EU/PCC PEER-TO-PEER LEARNING EXCHANGE ON CLIMATE ADAPTATION AND RESILIENCE

Recommendations Report

Final Report - August 2024

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EXECUTIVE SUMMARY

As global temperatures increase, climate change poses escalating risks to cities, which are hubs of social and economic activity. This has been seen in urban hubs like eThekwini Metropolitan Municipality (EMM), which has faced several significant flood events (most recently in 2022) and Nelson Mandela Bay Metropolitan Municipality (NMBMM), which has faced an ongoing drought since 2015, despite subsequent relief[1]. As such, cities provide critical spaces in which to build climate resilience and encourage leaders and stakeholders, such as municipal officials and NGOs, to address these risks strategically and with situated sustainability practices. As much as municipal governments are adopting many constructive approaches in response to the challenges of climate change, there is however, an urgent need to strengthen the capacity of municipal officials, policy-makers and practitioners, individually and collectively to build system-wide resilience. This capacity extends itself to the engagement and integration of complex knowledge sources, climate information, examples of practices and understandings of urban and city regional systems to inform more climate-resilient development pathways. The 'Climate Resilient Development Pathways' (CRDPs) approach provides a means through which to build these capacities and has been used in the current EU/PCC Peer-to-Peer learning exchange project to frame the learning journey that participants have been guided through.

The CRDPs approach helps adaptively and deliberatively plan and act on diverse development needs and aspirations emerging in complex socio-ecological systems facing evolving climate risks and opportunities. CRDPs are place-based, context-specific sequences or portfolios of public and private interventions that steer development trajectories towards resilience and equity. Importantly, the CRDPs approach creates space for the multiple (sometimes competing) priorities of different stakeholder groups to inform and co-design options for climate-resilient development pathways. Adopting a CRDPs approach is therefore not about 'arriving' at a specific development pathway; it is about strengthening the ability of a range of actors and stakeholders to engage with each other, multiple sources of climate information and perspectives, and consider, act on and learn from alternative intervention options in an evolving context of socio-economic and ecological complexity.

Using the CRDPs framing, the purpose of the current project was to: (i) improve climate resilience practice amongst participants (by strengthening participant capacities to engage with system complexity and navigate climate resilience decision-making); (ii) test the CRDPs approach in a Learning Lab context to advance the work of the PCC in this area; and (iii) test the concept of, and need for, a Community of Practice (CoP) working towards development pathways that are more climate resilient, sustainable and just.

In line with the CRDPs approach, the Learning Labs[2] that were part of the project aimed to create space for participants to:

- Consider the *systemic drivers* and impacts of climate-related events (floods in EMM and droughts in NMBMM) *(Learning Lab 1)*

[1] Most recently in June 2024, the city of Gqeberha (in NMBMM) experienced severe rainfall and flooding, which resulted in significant damage, at least six lives lost and hundreds displaced.
[2] The Learning Lab methodology is a transdisciplinary approach, that facilitates co-engaged learning and a space for inclusivity and social learning across a diversity of stakeholders and participants. This approach is intended to facilitate the combination of multiple forms of knowledge, including expert, tacit and local knowledge, to better understand the systemic aspects of urban climate adaptation in the design of plans and solutions. This methodology was used to frame and structure the CRDPs learning journey for this project.

- Adopt a *retrospective view* of the current situation in EMM and NMBMM to consider the events and processes that have influenced the status quo, and optimise learning from past decisions to inform future priorities *(Learning Lab 1)*
- Bring *climate information* into conversation with other types of relevant information to examine the *evolution of conditions* which are likely to shape the risk and resilience profile of the city / municipality *(Learning Lab 2)*
- *Identify* and *critically assess development options* to differentiate those that are climate-compatible and foster more equitable forms of resilience, from those that aggravate climate risks *(Learning Lab 2 and 3)* and
- Test an initial *clustering and sequencing* of development options *(Learning Lab 3)*.

A number of recommendations emerged from this process as follows:

Recommendations for improving climate resilience practice

- *Apply clear principles* when prioritising intervention options:
    - Ensure that relevant *scientific and experiential climate information* is used to inform prioritisation and decision-making:
    - Focus on innovation that involves *doing existing activities and functions better*
    - Address complexity and resource constraints through prioritising interventions and options that *reduce risk to multiple hazards*
    - Build on, mobilise and link to *indigenous heritage* practices
    - Explore and seek to apply a '*just transitions'* principles and associated criteria
- *Prioritise 'no regrets'* climate resilience interventions:
    - Improve and strengthen *governance and partnership relationships* with diverse actor groups
    - Seek to develop and build a *'social fabric'* that can connect citizens with relevant actors and information on emerging climate issues and risks
    - Invest in *ecological infrastructure*, including catchment management
    - Strengthen climate-resilient *urban planning, design and infrastructure*
    - Invest in *green and grey infrastructure maintenance* programmes
    - Increase capacities to *reclaim and re-use water*
    - Invest in *data collection and monitoring* relating to climate hazards, impacts and responses
    - Strengthen *community-based early warning systems* for floods and other climate hazards
    - *Mainstream climate risk* into municipal planning and management

Recommendations for using the CRDP approach to frame climate resilience conversations and decision-making

- Use the CRDP approach as a mechanism to engage with complexity, and diverse perspectives, and challenge dominant paradigms;
- Allocate sufficient time for the CRDPs process and incorporate opportunities for localised practical applications; and
- Create and nurture opportunities to build on and expand the CRDPs work undertaken for this project.

Recommendations for a Community of Practice:

- Establish and resource an annual South African adaptation and CRDPs Community of Practice learning event;
- Align with, bridge between, and support existing climate adaptation networks and forums (across local, provincial and national scales) to avoid duplication and fragmentation, instead fostering coherence and upscaling;
- Use the CoP to leverage potential where novel, inclusive and adaptive actions are already underway;
- Ensure that the implementation of the CoP aligns with principles of inclusivity and learning; and
- Convene relevant conversations to agree on 'next steps' for the CoP.

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LIST OF ACRONYMS

CRDPs	Climate Resilient Development Pathways
CSAG	Climate Systems Analysis Group
CSP	City Support Programme
DFFE	Department of Forestry, Fisheries and Environment
EMM	eThekwini Metropolitan Municipality
EU	European Union
KZN	KwaZulu-Natal
MOOC	Massive Open Online Course
NMBMM	Nelson Mandela Bay Metropolitan Municipality
PCC	Presidential Climate Commission
TRMP	Transformative Riverine Management Programme
SACN	South African Cities Network
SALGA	South African Local Government Association

GLOSSARY OF TERMS

Adaptation	Adaptation is a means of responding to the impacts of climate change. In human systems, it is the process of adjustment to actual or expected climate and its effects in order to moderate harms or exploit beneficial opportunities. In natural systems, it is the process of adjustment to actual climate and its effects[3].
Climate change	A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods (Definition of the United Nations Framework Convention on Climate Change)
Climate Resilient Development Pathways	CRDPs are sequences or portfolios of public and private interventions that steer development trajectories towards resilience and equity by creating gainful work opportunities, maintaining infrastructure and conserving ecosystems in ways that proactively reduce inequality, climate impacts and greenhouse gas emissions. CRDPs are place-based and context-specific with interactions across scales. CRDPs involve long-term thinking for near-term, joined-up decision-making and action.
Co-benefits	Additional benefits that can be achieved through implementing climate change mitigation and/or climate change adaptation interventions.
eThekwini Metropolitan Municipality	For the purposes of this report, eThekwini Metropolitan Municipality is used to refer to the geographic area of this Municipality, which includes the port city of Durban.
eThekwini Municipality	For the purposes of this report, eThekwini Municipality is used to refer to the local government that is responsible for the management of the eThekwini Metropolitan Municipality.
Just Transition	In terms of South Africa's Just Transition Framework, a Just Transition aims to achieve a quality life for all South Africans, in the context of increasing the ability to adapt to the adverse impacts of climate, fostering climate resilience, and reaching net-zero greenhouse gas emissions by 2050, in line with best available science. A just transition contributes to the goals of decent work for all, social inclusion, and the eradication of poverty and puts people at the centre of decision-making. A just transition builds the resilience of the economy and people through affordable, decentralised, diversely owned renewable energy systems; conservation of natural resources; equitable access of water resources; an environment that is not harmful to one's health and well-being; and sustainable, equitable, inclusive land use for all, especially for the most vulnerable.
Learning Lab	A Learning Laboratory (Learning Lab) methodology was applied as the foundation for the stakeholder engagement component of the project. The Learning Lab methodology is a transdisciplinary approach, which acknowledges that complex problems, such as those encountered in climate change adaptation, cannot be solved by a single, or linear, line of thinking, discipline, or method. The underpinning ethos of the approach is that of facilitated co-engaged learning among a diversity of stakeholders and participants. This approach is intended to facilitate the combination of multiple forms of

[3] Source: IPCC Glossary (https://apps.ipcc.ch/glossary/)

	knowledge, including expert, tacit and local knowledge, to better understand the systemic aspects of urban climate adaptation in the design of plans and solutions. The Learning Lab methodology also creates a platform to promote inclusivity, interaction, social learning and innovation, where different actors can share their knowledge with one another, and create sustainable value.
Mitigation	Mitigation refers to the measures taken to reduce the emission of greenhouse gases and to enhance sinks (i.e. ways of reducing) of greenhouse gases.[4]
Nelson Mandela Bay Metropolitan Municipality	This is the municipal area that includes the city of Gqeberha (formerly Port Elizabeth) and surrounding smaller towns.
Resilience	Resilience is 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[5].
Synergy	The combined effect of a group of things (e.g. people, organisations, interventions) when they are working together that is greater than the effect achieved by each operating separately.
Trade-off	A balancing of factors that are not all attainable at the same time. A trade-off involves giving up something in return for getting something else.

[4] Source: IPCC Glossary (https://apps.ipcc.ch/glossary/)
[5] Source: IPCC Glossary (https://apps.ipcc.ch/glossary/)

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- Local government practitioners from eThekwini Metropolitan Municipality and Nelson Mandela Bay Metropolitan Municipality;
- European and South African experts who contributed video 'snapshots' for each Learning Lab;
- The members of the study tour delegation who shared insights and thoughts from their tour; and
- South African, European and other participants at the Learning Lab events, who have contributed their own experiences and thinking to strengthen the content and emerging ideas on climate resilient development pathways for eThekwini Metropolitan Municipality and Nelson Mandela Bay Metropolitan Municipality.

1. PROJECT BACKGROUND

Climate change poses increasing risks to cities as hubs of social and economic activity. In responding to the collective effort demanded by climate change, the European Union (EU), within the scope of the EU Climate Dialogues Project, in partnership with the Presidential Climate Commission (PCC) of South Africa, commissioned a peer-to-peer engagement and learning process for cities across South Africa and the EU. This engagement aimed to initiate knowledge sharing, learning and support platforms to advance context-sensitive climate change efforts across government spheres and with other key role players, which included representation from private sector, academia, civil society, and non-governmental organisations. This Recommendations Report consolidates important outcomes from the learning journey and highlights key recommendations for the Presidential Climate Commission (PCC), policy-makers and practitioners – especially municipal officials and councillors – who are working towards more climate-resilient development pathways for South Africa and the EU.

2. MUNICIPAL CHALLENGE CONTEXT

2.1 The case study cities of eThekwini Metropolitan Municipality and Nelson Mandela Bay Metropolitan Municipality[6]

Cities provide critical spaces in which to build climate resilience. The eThekwini Metropolitan Municipality (EMM) in the KwaZulu-Natal Province of South Africa and the Nelson Mandela Bay Metropolitan Municipality (NMBMM) in the Eastern Cape Province are the case studies for the current project.

In EMM in April 2022, extreme rain of just over 300 mm fell on a single day over parts of the KwaZulu-Natal province in South Africa, and especially around the major port city of Durban. This rainfall was the result of a cut-off low pressure system over the east coast of South Africa - an event which lasted approximately 3-4 days. These cut-off low systems are a natural weather phenomenon experience by South Africa given its location in the sub-tropics, rising atmospheric and ocean temperatures are influencing the frequency and intensity of these weather systems. The resultant floods caused significant damage that amounted to more than R25 billion across the province, with more than 450 lives lost, an estimated 13 500 houses damaged or destroyed, 40 000 people displaced, and 630 schools affected. Significant damage to infrastructure and the environment was also recorded and disruptions were experienced in major economic sectors. Importantly, however, these flood-producing rains were by no means unprecedented along the KwaZulu-Natal coast and its immediate hinterland, although their impact was significantly exacerbated by a number of factors, including: the physical and natural environment (geology and catchment degradation); infrastructure and planning issues including land-use change and the increased proportion of impervious surfaces, without the necessary upgrades to infrastructure; and socio-economic factors such as the existing vulnerability of certain settlements. Despite the significant impact of the floods, several measures were already in

[6] Further information on the case study cities and their responses to climate change hazards can be found in the Background Reports and Summary Infographics prepared as part of this project.

place to reduce their impacts. These included science-based monitoring and modelling to inform Early Warning Systems (EWS) at a community level, and significant investments in the city's ecological infrastructure (rivers and catchments) to minimise loss of life and reduce the impacts of flooding. Severe flooding was experienced again in both KwaZulu-Natal and the Eastern Cape in June 2024 with persistent downpours causing damage to infrastructure and blocking roads with debris, resulting in the evacuation of many low-lying and informal settlement areas. The seven fatalities resulting from the floods were mostly in Durban[7].

In NMBMM, the consistent absence of spring rainfall (which usually accounts for 25% of the rainfall in the area) between 2008 and 2015 was a clear sign of the onset and persistence of drought. The impacts of the drought have been extensive and include agricultural and job losses, health issues, exacerbation of existing inequality (through unequal access to scarce water supplies) and environmental impacts affecting river quality and functioning. The climatic factors that contributed to the drought were exacerbated by several anthropogenic factors, including degraded river catchments as a result of expanded urban development and invasive alien plant infestation; lack of maintenance and investment in water, wastewater and stormwater infrastructure; water demand exceeding supply; and governance challenges including political instability and the loss of critical professional skills in municipal engineering functions. Despite the significant effects of the drought, measures that helped reduce the impact included augment supply through water transfers, exploring groundwater options, water recycling, reducing water loss through pressure management, leak detection and infrastructure repair programmes, revision of water tariffs and raising public awareness to help drive down demand and ensure compliance with water restrictions.

As much as cities like EMM and NMBMM are adopting many constructive approaches in response to the climate change challenge, there is an urgent need to strengthen the capacity of municipal officials, policy-makers and practitioners. This capacity includes the ability to engage with, and integrate, complex knowledge sources, climate information, examples of practice and understandings of urban and city regional systems to inform more climate-resilient development pathways. 'Climate Resilient Development Pathways' (CRDPs)[8] provides an approach to build these capacities and has been used in the current EU/PCC Peer-to-Peer learning exchange project to frame the learning journey that participants have been guided through.

The CRDPs approach assists in the active planning and actioning of diverse development needs and aspirations emerging in complex socio-ecological systems facing evolving climate risks and opportunities. The approach adopts a risk-based approach to long-term development trajectories or pathways shaped by past decisions and investments over decades and centuries that stretch out into multiple possible, contingent futures. It places current priorities, decisions, and decision-making within a systems perspective to act adaptively and in a more cohesive manner.

Within the context of this approach, CRDPs are location-based, context-specific sequences or portfolios of public and private interventions that steer development trajectories towards resilience and equity by creating gainful work opportunities, maintaining infrastructure and conserving ecosystems in ways that proactively reduce inequality, climate impacts and greenhouse gas emissions.

[7] https://www.nsri.org.za/2024/06/climate-change-wreaks-havoc-major-floods-in-kwazulu-natal-and-eastern-cape/
[8] Taylor and McClure (2023)

With a CRDPs lens, the drivers and impacts of climate-related events (such as floods or droughts) are considered within the context of nested socio-ecological systems and processes of governance, ecology, politics and economics. The CRDPs approach employs proactive and forward-looking strategies to determine opportunities for growth and development in response to a changing climate. Importantly, the CRDPs approach creates space for the multiple (sometimes competing) priorities of different actor groups to be tabled and then used to inform and co-design options for climate resilient development pathways[9]. A CRDPs approach therefore requires negotiating options, considering the synergies and trade-offs associated with different options, tracking progress towards preferred pathways and learning from the process and outcomes.

Inclusive processes of social learning and knowledge co-production are therefore central to a CRDPs approach, to ensure that a diversity of stakeholders is involved in decision-making processes on investments and resource (re)allocations. This requires that safe and deliberative spaces are created and maintained where aspirations, values, fears, risk perceptions, power dynamics and vested interests can be surfaced, explored, challenged and negotiated. It also involves nurturing new or altered relationships between residents, practitioners, business operators, researchers and policymakers.

Adopting a CRDPs approach is therefore not about arriving at or settling on a singular specific development pathway; it is about strengthening the ability of a range of stakeholders to engage in a transdisciplinary manner with multiple sources of climate information and perspectives. This approach considers alternative intervention options in an evolving context of socio-economic and ecological complexity and (re)negotiation, prioritisation and decision-making in collaborative ways with specific climate resilience, justice and equity objectives in mind. It is also about moving away from notions of finding solutions and fixing problems, towards building the collective capacities and relational agency to work with and adapt to ongoing and emergent changes. It is about navigating social and biophysical contingencies by working with multiple development pathways and gearing up to add and switch options based on learning, risk detection and feasibility. It is about building resilience.

This project used the learning journey to facilitate the CRDP approach and test the ability of the approach to developing such capacities amongst the participants.

2.2 Aligning the project and learning journey with the CRDPs approach

Prior to this engagement, the Presidential Climate Commission initiated a preceding Climate Resilient Development Pathways Project[10], which was undertaken between October 2021 and October 2022. The project supported the PCC in the development of a Climate Resilient Development Pathways approach and methodology to help facilitate the transition of South African society to be climate resilient and to be a net-zero producer of greenhouse gas emissions in a just and inclusive way by the 2050s.

[9] This is achieved through the inclusion of multiple voices and perspectives in the process; consideration of options in the context of the broader system; and the critical assessment of options against climate and equity criteria.
[10] https://acdi.uct.ac.za/acdi-research/climate-resilient-development-crd-pathways-applicability-navigating-just-transition-south-africa

The intention of this project was to set the direction for future knowledge co-production and planning in relation to the country's Just Transition. Two high-level city case studies were used to help ground the approach in practical spaces and establish its potential for application. In the Terms of Reference for the current EU/PCC Peer-to-Peer Learning Exchange Project, the PCC acknowledged the need to test and elaborate this model in different spaces.

The objectives of the project was to: (i) Improve climate resilient practices amongst participants (by strengthening participant capacities to engage with system complexity and navigate climate resilience decision-making); (ii) Test the CRDPs approach in a Learning Lab context and advance the work of the PCC in this area; and (iii) Test the concept of, and need for, a Community of Practice working towards development pathways that are more climate resilient, sustainable and just. To achieve this, the CRDPs approach was used in the Learnings Labs as a lens through which to view the systemic challenges being experienced by EMM and NMBMM in relation to floods and droughts; articulate development options that could promote climate resilience, equity and justice and which are robust to multiple climate conditions; and begin to cluster and sequence these in ways that could guide prioritisation and action.

3. AN OVERVIEW OF THE CRDP-FRAMED LEARNING JOURNEY

In line with the CRDPs approach, the Learning Labs aimed to create space for participants to:

- Consider the *systemic drivers* and impacts of climate-related events (floods in EMM and droughts in NMBMM) *(Learning Lab 1)*
- Adopt a *retrospective view* of the current situation in EMM and NMBMM to consider the events and processes that have influenced the status quo, and optimise learning from past decisions to inform future priorities *(Learning Lab 1)*
- Bring *climate information* into conversation with other types of relevant information to examine the *evolution of conditions* which are likely to shape the risk and resilience profile of the city / municipality *(Learning Lab 2)*
- *Identify* and *critically assess development options* to differentiate those that are climate-compatible and foster more equitable forms of resilience, from those that aggravate climate risks *(Learning Lab 2 and 3)*.

Figure 1 provides an overview of the learning journey across the three Learning Labs. Given the scope and time limitations of the project, the learning journey did not allow for a comprehensive CRDPs process to unfold, it did however surface important outcomes that will assist in informing further development in this area. These outcomes are explored in the next section of the Report.

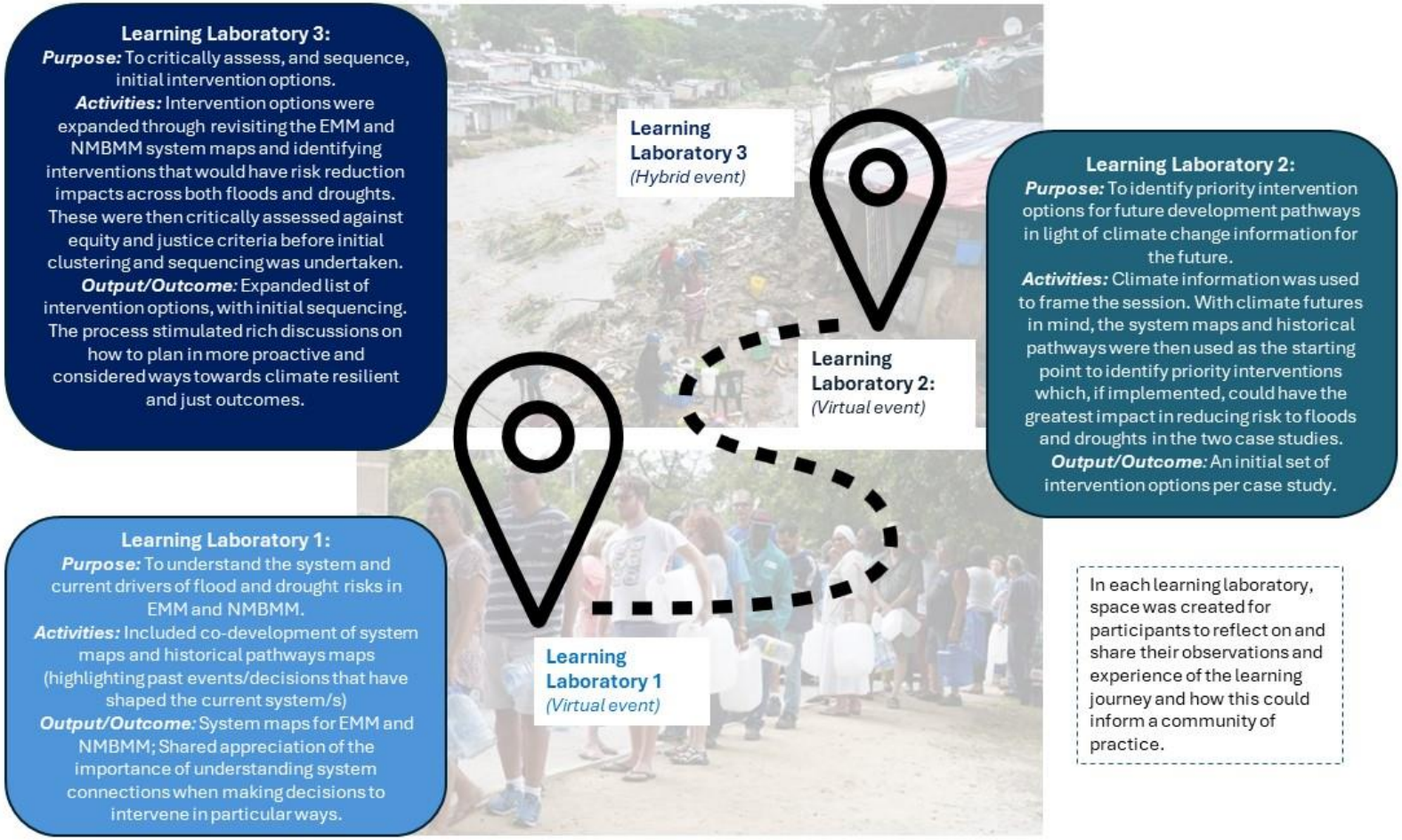

Figure 1: An overview of the Learning journey, structured in relation to the CRDPs approach

4. OUTCOMES OF THE LEARNING JOURNEY

Outcomes from the learning journey are considered in relation to the three objectives of the project, which were to: i) improve climate resilient practices amongst participants; ii) test the CRDPs approach in a Learning Lab context to advance the work of the PCC; and iii) test the concept of, and need for, a Community of Practice working towards development pathways that are more climate resilient, sustainable and just.

4.1 Improving climate resilience practice

The learning journey highlighted important tools and resources that are currently available (such as climate information) to strengthen climate resilient practices, and also identified interventions that should be considered as 'no regrets[11]' options within CRDPs.

4.1.1 *Climate information as a resource for climate resilience practice*

Resilience planning should be supported by different types of evidence, including scientific climate information. Processes of engaging with and interrogating climate information, by decision-shapers, decision-takers and other actors, are as important as climate information products. Such processes not only build capacity to engage with and debate climate information, but also allow different perspectives to be considered when interpreting and then applying this information in particular contexts. This was a significant focus of Learning Lab 2, where a number of important learnings emerged. These included the following:

- There are *different forms of climate information.* Climate information involves the collection and interpretation of relevant climate data, which could be derived from the more conventional 'science' fields as well as indigenous knowledge. The integrity of such data contributes to the reliability of climate information.
- It is important to *start with what decisions are being made* and then consider what evidence is needed to ensure those decisions are robust and build resilience against changing climate conditions. Often this happens the other way around, where data and information are generated in a vacuum from decision-making.
- Making decisions that are climate compatible into the future requires an understanding of how *systemic drivers contribute to risk, and how these will change into the future.* Climate is one driver that affects risk, but other factors related to exposure (e.g. location of a community or infrastructure), vulnerability (e.g. access to services and social networks, intersectional experiences that result in marginalization) and responses (e.g. governance processes and decisions, changes in ecosystems as a result of climate hazards) also need to be considered alongside climate information to provide a holistic view and adequately inform decision-makers.
- Climate information is *useful but dynamic and imperfect.* Like all information, it evolves as new discoveries are made and models are improved. Rather than providing precise answers,

[11] 'No regrets' options are defined as options that generate direct or indirect benefits that are large enough to offset the costs of implementing the options.

climate information is useful for providing a range of projections that help to understand potential climate futures. Working with climate information in a dialogic manner is, in itself, a learning process that can contribute a great deal to raising the level of debate and co-engagement with a range of information sources and perspectives.

- Generating actionable climate information requires *investment in data collection, monitoring and a co-engagement with the topics of concern.* It also requires data to be shared, collated, quality-controlled and analysed, ideally by multi-stakeholder groups that can assess what is working and what else is needed. This is a key capacity needed when adopting a CRDPs approach. This includes the need to collate and *record existing project and professional experience* in different spaces so that this is not lost and can be built on and developed as needed.

In the Learning Labs, participants appreciated the climate information provided and the tools that were used to assess system connections (further information on this is provided in Section 4.1.2). It was clear that climate information is more readily available in some parts of South Africa than in others, which can affect decision-making. Participants also acknowledged the importance of accepting that, while there may not always be precise numbers available in terms of climate projections, this should not hold municipalities back from taking relevant climate adaptation and mitigation action within the context of the credible information that *is* available. The Learning Labs also highlighted the danger of fragmentation and the need to raise awareness of information sources as well as initiatives currently being undertaken in the area and South Africa.

4.1.2 *Identifying priority climate resilience interventions*

An important focus of the learning journey was to negotiate a set of interventions and practices that can assist cities to become more climate resilient. Several activities in the Learning Labs contributed to identifying and assessing such practices. These included:

- Systems mapping (including brainstorming systemic drivers of drought and flood risk and looking across systems maps to identify interventions that might contribute to adaptation to both) (Figure 2);
- The historical pathways ('River of Life') exercise to consider how past practices should inform better decision-making in the present;
- Listening to other climate change stories from South Africa and Africa (including a focus on indigenous knowledge practices);
- Assessing intervention options against criteria; and
- Regularly revisiting the systems maps and intervention priorities to add new information and reflect on previous priorities.

Participant feedback highlighted the value of systems thinking in 'getting comfortable with discomfort', understanding the connections between components of the system and surfacing critical leverage points for intervention. For example, having skilled technicians, strong public-private partnerships, an adequate municipal revenue stream and reduced corruption and maladministration, all contribute towards the ability to maintain and expand drainage infrastructure, which in turn is central to the ability of cities to reduce flood risks. Exercises in the Learning Labs that aimed to highlight past events and practices that have shaped where we are, were seen to be important

opportunities to reflect on learnings from previous disaster events, and see connections between extreme events and everyday practices, before moving on to plan for the next.

Figure 2: Participants exploring commonalities across the flood (EMM) and drought (NMBB) system maps

The initial set of priority development interventions emerging from Learning Lab 2 in EMM and NMBMM across floods and droughts are shown in Figure 3 and Figure 4 below. The summary tables that were developed included the rationale participants provided for the identified priority along with the information they felt would still be needed to make an informed decision on this.

Priority	Development option	Rationale	Information needs (climate and other)
1	Building community networks and communities of practice (e.g. Water Crisis Committees) to raise awareness and build agency.	Behavioural change should not only be conceptualised as an individual process but as a process nested in social organisation. Implementing agency is needed to increase this awareness. There is a need to build networks and trust which creates an opportunity for information sharing, especially in moments of crisis. Networks allow for improved communication which can provide direction when disasters occur.	Early Warning Systems information that can be communicated via networks. Existing networks - Where are these located? What information do they have and what do they need? It is important to build on existing networks wherever possible.
2	Creating a governance or coordinating entity to align municipal functions	To ensure that daily operational activities and implementation of projects are alleviating the impacts of floods. A coordinating entity could help ensure that there is alignment of mandates across departments, to support improved action. There is a need to collaborate between different groups. A coordinating office may be helpful to assist with this. Possibly need a mandate for bridging between the various silos of information. Need to take a view of the bigger picture.	Bridging silos to share information. Using the sharing of information to improve how we do things into the future.
3	Creating a framework for urban setbacks and development and enforcement of these setbacks.	Municipalities need to be proactive rather than reactive in 'making room for the river' to keep people and infrastructure out of these vulnerable spaces. Need to try and act before building in these areas occurs, as it is costly to move people once they are in these areas. Once they are in these areas, the question arises as to how they can adapt effectively. However, there are complex socio-economic considerations in this space.	Floodline information. High risk zones based on floodlines. Alternative design options for flood mitigation - for example, avoid hard infrastructure in favour of ecological infrastructure.

Figure 3: Initial three development interventions that were prioritised through systems mapping to respond to floods in EMM

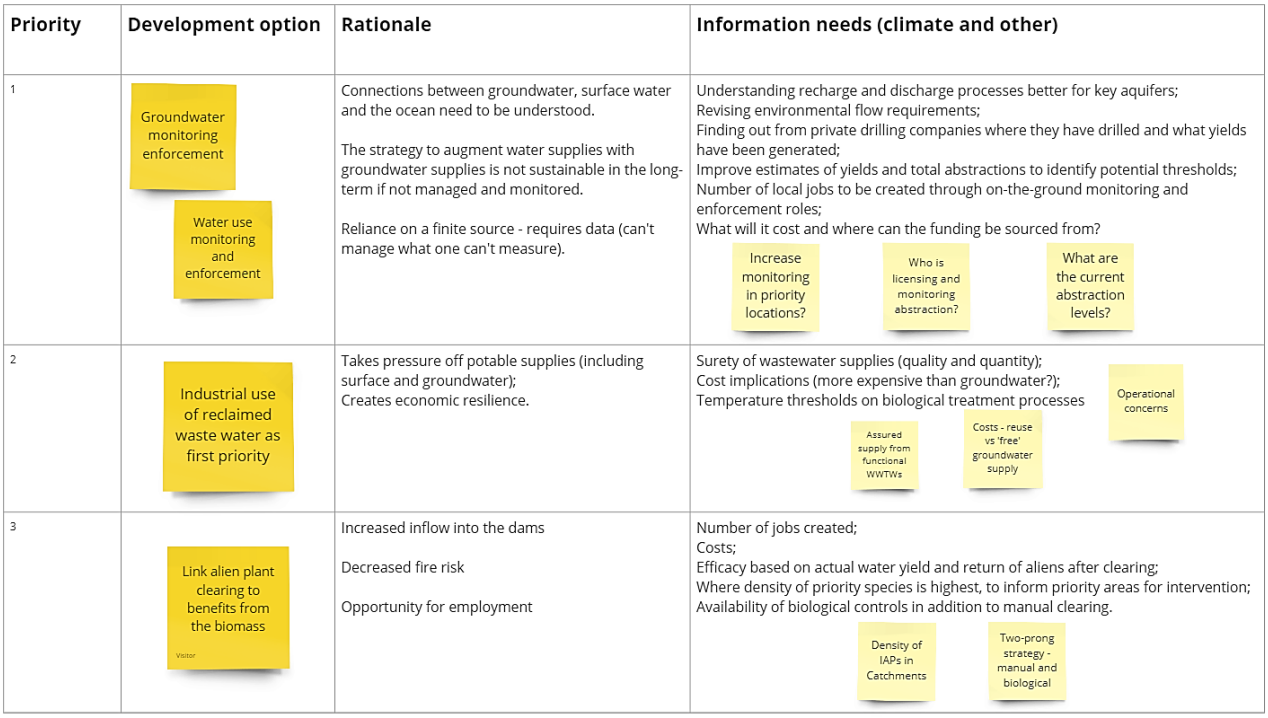

Figure 4: Initial three development interventions that were prioritised through systems mapping to respond to droughts in NMBMM

Learning Lab 2 and Learning Lab 3 allowed these ideas to be developed further and additional priorities emerged as participants engaged in group discussions, listened to a range of climate change stories and experiences, and reflected again across the system maps. The expanded lists of interventions are summarised in Box 1 and Box 2 for NMBMM and EMM, respectively.

Box 1: An expanded list of resilience intervention options for NMBM emerging through the Learning Lab engagement process

- Improve groundwater monitoring and enforcement
- Expand the industrial use of reclaimed wate water
- Expand catchment restoration programmes (e.g. through invasive alien plant removal) and maximise socio-economic benefits associated with this (e.g. use of biomass)
- Strengthen community integration through education and co-development of solutions
- Improve water infrastructure (reticulation networks, pressure management and upgrades)
- Facilitate regulatory changes (e.g. water tariffs, rebates for rainwater tanks, regulation of illegal sandmining etc) to unlock processes
- Strengthen water governance and finance mechanisms (e.g. through skills development, stabilising municipal leadership)
- Strengthen financial management (e.g. provision of emergency funding and systems to distribute this, oversight of government spending)
- Integrate ecological and built infrastructure systems (e.g. ecological infrastructure on municipal asset register)

Box 2: An expanded list of resilience intervention options for EMM emerging through the Learning Lab engagement process

- Review and strengthen coordinating entities to ensure alignment of mandates
- Reimagine and reconfigure high risk flood zones
- Build and support community networks (more government engagement with civic-led initiatives)
- Provide more funding for environmental education programmes
- Provide more staff to effectively deliver basic services and enforce by-laws
- Expand ecological restoration programmes (particularly in catchments)
- Increase community-led infrastructure installation and maintenance
- Curate a climate-related music, story and art festival to inspire and grab hearts and reduce fear
- Improve monitoring for early warning systems for floods and related disaster events

Interventions that emerged repeatedly in enhancing climate resilience action ranged from community-based interventions such as early warning systems and strengthened community-level networks for information sharing and action, to cross-scale interventions such as catchment management and ecological restoration. Interventions focused on enhancing infrastructure development and maintenance (particularly in relation to water, stormwater and sanitation) along with other foundational service delivery priorities such as solid waste management were also seen as critical. From a governance perspective, strong leadership was highlighted as central to climate planning and action, and participants highlighted the need to engage a range of leaders, including politicians, with the Climate Change Act being seen as a potential catalyst for engagement and greater climate action[12]. Aligning municipal functions that are involved in climate-related action around clear priorities could also play an important role in strengthening effectiveness.

When exploring commonalities across the EMM and NMBMM system maps, interventions such as skills development and retention, particularly in the engineering fields, emerged as additional priorities, as did investments in strengthening urban planning, urban design and compliance with planning guidelines and by-laws. In some instances, specific technical interventions were also prioritized, for example reclaiming and re-using wastewater, given the increasingly water-stressed context of South Africa and the need to sustain major industrial and economic sectors.

4.1.3 *Assessing, clustering and sequencing intervention options*

In Learning Lab 3, an important focus was to assess, cluster and sequence intervention options and, where possible, identify 'next steps' to take actions forward (Figure 5). Critically assessing interventions in a more holistic way against equity and justice criteria surfaced complex discussions on the need to consider not only *what* is done but also *how* it is done. Large-scale land restoration programmes, for example, could be located to take cognisance of potential overlap with land that could be used to house the urban poor. They could also be proactively planned to maximise the potential to leverage new investments, for example in the use of biomass from invasive alien plant clearing.

[12] Learning Lab 3, Project Learning Reflections

In terms of clustering, a cluster of interventions emerged around 'Water Infrastructure' in the NMBMM Learning Lab. The group that explored this cluster commented on the fact that there is a lot already being done in terms of pressure management and flow monitoring but there is a need to focus on the reticulation networks to reduce leaks and losses. The group also highlighted that expenditure (or the current lack of expenditure) on such interventions is not a product of too little capital budget, but rather the absence of sufficient skills (e.g. in the engineering field) and the influence of politics, which often hampers procurement processes. Improved monitoring of the infrastructure systems was also seen as a critical aspect of informing priority actions.

Figure 5: Participants engaging in a group exercise to cluster and sequence priority interventions

In EMM, participants acknowledged that the interventions that had been identified could not be seen as discrete options for action but rather as a clustering of interconnected actions that should be led by different actors including the Municipality and citizens. For example, strengthening coordinating networks and partnerships as a priority intervention will require appropriately trained staff on the side of the Municipality and increased agency on the part of communities to contribute to decision-making and support aspects of community infrastructure development. These conversations helped to facilitate discussions on connecting actions within the system and identifying more focused starting points for action.

4.2 Testing the CRDPs approach

Participant reflections were collated after each Learning Lab to understand lessons learned and inform the design of subsequent labs (interactivity is a key characteristic of learning labs). Several observations emerged relating to the usefulness of the process in inspiring new ways of thinking and creating space for multiple voices. Particular reflections are presented below.

4.2.1 *The CRDPs approach helped inspire participants to think in new and more systemic ways*

The learning journey activities helped participants consider the system and the connections across social, economic, environmental and governance components. This helped reduce one-dimensional perspectives on cause and impact and helped to consider a broad range of responses when prioritising interventions. One participant noted the importance of thinking systemically and holding the 'bigger picture' but also highlighted the difficulties in doing this, particularly when one starts considering the potential unintended consequences of actions across sectors and scales, that might not previously

have been recognised[13]. For other participants, the systems maps helped surface some of the less obvious points for intervention and highlighted the importance of elected political councillors in influencing the effectiveness of climate responses[14]. As one participant summarised:

> *"An important learning was developing an) understanding of the interconnectedness of our actions and how we can better respond if we take time to better plan and organise our responses in the face of a disaster like floods or drought."*

4.2.2 *The CRDPs approach created space for multiple voices and challenged dominant ways of thinking*

The group work and other Learning Lab processes helped build a collective view of the positions and perspectives of multiple participants when considering flood and drought responses, while practical virtual tools like Miro[15] helped facilitate such discussions on virtual platforms. Using different forms of information, including climate science, project videos and the sharing of participant experiences, helped to deepen more critical discussions on intervention priorities (Figure 6). One participant noted the importance of being able to brainstorm ideas without boundaries', while others appreciated being able to hear insights and knowledge from facilitators and fellow participants[16]. The CRDPs approach also helped to challenge dominant ways of thinking by creating space for multiple voices to be heard on an equal platform, and allowing opportunities for questioning, rethinking and challenging dominant modes of decision-making that often disregard connections and consequences. As one participant highlighted:

> *"One of the key insights today was regarding 'unlearning' and essentially breaking bad habits and thinking outside my own social/cultural norm/box."*

These discussions were strengthened when interventions were critically assessed against equity and justice criteria (See Section 4.1.3), which are often considered second to financial criteria. Adopting this assessment lens helped deepen participants' understanding of the interventions themselves and the potential to improve project design and benefits if planning happens proactively and applies a broader range of criteria in the project assessment and planning process.

Figure 6: Participants engaging in group discussions to assess interventions against equity and justice criteria

[13] Learning Lab 2, Project Learning Report.
[14] Learning Lab 3, Project Learning Report.
[15] www.miro.com
[16] Learning Lab 3, Project Learning Report.

4.2.3 *Testing the CRDPs approach revealed learnings that could inform future similar processes*

Important learnings related to the following:

Design of the CRDPs process within a Learning Lab context

- The *diversity of activities* and inputs helped keep participants engaged and participants enjoyed the smaller group discussions that were facilitated in breakout rooms. Keeping the *breakout groups small* also helped to facilitate more discussion and the co-construction of knowledge, as did having two facilitators per group.
- In some cases, it was *challenging to work across tools* (including Miro), especially given that many had to learn how to use these virtual tools and some participants joined late in the process. Although space was provided to support these individuals, thought should be given as to how to address this ahead of such learning journeys. *Working across virtual and physical* spaces can also be challenging, not only from a technical perspective but also in terms of facilitating active engagement – for some participants, working in a physical space is far easier, while for others, the opposite is true.
- *Having a 'straw dog'* helped to generate more debate and discussion. For each activity, the project team developed a rough draft of the intended output, such as the system maps. This allowed participants to understand what to do more quickly and build on or change the initial ideas, rather than starting from the beginning.
- The use of *jargon and difficult terms* was avoided, or properly explained.

Time and depth

- Although the 'light touch' testing of the CRDP approach helped expose participants to the process and to see its potential value, they might *not have gained the expertise to apply* this approach in their work. This would require transdisciplinary and relational expertise that can only be developed over time and through repeated application. Unfortunately, time was limited for the current project. However, participant feedback suggested that some of the tools (like systems mapping) within the broader CRDPs process, would be useful to them in their specific work areas.
- The limited time also meant that *discussions could not go into the depth* that would be required as part of a more comprehensive CRDPs process. For example, it was not possible to consider the development/ intervention options identified by participants concerning climate futures and possible thresholds.
- In general, *less time* should be spent on *presentations* and more time in discussion.

Translating CRDPs theory into practical spaces for application

Although the learning journey did create space for participants to engage on issues relating to their particular areas of work, more time could have been spent helping participants to translate the ideas emerging from the CRDP process into the *more focused spaces* in which they work.

4.3 Community of Practice

4.3.1 *The potential role and focus of a Community of Practice*

A potential mechanism for supporting ongoing knowledge sharing and social learning to advance context-sensitive climate change efforts is through a Community of Practice (CoP) that includes multiple stakeholders from government, civil society and other key role players, including academia and the private sector (e.g. consultants that provide technical support). A CoP refers to a group of people who have a shared concern or interest and meet regularly to deepen their understanding of an issue, or set of inter-related issues, and various practices and interventions aimed at addressing the issues[17]. The constant engagement of individuals in a CoP allows for the sharing of knowledge, building of trust amongst actors and the potential development of innovative solutions to the shared issues or concerns. It is important to note that CoPs evolve and come into existence organically. They can be supported and enabled but cannot simply be created by one entity, in a top-down manner. It is exciting that the field of climate adaptation is growing rapidly, within South Africa and globally, with more and more practitioners, policy-makers and researchers identifying as working on and being responsible for climate adaptation issues. As a result, relationships are growing organically and starting to coalesce into networks. But these still remain somewhat nascent and fragmented. Within the context of this project, a CoP could serve as a knowledge sharing and learning hub across a range of actors to facilitate the development and scaling of climate change solutions.

Throughout the three Learning Labs, discussions were facilitated around a potential CoP to build climate resilience (Figure 7). This was done through posing direct questions in focus groups, facilitating reflective exercises, probing and surfacing prior experiences, and presenting the experience of team members and participants on useful learning tools and other communities of practice. Through this process, it emerged that there is a clear appetite for a CoP that can help coordinate efforts toward shaping and supporting groups of actors eager to learn, share, and shape resilience in urban settings. Ideally, collective inquiry and innovation (that extends beyond the acquisition of knowledge to the transformation of practices and systems in an iterative and collaborative process), can be facilitated within the safe space of such a CoP[18].

Figure 7: Learning Lab participants in NMBMM engaging in discussions around a future Community of Practice

[17] Mohajan (2017); Sánchez-Cardona *et al*. (2012)
[18] Engeström and Sannino (2010)

There is also potential for agency to be created within and between CoP participants through the sharing of diverse perspectives and practices that cross knowledge domains and systems[19]. This need was specifically vocalised by participants during the learning journey. Importantly, a CoP should have a clear focus. In this regard, initial ideas emerging from EMM and NMBMM are captured in the text boxes below.

Box 3: A Community of Practice to support the TRMP (EMM)

In the EMM there is an opportunity to frame a CoP around the Transformative Riverine Management Programme's (TRMP) 'Hub' concept. The TRMP intends to upscale riverine management to reduce flooding risks and enhance socio-economic opportunities, as part of the city's community ecosystem-based adaptation approach within the Durban Climate Change Strategy. The TRMP attempts to manage Durban's extensive river systems on both state and non-state-owned land through two 'Hubs': an 'internal Hub' within the Municipality that coordinates riverine interventions on municipal-owned land, and an 'external Hub' which helps coordinate riverine interventions on non-municipal land. A climate resilience CoP framed around the TRMP could help support the emerging engagement, coordination and learning needs of the external Hub, especially in the preliminary stages. These ideas around the TRMP and 'hubs' are already well-developed and would be well supported by stakeholders if a CoP with such a focus were to be pursued.

Box 4: A Community of Practice to bridge and connect across existing work (NMBMM)

In the NMBMM, participants recognised that a CoP could provide regional cohesion between current initiatives, projects and programmes that are taking place. The national Municipal Benchmarking Initiative (MBI) for Water Services in South Africa was put forward as an initiative that could be replicated for climate change resilience. Water services benchmarking was established in response to growing development-driven water demand and increasing water scarcity. This initiative acknowledges the need for improved performance management by local government and aims to support municipalities in improving the efficiency of service delivery in the area of water management. The MBI is based on the mantra of 'for municipalities, by municipalities, to the benefit of municipalities', and aims to create a support network that fosters a culture of information exchange between peers so that municipalities can come together to learn from one another's experiences. A climate resilience-focused CoP with such a focus could provide significant support in this regard.

4.3.2 *Principles to establish and sustain a Community of Practice*

Recognising the potential for a CoP to contribute to learning about adaptation, resilience and sustainability, sessions were included to explore existing relevant CoPs, including the benefits and limitations of these CoPs, and the potential for strengthening these CoPs for climate resilience. The outcomes from these sessions, along with existing knowledge of the project team, have been used to shape the recommendations in this Report. The outcomes are summarised below.

[19] Nautiyal (2024)

A Community of Practice needs a clear home and lead organiser/convener

A champion individual or organisation needs to drive the establishment of a CoP. Participants expressed their excitement about the potential of the PCC to support a CoP that would be focused on exploring climate resilience through a CRDPs lens and a peer-to-peer learning approach. Considering the coordinating role of the PCC, particularly to engage a wide range of stakeholders on South Africa's journey towards climate resilience, it seems a logical body to host such a CoP. Moreover, the PCC already facilitates engagements across actor groups on various climate-related issues, which could be expanded. In a way, the PCC is already serving as, and supporting, an emerging CoP.

A CoP that supports knowledge exchange and sharing practices requires nurturing and investing in, and the PCC is ideally placed for this role. However, rather than being the driver or the implementer of such a community, the PCC could play the role as the coordinating entity of the CoP. This might entail executing the secretariat responsibilities of a CoP, managing, maintaining and growing stakeholder databases, organizing learning events and dialogues or being intermediaries between sectors. The Climate Change Act in South Africa, requiring that Provincial and Municipal Forums on Climate Change be established, and Municipalities develop response plans, could be an entry point for such engagements, making sure that the CoP does not duplicate functions but rather supports, enlivens and cross-pollinates between these legislated bodies. Importantly, many learning and sharing processes do already exist, or could be initiated, across diverse actors, scales and objectives, which can contribute to climate resilience learning. Partnering with and strengthening existing climate resilience communities of practice could also be considered, a notable example being the Adaptation Network, which centres NGOs and civic groups working on practically progressing local adaptation, linking them with the initiatives of government, researchers and the private sector. A suggestion on this is included in the Recommendations section of the Report.

Principles for inclusivity and collaboration

- The shared interest for a CoP would be building resilience to climate change impacts in urban areas. Participants from the learning journey expressed the need to *open the CoP to anyone interested and committed to this praxis, across levels and scales.*
- Actors should be able to see value in participating in the CoP, particularly since time/effort is required to engage in active learning processes. *A shared interest would have to be defined* very clearly to attract committed participants.
- The CoP should facilitate *collaborative work* on climate-related issues, so a diversity of perspectives and approaches can be considered and drawn on to navigate climate-related issues across different contexts.
- CoPs should *include the voices of vulnerable and marginalized communities* such that these communities can inform planning and action.
- The CoP should facilitate *peer-to-peer learning through practices such as learning exchanges*.
- The CoP could *support mentorship across different actors.*
- *A common language needs to be built*. Complex concepts and jargon should be avoided to promote inclusivity.
- To accommodate diversity in participation*, logistical support should be provided when needed.*

- There should be a focus on *building trust, transparency, and accountability* between participants[20].
- The CoP should be accessible to *avoid excluding groups* e.g. traditional groups who, if unable to participate, would not be able to contribute indigenous knowledge practices.
- The CoP could help *strengthen the social fabric of citizens and authorities*. Citizens, for example, may be unaware of who is responsible for what in the context of their city such as for service delivery issues as well as when a crisis is developing. The Enviro-Champs movement in the Palmiet region of Durban is an example of such a bottom-up, and developing, social fabric for change and sustainability.

Learning as an underpinning ethos of the CoP

- The underpinning ethos of a CoP should be a focus on *expansive, mutual, peer-to-peer learning*, designed to suit the needs and working realities of diverse actors. The *Learning Lab approach* used in this study could provide a tool to facilitate this type of learning.
- Participants proposed that learning is most effective when a *case study approach is adopted as the focus for learning*. This can be nurtured by: building an informal and flexible body of knowledge around specific localised cases; learning from these localised cases where cities/institutions have actioned successful projects to address the global narrative at a local level; sharing and learning about on-the-ground solutions; and sharing stories of change.
- Through participating in a CoP stakeholders can gain from *studies and research* being undertaken through institutions of higher learning and could access *relevant information and tools,* such as climate information, best adaptation practices, mistakes/failures from which to learn etc, particularly in the areas of accessing *climate finance* and meeting international *climate change commitments*.

Access to opportunities for co-development of solutions

- Participants articulated the need to work within CoPs to *co-develop relevant tools and strategies,* such as climate resilient development strategies and planning tools. It was expressed by some participants that if outputs such as planning tools commissioned by government are co-developed in a CoP, they would be more widely accepted, trusted, acknowledged, and implemented; and likely more robust.
- For some participants, a CoP could *play the role of project steering or advisory committee* on current ongoing projects.

Developing agency

Many participants indicated that this learning journey inspired them to work towards being proactive rather than reactive, work in more interdisciplinary ways by engaging in dialogues and collaboration with different people and open themselves to other perspectives and voices. Participants also reflected on their own intentions to facilitate change, which included becoming a climate change champion, promoting South Africa as a climate change leader, and building pride in South African and African ideas and practices that could build climate resilience. The CoP could *enable this agency by developing the necessary leadership, technical, and social skills.*

[20] Nautiyal (2024)

5. RECOMMENDATIONS

This section aims to consolidate the outcomes from the Learning Lab process into specific recommendations that relate to the objectives of the project outlined previously.

5.1 Recommendations for improving climate resilient practices

5.1.1 *Apply clear principles when prioritising intervention options*

- *Ensure that relevant scientific and experiential climate information is used to inform prioritisation and decision-making:* Climate information is a critical resource to inform climate resilience practice. Investing in data collection, monitoring and co-engagement is therefore essential in generating actionable climate information that can be used to assess the efficacy of proposed interventions against multiple potential climate futures.
- *Focus on innovation that involves doing existing activities and functions better:* This includes prioritising improved service delivery, particularly in the spaces of solid waste management, infrastructure maintenance and the management of water and sanitation systems. It also means thinking differently about existing processes – for example, what would it look like to 'reimagine and reconfigure' high-risk flood zones in the context of current planning approaches.
- *Address complexity and resource constraints through prioritising interventions and options that reduce risk to multiple hazards:* For example, interventions focused on catchment restoration, promoting and retaining engineering skills in local municipalities, investing in infrastructure maintenance and securing political support for climate change priorities, are interventions that will reduce risk to both flood and drought events.
- *Build on, mobilise and link to indigenous heritage practices:* For example, indigenous agricultural practices that promote productivity of a range of crops throughout the year and focus on maintaining or replenishing the health of the soils.
- *Explore and seek to apply the 'just transitions' principles and associated criteria:* A Just Transition aims to achieve a quality life for all South Africans, in the context of increasing the ability to adapt to the adverse impacts of climate, fostering climate resilience, and reaching net-zero greenhouse gas emissions by 2050. It includes a focus on decent work for all, social inclusion, the eradication of poverty, conservation of natural resources and ensuring equitable and inclusive access to resources like water and land, especially for the most vulnerable. A Just Transition approach also puts people at the centre of decision-making. Upfront inclusion of such criteria, alongside others that tend to be more dominant (e.g. financial feasibility) can help inform and improve project design upfront, to maximise benefits.

5.1.2 *Prioritise 'no regrets' climate resilience interventions*

The following interventions and practices have emerged from the Learning Lab process as 'no regrets' implementation priorities that need to feature in most if not all CRDPs, often forming a necessary basis for more niche interventions:

- *Improve and strengthen governance and partnership relationships with diverse actor groups*: In many instances, poor governance and the absence of sectoral coordination undermines the ability to implement policies, for example relating to strategic spatial planning and the implementation and enforcement of planning by-laws. This is exacerbated by the influence of political interests. In the absence of sound governance, partnerships (e.g. with the banking and insurance sectors) can help to drive the required behaviour change for example linked to the location of infrastructure, homes and assets in high-risk flood zones.
- *Seek to develop and build a 'social fabric' that is able to connect citizens with relevant actors and information on emerging climate issues and risks:* Citizens from all socio-economic backgrounds should be connected with each other, with service providers, with the municipal authorities and with key information relevant to the emerging issues and risks.
- *Invest in ecological infrastructure, including catchment management:* Properly managed catchments that are free of Invasive Alien Plants help to increase water supply, improve water quality, reduce sediment runoff, improve groundwater recharge, attenuate flooding as well as improving water storage within the catchment. In addition, keeping streams free of litter helps reduce culvert blockages, thus minimising infrastructure damage. Such investments help reduce risk to multiple climate hazards like floods and droughts.
- *Strengthen climate resilient urban planning and design:* Urban development controls (e.g. capping development in areas with inadequate water supply) and urban design (e.g. incorporating sustainable urban drainage systems and green infrastructure in urban contexts) play a significant role in reducing climate risks related to flooding, heat and drought.
- *Invest in green and grey infrastructure maintenance programmes:* Inadequate investments in both EMM and NMBMM have seen loss of ecological infrastructure and built infrastructure (at significant expense), often exacerbating existing inequalities (e.g. when destroyed roads prevent communities from travelling to work). Inadequate investments in maintenance undermines the ability of that infrastructure to deliver services and can result in inefficient water use, water losses and pollution events which can exacerbate events such as droughts.
- *Increase capacities to reclaim and re-use water:* In a context of increasing water scarcity, there is an urgent need to increase such capabilities. In NMBMM, the use of reclaimed waste-water for industrial use is seen as a priority.
- *Invest in data collection and monitoring relating to climate hazards, impacts and responses:* This is critical in informing climate modelling and early warning systems and in monitoring resource use and quality (e.g. water consumption and groundwater monitoring).
- *Strengthen community-based early warning systems for floods and other climate hazards:* These help to avoid immediate loss of life but require an expansion of community networks and local communities of practices (such as Water Crisis Committees) that can raise awareness, build agency, coordinate local action and interface with information and processes being directed by local government.
- *Invest in the capabilities/capacities of municipal officials to be key actors in climate resilience:* Appropriately skilled municipal officials are at the heart of delivering climate resilient solutions in an increasingly high-risk context. Initiatives that retrain such individuals to be cognisant of emerging threats like climate change, are critical, as are efforts to retain and grow such skills at the local level.

- *Mainstream climate risk into municipal planning and management:* Ensure that climate change impacts and relevant adaptation or mitigation measures are incorporated across sectors as part of municipal planning.

5.2 Recommendations for using the CRDP approach to frame climate resilience conversations and decision-making

5.2.1 *Use the CRDP approach as a mechanism to engage with complexity and diverse perspectives, and challenge dominant paradigms*

The CRDP approach provides an opportunity to engage with systems complexity and create space (for example through the systems maps, 'River of Life' exercises and project videos) for prior learning to be incorporated and multiple voices to co-construct knowledge. The rich debates that were surfaced during small group discussions and voting exercises created multiple opportunities for reflection and 'un-learning' in the face of varying perspectives on the same issue. This is very different from the many decision-making processes that are undertaken in a uni-directional manner, with dominant voices over-riding others.

5.2.2 *Allocate sufficient time for the CRDPs process and incorporate opportunities for localised practical applications*

A 'light touch' incorporation of the CRDPs approach (such as that adopted for the learning journey) helps expose participants to the process and its value but is unlikely to be sufficient in facilitating the whole-scale application of these ideas into specific work areas. An acknowledged shortcoming of the current project was that there was insufficient time to translate the tools and concepts used in the CRDPs approach into specific work and project scenarios that were relevant for individuals. It would be a priority to develop this aspect further.

5.2.3 *Create and nurture opportunities to build on and expand the CRDP work undertaken for this project*

There are important opportunities to develop this work further, either within the current project (for example as part of the Massive Open Online Course that is currently being developed, which could be accessed by a broader audience) or as part of related work such as that being undertaken by Gqeberha colleagues in the development of a Climate Strategy for the Nelson Mandela Bay area. Importantly, the current project has laid the groundwork to help expand this 'light touch' approach to a wider range of participants and has flagged the need to support more in-depth CRDPs processes with specific cities or in relation to specific intervention options. There are also opportunities, potentially in partnership with the South African Local Government Association (SALGA) and National Treasury's City Support Programme (CSP) to consider how basic CRDPs training could be included as part of Councillors' induction programmes. This would provide an important foundation to build capacity around climate change issues and help local politicians to think differently about climate action.

5.3 Recommendations for a Community of Practice

Although no specific recommendations emerged from the Learning Labs on the form and leadership of a Community of Practice, there was a more generic need expressed by participants for a climate resilience-focused CoP that can support ongoing knowledge sharing and social learning to advance context-sensitive climate change efforts. Given the role of the PCC in engaging a wide range of stakeholders around climate change, the PCC could play a critical role in convening and coordinating such a CoP and executing the secretariat functions. This would lend significant credibility and gravitas to such a process. Other organisations, such as SALGA or SACN, could also be well positioned for this role. There are a number of possible entry points for considering such a CoP. These are outlined below, along with important design principles for a future CoP and suggestions on next steps.

5.3.1 *Establish and resource an annual South African Adaptation and CRDPs CoP learning event*

The number and variety of people working on adaptation across South Africa is growing and needs to continue to grow. However, everyone is grappling with how to plan, design and implement climate adaptation interventions in a variety of contexts, as well as mainstream and scale up those interventions that are working well. There is a need to facilitate regular convening of such actors to discuss challenges, provide updates, share lessons and offer each other support and training. This could be coordinated by the PCC or SALGA and hosted by a different municipality each year. This could also be supported by a web presence that links practitioners to existing portals and platforms such as the Adaptation Network site (https://adaptationnetwork.org.za) and weADAPT (https://weadapt.org) and potentially aligned with existing training opportunities such as the Climate Systems Analysis Group (CSAG) Winter School at the University of Cape Town, a short course on assessing and navigating climate risks aimed at practitioners. Such ideas would need to be given further consideration should there be interest from the PCC and others in pursuing these.

5.3.2 *Align with, bridge between, and support existing climate adaptation networks and forums (across local, provincial and national scales) to avoid duplication and fragmentation, instead fostering coherence and scaling*

A number of forums and networks already exist in the climate adaptation space. A CoP needs to be designed in a way that enlivens and supports these but does not replicate them. For example, the Climate Change Act now requires Climate Forums at the provincial and municipal scales and the Department of Forestry, Fisheries and the Environment (DFFE) convenes an adaptation technical working group three or four times per year. There is an opportunity for the CoP to align with, feed into and support, these processes.

In addition, the Adaptation Network already convenes NGOs, CBOs, researchers and government representatives from across the country to share, update and learn with each other, with a strong 'bottom-up' focus and an ethos rooted in local communities. To date, this has been financially supported by the Government of Flanders, but this support is coming to an end and so the Adaptation Network and its support needs to be reimagined. This is a potential opportunity to build on, strengthen and expand an existing community of practice in the climate adaptation space.

In addition, there are a number of complementary processes that are able to support a developing community of practice in climate change. These include the South African National Biodiversity

Institute's (SANBI) Research Network in support of ecosystem-based adaptation, a partnership between SANBI and the National Business Initiative to develop a pipeline of adaptation projects for investment, the Institute for Strategic Studies' forecasting capabilities (including for climate change) and UNICEF's 'Young Reporters for the Environment' network. Additional details on these and other processes that could be relevant to a climate change community of practice are included in Annexure 1.

5.3.3 *Use the CoP to leverage potential where novel, inclusive and adaptive actions are already underway*

In some cases, specific project-focused needs have been identified where participants felt a CoP could provide support. This is seen for example in the case of the community of practice that is emerging around EMM's TRMP, which aims to connect municipal and non-municipal actors in the space of catchment and riverine management. Additional secretariat and convening support from the PCC, SALGA or SACN could help advance the work that is already underway and would provide a space for learning and co-production across multiple stakeholders who are already active in the space of riverine management.

5.3.4 *Ensure that the implementation of the CoP aligns with principles of inclusivity and learning*

It is critical for a CoP to be inclusive, not only in terms of being open to all interested participants, but also in terms of the mechanisms by which it operates. This could, for example, include participatory learning processes, providing logistical support to make it easier for all to participate, and avoiding the use of complex concepts and jargon that could exclude many from engaging effectively. The CRDP approach used in this project could provide useful guidance on how to practically advance such principles and enable systemic, holistic understandings of climate-related risks, and responses that integrate multiple people, perspectives and types of evidence.

5.3.5 *Convene relevant conversations to agree on 'next steps' for the CoP*

Given the number of existing actors and initiatives in this space, it will be critical to convene a conversation to decide on how best to proceed with a CoP. A conversation between the PCC, SALGA and the Adaptation Network could provide a good starting point for understanding where the current gaps are within existing processes and then considering how best to address these. This might, for example, take the form of providing financial resources to support an existing community of practice (such as the Adaptation Network) or convening an annual event (see 5.3.1) that could help connect different actors and processes within the climate adaptation field. The conversation would need to agree on important next steps and roles and responsibilities of the participating institutions.

6. CONCLUDING COMMENTS

The messages emerging through this project resonate strongly with those articulated in a recent paper synthesising the best practices and lessons learned on implementing capacity building to enable transformative climate action. The four issues highlighted were: the importance of enabling agency while also navigating power dynamics across stakeholders; making space for different forms of knowledge in capacity building; incorporating mechanisms that facilitate learning, collaboration and systems thinking; and going beyond the more traditional and technical framings to build capacity for creative visioning and mobilising action[21]. The current project has demonstrated how some of these ideas and learning modalities can be translated into practical learning spaces. It has also highlighted some of the challenges and limitations of such approaches. It is hoped that this experience provides a starting point for others to develop these ideas and practices further, to strengthen learning and equip stakeholders with the capacities needed for transformative climate action. What is clear is that people working in the climate resilience space - which is often not their core area of expertise or primary mandate but rather an extension of their work in water service provision, road, and drainage infrastructure, informal settlement upgrading, biodiversity management, waste management, disaster management or alike - really value the opportunity to come together, share insights, difficulties, and ideas for how to do things differently and better. People find learning with diverse peers really valuable in supporting and enriching their own work and reciprocating by providing feedback and support to others. This is something that needs to be encouraged, facilitated, and invested in further.

7. REFERENCES

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[21] Nautiyal (2023)

8. ANNEXURES

8.1 Complementary processes that could add value to a Community of Practice

Name of process/ organisation	**Description**
Central KwaZulu-Natal Climate Change Compact[22]	A regional hub to connect actors and networks engaging in collaborative climate change adaptation action. The Compact is a partnership between Durban and its surrounding local and district municipalities. It provides an opportunity to share learnings and facilitate more aligned and coordinated climate change action.
Institute for Strategic Studies (ISS)	ISS works with partners to build knowledge and skills that enable sustainable peace, development and prosperity in Africa. Established in 1991, the ISS is Africa's leading multidisciplinary human security organisation, with a unique operational model that combines research, policy analysis, technical assistance and training. The ISS has also developed a powerful forecasting capability to identify future risks and opportunities in fields as diverse as development, industrialisation, demographics, technology and climate change.
South African National Biodiversity Institute (SANBI) Research Network	The Research Network supports Eco-system Based Adaptation (EBA) and Nature Based Solutions (NBS).
UNICEF	UNICEF are developing a Young Reporters for the Environment network (YRE). They are exploring opportunities to mobilise any supportive community of practice they are able to nourish and expand such programmes. UNICEF are also pilot testing a 'Learn as you Earn' and 'work for the common good' programme. Young people who would like to work for the common good, especially from a climate change perspective, can undertake courses and be reimbursed for positive actions that they may take for the benefit of the environment and sustainability. This project is being pilot tested in South Africa with 1200 young people before possibly being taken to scale in other parts of the world.
The United Nations University Regional Centres of Expertise (RCE) Network	GroundTruth is a founder member of the global RCE network. Working with the two other South African RCE's, namely Gauteng RCE and Makana RCE in the Eastern Cape, a further, widening community of practice around climate change education is also available in terms of climate change learning.

[22] https://www.csag.uct.ac.za/wp-content/uploads/2021/05/LIRA2030_Durban-background-paper_June-2019.pdf