and exploit opportunities for sustainable development (National Treasury, 2018; Pieterse, 2020). |
| Adaptive capacity | "The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences" (IPCC, 2022, p. 2899). |
| Climate change adaptation | "In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate and its effects" (IPCC, 2022, p. 2898). |
| Climate change mitigation | "A human intervention to reduce emissions, or enhance the sinks, of greenhouse gases (GHGs)" (IPCC, 2022, p. 2915). The goal of climate change mitigation is to achieve a reduction of emissions that will limit global warming to between 1.5°C and 2°C above preindustrial levels (Behsudi, A, 2021). |
| Climate hazards | Climate hazards are a sub-set of natural hazards and a grouping of hydrological, climatological, and meteorological hazards. This includes the spatial extent and frequency of, among others, floods, fires, and extreme weather events such as extreme rainfall and extreme heat. Sometimes referred to as hydrometeorological hazards. The potential occurrence of a climate hazard may cause loss of life, injury, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems, and environmental resources (IPCC, 2022). Climate hazards can increase in intensity and frequency with climate change (Pieterse et al., 2023). |
| Climate risk | Risk implies the potential for adverse consequences resulting from the interaction of vulnerability, exposure, and a hazard. Relevant adverse consequences include those on "lives and livelihoods, health and well-being, economic and sociocultural assets, infrastructure and ecosystems" (IPCC, 2022, p. 144). In the IPCC's 6th Assessment Report, it is confirmed that risks |

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| | may result from "dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system" (IPCC, 2022, p. 132). |
| Coping capacity | "The ability of people, institutions, organizations and systems, using available skills, values, beliefs, resources and opportunities, to address, manage, and overcome adverse conditions in the short to medium term" (IPCC, 2022, p. 2904). |
| Disaster risk reduction | "Denotes both a policy goal or objective, as well as the strategic and instrumental measures employed for anticipating future disaster risk; reducing existing exposure, hazard or vulnerability; and improving resilience" (IPCC, 2022, p. 2906). |
| Exposure | Exposure implies the physical exposure of elements to a climate hazard. It is defined as the "presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected [by climate hazards]" (IPCC, 2022, p. 2908). |
| Mainstreaming | The process of integrating climate change adaptation strategies and measures into existing planning instruments and processes as opposed to developing dedicated adaptation policies and plans (Pieterse et al., 2021). |
| Resilience | "The capacity of interconnected social, economic and ecological systems to cope with a hazardous event, trend or disturbance, responding or reorganising in ways that maintain their essential function, identity and structure. Resilience is a positive attribute when it maintains capacity for adaptation, learning and/or transformation" (IPCC, 2022, pp. 2920–2921). |
| Sensitivity | "The degree to which a system or species is affected, either adversely or beneficially, by climate variability or change. The effect may be direct (e.g., a change in crop yield in response to a change in the mean, range, or variability of temperature) or indirect (e.g., damages caused by an increase in the frequency of coastal flooding due to sea level rise)" (IPCC, 2022, p. 2922). |
| Vulnerability | Vulnerability is defined as the "propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements including, sensitivity or susceptibility to harm and lack of capacity to cope and adapt" (IPCC, 2022, p. 2927). Vulnerability refers to the characteristics or attributes of exposed elements, i.e., elements that are exposed to potential climate-related hazards. Vulnerability is a function of sensitivity and (coping or adaptive) capacity (Pieterse et al., 2023). |

# 1. Introduction

Climate change impacts vary widely from region to region in South Africa, and are reflected by floods, droughts, heatwaves, and coastal erosion, among others. These impacts directly threaten life, economic well-being, property, infrastructure, and ecosystems as well as the ability of local government to provide public services. It is local government's responsibility and duty to provide leadership in planning and preparing to manage these risks for the sake of the well-being, safety, and security of individuals within their jurisdiction (SABS, 2023). The purpose of this document is to strengthen the capability of local government to prepare for climate change threats and associated risks.

The Climate Change Adaptation Plan and its accompanying Risk Profile report have been specifically drafted for the Rustenburg Local Municipality (RLM) with the aim of strengthening its strategic response to climate change. These documents derive their insights from the GreenBook (www.greenbook.co.za), a freely accessible online planning support system. The GreenBook is a unique and invaluable resource, providing quantitative scientific evidence to assist local governments in comprehending their climate risks. It plays a pivotal role in guiding the adaptation of settlements to withstand the impacts of both current and future climate challenges.

Designed as an information-rich tool, the GreenBook caters to South African local governments, offering insights into risks and vulnerabilities associated with population growth, climate change, exposure to hazards, and the vulnerability of critical resources. Moreover, the GreenBook not only diagnoses these challenges but also provides practical adaptation measures. These measures are essential for cities, towns, and settlements, empowering local government to mitigate the impacts of climate hazards on communities, the environment, the economy, and municipal assets and infrastructure, while aligning with broader developmental goals (refer to Green Book l Adapting settlements for the future).

The Climate Risk Profile and the Climate Change Adaptation Plan serve distinct yet interlinked purposes and strategic objectives. They aim to:

1. Drive and advance the local climate change response agenda.
2. Provide a foundational framework for strategy and planning within the Local Municipality, with a specific focus on Priority Human Settlements or Priority Housing Development Areas (PHSDAs).
3. Systematically identify and prioritise risks and vulnerabilities.
4. Pinpoint and prioritise targeted interventions and responses.
5. Facilitate the integration of climate change response, particularly adaptation, into mainstream policies and practices.

In essence, these documents are instrumental in equipping Rustenburg Local Municipality with a comprehensive strategy to navigate the complexities of climate change, reduce vulnerability and exposure, and champion sustainable development.

The Adaptation Action Plan briefly outlines the policies constituting the framework for adaptation in South Africa. It then goes on to describe generic adaptation principles, approaches, pathways, and various categories of actions. Subsequently, the plan suggests a specific adaptation strategy for Rustenburg LM by aligning it with adaptation goals, programmes, and actions designed to address priority risks. Finally, the document concludes with recommendations aimed at facilitating the integration of the proposed actions into broader initiatives, ensuring their effective mainstreaming.

# 2. Policy Framework

South Africa's institutional policy and legislative framework makes provision for climate change adaptation at all levels of government, with local government increasingly identified as the primary driver of climate change adaptation. For instance, there exists various national policy and legislative mechanisms that promote, necessitate, guide and/or regulate climate change adaptation at the local level. These include the Disaster Management Amendment Act, i.e., Act No. 16 of 2015, the Spatial Planning and Land Use Management Act (SPLUMA), i.e., Act No. 16 of 2013, the Climate Change Bill (B9 of 2022), the 2011 National Climate Change Response White Paper, as well as the 2019 National Climate Change Adaptation Strategy.

While the Disaster Management Amendment Act requires each organ of state, as well as provincial and local government to identify measures for, as well as indicate plans to invest in, disaster risk reduction (DRR) and climate change adaptation; SPLUMA identifies the principles of (1) spatial resilience – which involves accommodating "flexibility in spatial plans, policies and land use management systems, to ensure sustainable livelihoods in communities most likely to suffer the impacts of economic and environmental shocks" (Republic of South Africa., 2013, p. 20) – some of which may be induced by the impacts of climate change, and (2) spatial sustainability, which sets out requirements for municipal planning functions such as spatial planning and land use management to be carried out in ways that consider protecting vital ecosystem features such as agricultural land, i.e., from both anthropogenic and natural threats, including the impacts of climate change, as well as in ways that consider current and future costs of providing infrastructure and social services in certain areas (e.g., uninformed municipal investments may lead to an increase in the exposure of people and valuable assets to extreme climate hazards) amongst the key principles intended to guide municipal planning and development. The Climate Change Bill (DEA, 2018) sets out requirements for every District Intergovernmental Forum to serve as a Municipal Forum on climate change that coordinates climate response actions and activities in its respective municipality, while also requiring every municipality to report on their climate change response needs and draft resultant climate risk assessments, as well as climate change response and -implementation plans.

Moreover, the National Climate Change Response White Paper identifies local governments as critical role players that can contribute towards effective climate change adaptation through their various functions, including human settlement planning; urban development; municipal infrastructure and services provision; water and energy demand management; and local disaster response, amongst others. The National Climate Change Adaptation Strategy (DEA, 2019) outlines several actions that are applicable at local government level, including the development and implementation of adaptation strategies and vulnerability reduction programmes for communities and individuals that are most at risk to the impacts of climate change; the development of municipal early warning systems; as well as the integration of climate change adaptation into municipal development plans and relevant sector plans.

In response to the national call to advance spatial transformation and consolidation in human settlement development, the National Department of Human Settlements (DHS) has identified and gazetted a total of 136 Priority Human Settlements and Housing Development Areas (PHSHDAs). The PHSHDAs were declared to ensure that housing delivery is used to restructure and revitalise towns and cities, strengthen the livelihood prospects of households, and overcome apartheid spatial patterns by fostering integrated urban forms (DHS, 2020). PHSHDAs were designated using national criteria which includes an area or settlement's potential to support sustainable environmental management (which plays a critical role in mitigating the negative impacts of climate change, particularly through nature-based adaptation

solutions), as well as its potential to accommodate the integration of land uses and amenities, i.e., in addition to other criteria.

The DHS has identified two key objectives for PHSHDAs, including (1) targeting and prioritising areas for integrated housing and human settlements development to ensure the delivery of housing for a diverse range of income groups within an integrated mixed-use development, as well as (2) transforming spatial patterns which have historically exacerbated social inequality and economic inefficiency (DHS, 2020). As part of the second objective, this initiative aims to develop post-apartheid cities and city patterns that ensure urban access, as well as achieve a balance between spatial equity, economic competitiveness and environment sustainability (DHS, 2020). As the impacts of climate change become more severe, the latter outcome (i.e., ensuring and maintaining environmental sustainability) will become increasingly important.

Furthermore, as part of the implementation approach for housing and human settlement development in PHSHDAs, the DHS has identified the provision and maintenance of ecological infrastructure to support development in priority areas as a key avenue for integrating climate considerations and mainstreaming climate responses, including climate change adaptation.

# 3. Adaptation Principles, Approach, Programmes & Actions

Climate change mitigation and adaptation refer to the two primary strategies aimed at addressing the adverse effects of climate change, i.e., by either delaying, reducing, redistributing, or avoiding the impacts. Although disaster risk reduction and climate change mitigation form part of the overall climate change response agenda, the focus of this plan is on adaptation.

Climate change adaptation aims to reduce climate-related risks by adjusting a system to the actual or anticipated climate and seeking "to moderate or avoid harm [and] exploit beneficial opportunities" (IPCC, 2022, p. 2898) that may derive from unavoidable impacts of climate change such as extreme hazards. The climate change adaptation agenda is concerned with adapting species, people, places, assets, and systems, to the impacts of actual or anticipated climate-related risks and implements various measures or actions to achieve this (Behsudi, 2021; C40, 2020).

This section of the report outlines adaptation principles, drawing from the recommendations by the South African Bureau of Standards. It also presents a structured approach to selecting adaptation options, categorises adaptation actions, and explains the concept of an adaptation pathway.

## 3.1. Adaptation principles

The Bureau for Standards recently proposed the following principles that apply to local government when adapting to climate change (SABS, 2023):

i. Accountability: Local governments not only acknowledge but also assume responsibility for their climate change adaptation efforts. They willingly subject themselves to appropriate scrutiny and accept the duty to respond to this scrutiny.
ii. Continual learning and improvement: Recognising the uncertainties in knowledge and the dynamic nature of drivers of change, available knowledge and evidence, and the contextual factors, continual learning and improvement are essential for effective climate change adaptation.

iii. Mainstreaming and embedding: The effectiveness of climate change adaptation is maximised when integrated into local government operations, encompassing policies, plans, procedures, risk management, and implementation strategies.
iv. Flexibility: Embrace a flexible approach that considers technical, social, administrative, political, legal, environmental, and economic circumstances. This allows for the accommodation of a diverse range of data availabilities and technical and institutional capacities to meet goals and objectives.
v. Practicality: Set practical and achievable goals and objectives. Impractical targets may hinder the successful realisation of climate change adaptation benefits. Focus on easily measurable indicators/metrics with available underlying data and compare them across scales to avoid imposing additional burdens.
vi. Prioritisation: During the identification of adaptation plans and measures, prioritise areas based on the relative characteristics of climate change impacts (magnitude, likelihood, and urgency). Consider the capacities of stakeholders and the local government and community's ability to act.
vii. Proportionality: Undertake actions that are most effective under the current circumstances, including economic, social, cultural, and political contexts, capabilities, knowledge, and evidence base. Aspire for continual improvement in identifying and assessing adaptation measures.
viii. Relevance: Facilitate assessments that provide decision-makers and practitioners with meaningful information for adaptation planning, considering appropriate spatial scales and relevant time durations.
ix. Transparency: Ensure that reports and communications on climate change adaptation are openly, comprehensively, and understandably presented, providing accessible information for all interested parties (SABS, 2023).

These principles should be considered when formulating adaptation goals, programmes, and measures.

## 3.2. Adaptation approach

The approach that was followed to develop this adaptation plan revolves around comprehending the climate-related risks and implementing adaptive measures in response to these risks. Climate-related risk encompasses the potential for adverse consequences arising from the interplay of vulnerability, exposure, and the occurrence of climate hazards (IPCC, 2022). The components of risk are dynamic, with the occurrence of climate hazards influenced by both natural climate variability and anthropogenic climate change. The exposure of individuals, the built environment, and the natural surroundings to climate hazards is driven by both planned and unplanned development and growth. Vulnerability is the inherent characteristics that make systems sensitive to the effects and impacts of climate hazards.

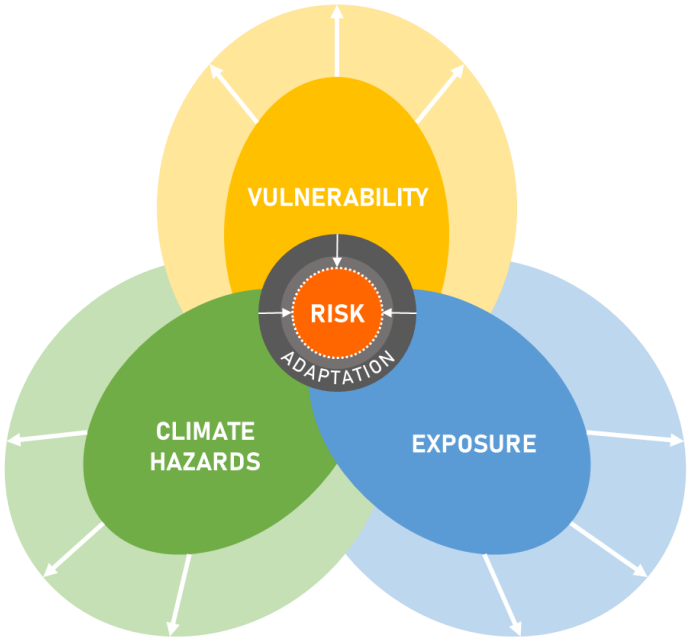


*Figure 1 – The interplay between climate hazards, vulnerability and exposure that determines risk (based on IPCC, 2014 and IPCC, 2021)*

The inherent uncertainty in future climate trends underscores the necessity for a flexible response and the formulation of adaptable, medium to long-term adaptation strategies.

The approach followed in this plan involves the following steps:

i. Gain an understanding of climate risk in a specific geographic area.
ii. Identify priority climate hazards/zones based on the risk profile.
iii. Establish adaptation goals to mitigate the risk associated with priority hazards/zones.
iv. Develop adaptation programmes with measures/actions to achieve these goals.
v. Integrate climate considerations into other sector plans/instruments/strategies.

Refer to Table 1 for a more detailed description of this approach.

*Table 1: The adaptation approach*

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| Understand climate risk for a specific geographic area | A climate risk profile assesses risk by determining – in a specific geographic area and at a specific scale – the likelihood of a hazard to occur, the inherent vulnerability of various systems, and exposure of these systems to specific climate hazards. To be able to develop an appropriate adaptation plan, it is important to understand what contributes to risk and vulnerability. |
| Identify priority climate-related risks/zones | Identify the climate hazards and impacts that pose the greatest risk at present and in the future within a geographic area. If possible, also identify climate risk zones that need to be prioritised for intervention. |

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| Establish adaptation goals | Identify adaptation goals to address priority risks/zones that speak to policy goals. |
| Develop adaptation programmes and actions | Develop adaptation programmes that speak to the identified adaptation goals and identify appropriate adaptation actions under each of the programmes that are mutually supportive. Adaptation actions should:<br>• Be specific to a climate hazard/vulnerability/exposure.<br>• Suggest a target or an indicator to measure progress.<br>• Be assignable to a primary implementer.<br>• Consider co-benefits and other possible implications.<br>• Include mitigation as far as it builds resilience or reduces exposure and vulnerability. |
| Mainstream climate considerations into planning | Integrate evidence of climate risk, adaptation goals, programmes, and actions into existing instruments and processes. The aim is to ensure that climate change considerations are an integral part of all that local government is doing. |

The primary aim of an adaptation plan is to address both current and anticipated future risks and vulnerabilities while also leveraging opportunities for long-term transformation and sustainable development.

## 3.3. Adaptation programmes and actions

An adaptation programme is a structured and systematic set of actions, initiatives, and interventions that can be used to adapt to the impacts of climate change. It involves the practical implementation of specific goals identified in the plan.

Broadly, adaptation actions include anticipatory and reactive measures. Anticipatory adaptation involves proactive measures taken in preparation for anticipated climate change impacts, while reactive adaptation entails responding to climate change effects as they are experienced. Furthermore, it facilitates the integration and prioritisation of climate change adaptation and resilience measures into various planning mechanisms and processes (CSIR, 2019).

A spectrum of adaptation actions is at the disposal of local municipalities to enhance resilience and mitigate risks posed by changing climatic patterns and extreme weather events. Some of the categories of actions include:

- Infrastructure development, encompassing the construction of, for example, seawalls, levees, and storm surge barriers to protect against rising sea levels and extreme weather events. These engineered solutions provide immediate protection and buy time for longer-term adaptation efforts but are mostly very expensive to build.
- Green infrastructure initiatives offer sustainable and nature-based solutions. Municipalities can implement urban green spaces, green roofs, and permeable pavements to absorb excess water, reduce flooding, and mitigate the urban heat island effect. Such approaches not only enhance climate resilience but also contribute to improved air quality and overall urban liveability.

- Environmental protection such as restoring ecosystems like mangroves, dunes, and wetlands, not only provides natural buffers but also supports biodiversity.
- Integrated urban planning is essential to create climate-resilient municipalities. Land-use regulations should be adapted to consider climate risks, prioritising construction practices that enhance resilience. Elevating structures above projected flood- and sea levels and using climate-resilient materials in building design can minimise the impacts of flooding and storm damage.
- Early warning systems and emergency preparedness plans are critical tools to ensure swift responses to extreme weather events, minimising the impact on vulnerable communities.
- Innovative water management strategies are essential for municipalities facing changing precipitation patterns and increasing water scarcity. Diversifying water sources, implementing water efficiency measures, and investing in advanced stormwater management systems contribute to water security and sustainable resource use.
- Engagement and education are pivotal components of successful adaptation strategies. Empowering officials, and residents, to understand and respond to climate risks through awareness campaigns, education programmes, and participatory planning initiatives can enhance local adaptive capacity (CSIR, 2019).

Local governments must embrace a combination of structural, natural, and community-based approaches to build resilience and adaptive capacity, protect vulnerable communities, while ensuring long-term sustainability in the face of evolving climate challenges.

# 4. Summary of Climate Risk Profile

A Climate Risk Profile Report was prepared by the team, designed to complement this Plan. The comprehensive Climate Risk Profile serves as an essential resource for understanding the risks associated with climate change in the Rustenburg Local Municipality. Presented to representatives of the Municipality during a series of nationwide stakeholder engagements in late 2023, these workshops served as forums to not only validate the risks outlined in the report but also to confirm the adaptation goals proposed.

This section of the Plan summarises the climate risk profile for Rustenburg Local Municipality, drawing from the GreenBook Risk Profile Tool at https://riskprofiles.greenbook.co.za/. Consult the accompanying Climate Risk Profile Report for more detailed information.

## 4.1. Climate projections, vulnerabilities and impacts

The average annual temperature under baseline conditions for the Rustenburg Local Municipality (RLM) ranges between 18°C and around 20°C and are expected to increase by between 2.5°C to 3°C in future (2050). Under baseline conditions, RLM experiences 10 or less very hot days in most areas, but between 11 and 20 very hot days in the north-western part of the municipality. The projected change in the average annual number of very hot days by 2050 is an increase of 21-30 in the west and 31-45 days in the north-west and east under the RCP 8.5 scenario. The current average number of heatwave days of less than five days per year is projected to increase by up to four more heatwave days in the southwest and 9-12 more heatwave days in the northwest and east.

The RLM currently has a rainfall of 1 200 mm per annum with rainfall expected to increase by 100 mm or less per annum under the RCP 8.5 scenario.

Rustenburg LM's socio-economic vulnerability has decreased (improved) between 1996 and 2011 – thus indicating that the number of vulnerable households has decreased, particularly in terms of their lack of access to basic and social services, and essential resources that influence their ability to withstand adverse shocks from the external environment, including those induced by climate change. However, the LM's economic vulnerability has increased (worsened) within the same period, therefore indicating the municipality's high susceptibility to being adversely affected by external shocks. The physical vulnerability score is the 11th highest in the province. This alludes to the high structural vulnerabilities in the LM, particularly when considering the municipality's buildings and infrastructure. The environmental vulnerability is the highest in the province, indicating that there is conflict between preserving the environment and accommodating growth pressures. The settlement vulnerability (as determined by the GreenBook settlement footprint typology) indicates that Rustenburg has the highest growth pressure vulnerability, Boitekong and Bokamoso have the highest environmental vulnerability and Marikana the highest economic vulnerability, while Molote has the highest regional connectivity vulnerability. Service access and economic vulnerability in Popo Molefe are the highest in the RLM.

Rustenburg Local Municipality is projected to be the fastest growing local municipality in the District Municipality (HDA, 2022) with most of the growth expected between 2011 and 2030. Within the RLM, Rustenburg and Marikana are projected to experience extreme growth pressure, with Boitekong, Bakamoso and Molote projected to experience high growth pressure towards 2050 – thus alluding to the potential increase in the exposure of people and their assets to future climate conditions and their impacts.

The number of informal settlements in the RLM has increased by 1234 over the past 10 years, from about 54 in 2011 (HDA, 2022, p 55 of 107). The settlements of Boitekong/Meriting and Marikana have shown significant growth with an increment of 15 503 and 6 040 residential units respectively since 2011. In 2022, a total of 21 794 informal structures were recorded within the RBM-PHSHDA (HDA, 2022, p 49). The expected population growth means an increase in pressure on service delivery and competition for resources. Although towns and settlements in RLM have above-average levels of groundwater potential under current (baseline) climatic conditions, they are also surface water dependent. If these conditions are combined with increasing temperatures, the projected decrease in mean annual precipitation, projected increases in mean annual evaporation, and population growth, and an increase of only 0.06% in regional urban water supply, it is clear the water supply vulnerability is bound to increase.

## 4.2. Priority climate-related hazards

The main climate risk faced by RLM is wildfire. Wildfires are likely in most settlements under baseline conditions and projected to increase to a high risk by 2050 for most settlements, except in the west (Rustenburg, Popo Molete and at Rustenburg Platinum 2) where the risk is low. The number of fire danger days under the RCP85 scenario are projected to increase by between 40 and 60 days per annum.

A projected increase of 1.54 extreme rainfall days is expected in some parts of the RLM with places such as Rustenburg and Rustenburg Platinum 1 projected to be at moderate risk of an increase in flooding likelihood by 2050. On the other hand, a slight increase in drought tendency is expected in the far east of the LM.

# 5. Adaptation Goals, Programmes and Actions

This section outlines the adaptation plan using goals and measures designed to help Rustenburg LM to adapt to the impacts of climate change. Based on the assessment of the potential risks and vulnerabilities posed by climate change, this plan was developed as a proactive strategy to mitigate these risks and enhance resilience.

## 5.1. Adaptation goals

Drawing upon the assessment of the current and projected climate-related risks and vulnerabilities outlined in the preceding section, the following adaptation goals for Rustenburg LM were identified, prioritising those risks with the highest potential impact. These goals were validated by stakeholders during the nationwide engagements:

- Goal 1: To manage the two drainage/catchment areas, especially in terms of ensuring that floodlines are adhered to, and that ecological corridors are protected.
- Goal 2: To improve communication in vulnerable rural settlements for disaster management purposes.
- Goal 3: To improve infrastructure for responding to fire events.
- Goal 4: To establish a multi-disciplinary joint operation centre (JOC) to ensure effective coordination between all role players in the event of a disaster.

The adaptation programmes below identify the overarching programmes and their actions, necessary to achieve each one of the goals. Specific timeframes and responsibilities are allocated in the subsequent implementation framework.

## 5.2. Adaptation programme: Goal 1

| Goal 1: To manage the two drainage/catchment areas, especially in terms of ensuring that floodlines are adhered to, and that ecological corridors are protected. |
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A moderate increase in extreme rainfall days is projected for more than half of the RLM with a moderate or high increase in associated flooding risk for a few settlements in the LM. Ensuring adherence to floodlines, both through public education and awareness and management and adaptation of catchment areas will reduce the loss of human lives and infrastructure.

Programme 1.1: Keeping floodline information current
The purpose of this programme is to ensure up-to-date place information is available on the state of water infrastructure.

Actions:

i. Determine floodlines in settlements along watercourses using relevant methodologies.
ii. Review floodlines every five years in terms of changing precipitation patterns.
iii. Include - and regularly update – floodlines in the SDF.

Programme 1.2: Maintaining the two drainage/catchment areas
The purpose of this programme is to ensure that processes are always in place to protect lives and infrastructure.

Actions:

i. Construct and regularly inspect and replace flood control measures.
ii. Maintain infrastructure that demarcate floodlines.
iii. Put early warning signs in place e.g. to alert emergency teams before a flood event.
iv. Place camera systems and water level sensors in critical locations to send automated alerts to authorities.
v. Update and enforce by-laws that contribute to the upkeep of infrastructure.
vi. Do visible policing.

Programme 1.3: Education and awareness programmes
The purpose of the programme is to empower and inspire the public to contribute to the goal of maintaining drainage and catchment areas. This programme should be integrated with programmes of other goals. Education and Awareness initiatives to the RLM Directorates should be driven from through the Climate Change Management Plan and other recent climate change information platforms as per the IDP (RLM, 2022).

Actions:

i. Install information boards with messages that are visual and in the language of the community.
ii. Put systems in place to empower the public to report clogged drains, rising water levels, etc. in real time.
iii. Develop and maintain a different platform through which information can be shared regularly - but also where actions of local climate heroes /change makers can be shared.
iv. Do regular education and awareness in different groups of the community on the importance of adherence to floodlines.
v. Do regular clean-ups that involves different groups in the community, such as schools, business, etc.
vi. Involve community and business sector in the protection of ecological corridors.

## 5.3. Adaptation programme: Goal 2

| Goal 2: To improve communication in vulnerable rural settlements for disaster management purposes. |
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Climate awareness and preparedness starts at a household and community level. Identification of vulnerable communities and infrastructure, and promotion of infrastructure adaptation and community response are needed to increase climate response and disaster risk reduction at community level.

Programme 2.1: Build local capacity and knowledge sharing for climate response
The purpose of this programme is to ensure that communication channels are appropriate and able to respond in the event of different hazards. This builds onto the education and awareness programmes.

Actions:

i. Identify and empower climate champions in vulnerable rural settlements in collaboration with public structures.
ii. Assess current communication methods and identify methods that are appropriate for different vulnerable groups and different types of extreme events.
iii. Set up centres with resources on climate change and adaptation in local languages. Train community members to manage these centres.
iv. Have regular meetings with different stakeholders to build trust, understand roles and responsibilities.
v. Use traditional storytelling and drama performances to raise awareness about climate change impacts and promote community solutions.
vi. Work with local structures to identify action plans for different types of events.
vii. Facilitate farmer-to-farmer exchanges where experienced farmers share traditional knowledge and best practices for climate-resilient agriculture.
viii. Send SAWS early warnings to climate champions and/or local councillors.
ix. Establish or support existing community radio stations that broadcast in local languages. This allows for sharing information on climate risks, adaptation strategies, and success stories from nearby communities. Conduct regular radio interviews on different stations.
x. Engage communities in data collection on weather patterns, water availability, and crop yields. This empowers communities and validates their local knowledge.

Programme 2.2: Leverage technology for inclusive communication
The purpose of the programme is to provide infrastructure and technology that are appropriate for communicating climate messages and early warnings to different communities.

Actions:

i. Use text message services to disseminate weather forecasts, early warnings for extreme weather events, and updates on government support programmes.
ii. Provide Wi-Fi access points in central locations such as community centres to allow information access and communication through online platforms.
iii. Implement Interactive Voice Response Systems (IVRS) systems where residents can dial in and access pre-recorded messages on climate issues and adaptation strategies in their local language.
iv. Test climate messages and methods of communication regularly.

## 5.4. Adaptation programme: Goal 3

| Goal 3: To improve infrastructure for responding to fire events. |
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Programme 3.1: Maintain infrastructure for continuous fire-response readiness
The purpose of this programme is to establish and/or improve climate-resilient infrastructure which is crucial for ensuring swift response to disaster events. Identification and promotion of infrastructure adaptation and community response are needed to increase climate response and disaster risk reduction at community level. This programme links to Programmes 1.3 and 2.1.

Actions:

i. Establish fire stations in high-risk areas.
ii. Procure fire engines.
iii. Upgrade the emergency community centre.
iv. Keep a current asset register, accessible to stakeholders, that tracks the state and readiness of infrastructure such as maintenance, availability etc.
v. Do regular assessments of response-readiness of infrastructure to identify gaps.

Programme 3.2: Achieve golden hour response times

The purpose of this programme is to determine what is required to respond appropriately to fire hazards and to build capacity that that addresses the needs for swift response.

Actions:

i. Do a fire risk assessment for different settlements in collaboration with appropriate stakeholders – to identify obstacles associated with access routes, water availability etc.
ii. Develop a fire response plan in collaboration with stakeholders in high-risk settlements, identify appropriate actions, and outline roles and responsibilities, places of safety, etc.
iii. Build capacity at ward level, which includes training community fire fighters and first responders and training different community groups on related disaster management skills.
iv. Raise awareness in different community settings such as schools, retirement centres, informal areas on issues such as the identification of fire hazards and how to report incidents.
v. Integrate regular fire awareness and readiness activities into the actions of Programme 1.3 on Education and Awareness

## 5.5. Adaptation programme: Goal 4

| Goal 4: To establish a multi-disciplinary joint operation centre (JOC) to ensure effective coordination between all role players in the event of a disaster. |
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Programme 4.1: Infrastructure and technology programmes

The purpose of this programme is to set up multi-disciplinary JOC space. It could involve renovating an existing space or building a new one.

Actions:

i. JOC facility development:
    a. Conduct site surveys and identify an appropriate site, using co-developed criteria.
    b. Develop the architectural plan and secure funding.
    c. Manage construction or renovation process ensuring that building regulations are being adhered to.
ii. Do technology integration:
    a. Develop appropriate disaster management software to facilitate the coordination of Joint Operations Committee (JOC) actions, timeously submit reports and plans, etc.
    b. Secure appropriate communication systems to communicate early warnings, etc.
    c. Install real-time data feeds to access weather data, sensor networks and public reports.
    d. Install back-up systems that can be used if normal communication features fail.
iii. Develop a maintenance plan for the infrastructure and technology.

Programme 4.2: Continuous training and maintenance programmes

The purpose of the programme is to develop a clear plan for managing disasters, including capacitating role players from different agencies to ensure continuous improvement.

Actions:

i. Develop a clear Standard Operating Procedure (SOP) to manage different types of disasters, both internally and for each participating agency, delineating protocols for JOC activation, information sharing, roles and responsibilities, decision-making and communication processes.
ii. Train JOC staff and do inter-agency collaboration training to facilitate teamwork and efficiency during a real disaster through identification of threats, development of contingency plans and sharing of best practices.
iii. Do disaster simulation exercises to identify gaps in communication, resources and overall readiness.
iv. Establish an ongoing training programme for staff that encourages continuous development.

Programme 4.3: Public outreach programmes

The purpose of the programme is to empower and inspire the public to adopt behaviours and practices that will contribute to climate change adaptation, integrating actions into existing programmes where relevant.

Actions:

i. Education on early warning systems – recognition of early warning signs of disasters and how to report these.
ii. Community engagement through workshops with community leaders and climate champions to explain the role of the JOC and train (and co-learn with) the community on how they can support disaster response efforts.
iii. Involve schools and local NGOs through talks and open days.
iv. Link this programme with Programme 1.3.

# 6. Implementation Framework

The implementation framework summarises the adaptation plan and indicates responsibilities, timeframes, and priorities.

## 6.1. Implementation framework: Goal 1

Goal 1: Maintain the two drainage / catchment areas in the PHSHDA

| Adaptation programme 1.1: Keep floodline information current | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Determine floodlines in settlements along watercourses using relevant methodologies. | Flooding | Public Safety – Emergency and Disaster Management<br>Technical and Infrastructure – Water | Short-term | High |
| ii. Review floodlines every five years in terms of changing precipitation patterns. | Flooding | Public Safety – Emergency and Disaster Management<br>Technical and Infrastructure – Water<br>Community Development – Integrated Environmental Management | Medium-term | Medium |
| iii. Include - and regularly update – floodlines in the SDF. | Flooding | Local Economic Development: Policy And Research | Long-term | High |

| Adaptation programme 1.2: Maintaining the two drainage/catchment areas | | | | |
|---|---|---|---|---|
| Adaptation actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Construct and regularly inspect and replace flood control measures. | Flooding | Public Safety – Emergency and Disaster Management | Medium-term | High |

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|---|---|---|---|---|
| | | Technical and Infrastructure – Water Community Development – Integrated Environmental Management | | |
| ii. Maintain infrastructure that demarcate floodlines. | Flooding | Technical and Infrastructure – Water | Long-term | High |
| iii. Put early warning signs in place e.g. to alert emergency teams before a flood event. | Flooding | Community Development – Integrated Environmental Management | Short-term | High |
| iv. Place camera systems and water level sensors in critical locations to send automated alerts to authorities. | Flooding | Technical and Infrastructure | Medium-term | Medium |
| v. Update and enforce by-laws that contribute to the upkeep of infrastructure. | Flooding | Local Economic Development: Policy And Research | Short-term | High |
| vi. Do visible policing. | Flooding | Public Safety Emergency And Disaster Management Law Enforcement & Security | Short-term | High |

| Adaptation programme 1.3: Education and awareness programmes | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority Level |
| i. Install information boards with messages that are visual and in the language of the community. | Flooding but also other hazards | Community Development – Integrated Environmental Management | Short-term | High |
| ii. Put systems in place to empower the public to report clogged drains, rising water levels etc in real time. | Flooding | Community Development – Integrated | Short-term | High |

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|---|---|---|---|---|
| | | Environmental Management | | |
| iii. Develop and maintain a different platform through which information can be shared regularly - but also where actions of local climate heroes /change makers can be shared. | Flooding but also other hazards | Community Development – Integrated Environmental Management | Medium -term | Medium |
| iv. Do regular education and awareness in different groups of the community on the importance of adherence to floodlines. | Flooding but also other hazards | Community Development – Integrated Environmental Management | Medium -term | Medium |
| v. Do regular clean-ups that involves different groups in the community, such as schools, business, etc. | Flooding | Community Development – Integrated Environmental Management | Short-term | Medium |
| vi. Involve community and business sector in the protection of ecological corridors. | Flooding but also other hazards | Local Economic Development<br>Rural Development<br>Enterprise Development<br>Integrated Environmental Management | Long-term | Medium |

## 6.2. Implementation framework: Goal 2

Goal 2: Improve communication in vulnerable rural settlements

| Adaptation programme 2.1: Communication for climate response | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Identify and empower climate champions in vulnerable rural settlements in collaboration with public structures. | Flooding, fires, heat | Local Economic Development<br>Rural Development<br>Enterprise Development | Short-term, long-term | Medium |

| | | | | |
|---|---|---|---|---|
| | | Integrated Environmental Management | | |
| ii. Assess current communication methods and identify methods that are appropriate for different vulnerable groups and different types of extreme events. | Flooding, fires, heat | Community Development – Integrated Environmental Management | Short-term | Medium |
| iii. Set up centres with resources on climate change and adaptation in local languages. Train community members to manage these centres. | Flooding, fires, heat | Community Development – Integrated Environmental Management | Long-term | High |
| iv. Have regular meetings with different stakeholders to build trust, understand roles and responsibilities. | Flooding, fires, heat | Community Development – Integrated Environmental Management | Short-term | High |
| v. Use traditional storytelling and drama performances to raise awareness about climate change impacts and promote community solutions. | Flooding, fires, heat | Community Development – Integrated Environmental Management Education | Short-term | Medium |
| vi. Work with local structures to identify action plans for different types of events. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management | Short-term | High |
| vii. Facilitate farmer-to-farmer exchanges. | Flooding, fires, heat | Community Development – Integrated Environmental Management Education | Medium -term | Medium |
| viii. Send SAWS early warnings to climate champions and/or local councillors. | Flooding, fires, heat | Community Development – Integrated Environmental Management | Short-term | High |

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|---|---|---|---|---|
| | | Education | | |
| ix. Establish or support existing community radio stations that broadcast in local languages. | Flooding, fires, heat | Community Development – Integrated Environmental Management Education | Short-term | Medium |
| x. Engage communities in data collection on weather patterns, water availability, and crop yields. | Flooding, fires, heat | Community Development – Integrated Environmental Management Education | Medium-term | Medium |

| Adaptation programme 2.2: Leverage technology for Inclusive Communication | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Use text message services to disseminate weather forecasts, early warnings for extreme weather events, and updates on government support programs. | Flooding, fires, heat | Community Development – Integrated Environmental Management Education | Medium-term | High |
| ii. Provide WiFi access points in central locations such as community centres to allow information access and communication through online platforms. | Flooding, fires, heat | Technical & Infrastructure | Medium-term | Medium |
| iii. Implement Interactive Voice Response Systems (IVRS) systems where residents can dial in and access pre-recorded messages on climate issues and adaptation strategies in their local language. | Flooding, fires, heat | Technical & Infrastructure | Medium-term | Medium |
| iv. Test climate messages and methods of communication regularly. | Flooding, fires, heat | Technical & Infrastructure | Short-term | High |

## 6.3. Implementation framework: Goal 3

Goal 3: To improve infrastructure for responding to fire events.

| Adaptation programme 3.1: Maintain infrastructure for continuous fire-response readiness | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Establish fire stations in high-risk areas. | Fires | Technical & Infrastructure<br>Community Development<br>Budget & Treasury | Medium-term | High |
| ii. Procure fire engines. | Fires | Transport<br>Budget & Treasury | Short term<br>Long term | High |
| iii. Upgrade the emergency community centre. | Fires | Community Development<br>Budget & Treasury | Medium-term | High |
| iv. Keep a current asset register, accessible to stakeholders, that tracks the state and readiness of infrastructure such as maintenance, availability etc. | Fires | Technical & Infrastructure | Short-term | High |
| v. Do regular assessments of response-readiness of infrastructure. | Fires | Technical & Infrastructure | Medium-term | High |

| Adaptation programme 3.2: Achieve golden hour response times | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Do a fire risk assessment for different settlements. | Fires | Community Development – Integrated Environmental Management | Short-term | High |

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|---|---|---|---|---|
| ii. Develop a fire response plan for each settlement. | Fires | Public Safety – Emergency and Disaster Management | Medium-term | High |
| iii. Build capacity at ward level. | Fires | Community Development | Short-term | High |
| iv. Do education and awareness in different community settings. | Fires | Community Development | Short-term | High |
| v. Integrate regular fire awareness and readiness activities into the actions of Programme 1.3 on Education and Awareness. | Fires | Community Development | Short-term | High |

## 6.4. Implementation framework: Goal 4

Goal 4: To establish a multi-disciplinary joint operation centre (JOC) (as recommended in the IDP) to ensure effective coordination between all role players in the event of a disaster (RLM, 2022).

| Adaptation programme 4.1: Infrastructure and technology programmes | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Develop a JOC Facility. | Flooding, fires, heat | Technical & Infrastructure<br>Community Development<br>Budget & Treasury | Medium-term | High |
| ii. Do technological integration. | Flooding, fires, heat | Technical & Infrastructure | Medium-term | High |
| iii. Secure appropriate communication. | Flooding, fires, heat | Technical & Infrastructure | Medium-term | High |
| iv. Develop a maintenance plan for the infrastructure and technology. | Flooding, fires, heat | Technical & Infrastructure | Medium-term | High |

| Adaptation programme 4.2: Continuous training and maintenance programmes | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |

| | | | | |
|---|---|---|---|---|
| i. Develop a clear SOP to manage different types of disasters. | Flooding, fires, heat | Technical & Infrastructure | Short-term | High |
| ii. Train JOC staff and do inter-agency collaboration training to facilitate teamwork and efficiency. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Technical and Infrastructure<br>Community Development | Medium-term | High |
| iii. Do disaster simulation exercises to identify gaps in communication, resources and overall readiness. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Technical and Infrastructure<br>Community Development | Medium-term | High |
| iv. Establish an ongoing training programme for staff that encourages continuous improvement. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Community Development | Medium-term | High |

| Adaptation programme 4.3: Public outreach programmes | | | | |
|---|---|---|---|---|
| Adaptation Actions | Key risk or vulnerability addressed | Responsible department | Timeframe | Priority level |
| i. Do education on early warning systems – recognition of early warning signs of disasters and how to report these. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Community Development | Short-term | High |
| ii. Facilitate community engagement through workshops with community leaders and climate champions. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Community Development | Short-term | Medium |

| | | | | |
|---|---|---|---|---|
| iii. Involve schools and local NGOs through talks and open days. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Community Development | Short-term | Medium |
| iv. Link this programme with other education and awareness programmes. | Flooding, fires, heat | Public Safety – Emergency and Disaster Management<br>Community Development | Short-term | High |

# 7. Implications for the PHSHDA

The climate projections indicate that the Rustenburg-Boitekong-Marikana (RBM) PHSHDA will become hotter and wetter towards 2050. The likelihood of an increase in extreme heat is low to moderate. The risk of drought is low. However, a significant increase in extreme rainfall is projected for 2050. Areas in the west and around Rustenburg Platinum 1 are projected to be at moderate risk of flooding. The current water demand is lower than supply. However, despite an increase in rainfall, water supply vulnerability is projected to increase due to several factors, including population growth and the fact that urban water supply is only expected to increase by 0.06%.

The greatest likelihood of hazards occurring in the RBM-PHSHDA are floods due to significant projected increases in extreme rainfall, but also wildfires, with a projected high risk of wildfires in several settlements across the PHSHDA. The high risk of wildfires has cascading effects of which poses severe health risks to people and animals. Wildfires pose a threat of smoke pollution. This elevated risk is compounded by the high socio-economic and regional connectivity vulnerabilities faced by some communities in the area, making them more susceptible to adverse outcomes arising from climate change. In addition, the area is projected to have population growth pressure, which may increase the number of people exposed to climate hazards in the future.

The Development Plan for the PHSHDA aims to ensure equal access to proper services and facilities. It is therefore imperative that the plan considers the risks posed by these climate hazards to ensure that the planned upgrade and expansion of infrastructure (settlements, transport, facilities, etc) are climate resilient.

# 8. Recommendations for Mainstreaming

Mainstreaming is the process of integrating climate change considerations into existing sectoral plans, other instruments and decision-making processes across various sectors and levels of governance. It involves recognising that climate change impacts and risks cut across multiple sectors and require a holistic approach to address effectively.

Mainstreaming climate change involves several key elements:

- Policy integration: Embedding evidence of climate change, as well as climate change adaptation and mitigation considerations into sectoral policies and strategies, such as those related to disaster risk management, energy, water resources, transportation, and urban planning. This ensures that climate change is not treated as a standalone issue but is instead integrated into broader development agendas.
- Institutional integration: Incorporating climate change responsibilities and expertise within departments. This may involve establishing a dedicated but decentralised climate change unit, as well as fostering collaboration and coordination among departments and relevant external stakeholders. Incorporating climate response outcomes in the KPIs of all relevant departments, will ensure that progress towards climate goals can be tracked and measured.
- Capacity building: Enhancing the knowledge, skills, and capacities of politicians, decision-makers, and practitioners to understand and address climate change effectively. This includes providing training, technical assistance, and access to relevant information and tools, such as the GreenBook. By

improving their understanding of climate change and the need for adaptation, these groups can better integrate climate considerations into their work.

- Budgeting and financing: Allocating resources and funding to support climate change adaptation and mitigation activities within existing budgets and financing mechanisms. This may involve reallocating funds from other priorities, leveraging external sources of finance, or integrating climate considerations into budget planning processes.
- Establishing networks and partnerships: Establishing networks and partnerships with civil society organisations, research councils, the private sector, different spheres of government, and other relevant entities could bolster climate adaptation efforts.
- Monitoring and evaluation: Establishing systems for monitoring and evaluating the effectiveness of mainstreaming efforts and tracking progress towards climate-related goals and targets is essential. This helps ensure accountability and facilitates learning and adaptation over time.

Climate change mainstreaming is essential for building resilience and promoting sustainable development in the face of climate change. By integrating climate considerations into decision-making processes and actions across sectors, mainstreaming helps minimise future risks, maximise opportunities for adaptation and mitigation, and enhance overall resilience to climate change impacts.

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