Putting Climate Resilient Development Pathways Into Practice

Capacity Assessment Framework

1. Introduction

Climate impacts are causing extensive losses and costly damages across many parts of South Africa. Emerging and future projected changes in climate patterns, together with persistent widespread inequality and underinvestment in infrastructure, are threatening to increase these risks considerably. It is becoming increasingly apparent that various interrelated dimensions of climate risks need to be understood to plan, sequence and enact effective climate action, and that measures to address climate impacts should be co-designed jointly with affected communities, as well as with influential – and sometimes reticent – public and private actors.

The climate resilient development (CRD) pathways approach presents a useful framework for driving coordinated climate planning and action in South Africa by integrating climate adaptation and mitigation interventions into the country's development agenda across scales. The CRD pathways approach is a decision-making framework for navigating climate challenges in ways that account for uncertainty regarding future conditions while redressing the consequences of past development choices. It is rooted in pathways thinking, which helps to identify and navigate trajectories of sequenced actions that improve ecological health and human well-being (Eriksen et al., 2021a). It is a forward-looking, proactive approach that requires government, business and civic actors to negotiate and determine the appropriate balance of various actions and investments that are consistent with their local context, development circumstances and national goals, while aligning with international agreements. This entails competing values and priorities and thereby negotiating difficult trade-offs, while promoting possible synergies.

Such inclusive and iterative planning and action requires capacities at multiple levels, as well as empowering various actors to take climate action and to coordinate and collaborate across levels. Due to the multi-dimensional nature of the CRD pathways approach, diverse and competing aspirations need to be considered, addressing root causes of climate vulnerability, and centring equity and justice, while remaining flexible to account for the dynamism of coupled socio-ecological systems (Werners et al., 2021). This is a big ask. It demands weaving together various practices, actors, and institutional arrangements (including financing) that relate to social, environmental and economic development while considering climate change. To operationalise the CRD pathways approach, relevant capacities need to be strengthened to work beyond 'silos' and hierarchies, to understand systemic risks, to leverage synergies and to mediate trade-offs along development pathways.

Capacity to support a CRD pathways approach is understood to be more than only the capacities of individuals. The capacities of organisational units, whole organisations and systems of organisations

to exercise the capacities required for collective planning, sequencing, enacting and learning towards long-term climate action and resilience. This framework presents a characterisation of capacities needed to enable a CRD pathways approach to take root and be sustained in South Africa, and suggests methods for assessing these capacities. The suggested framework is based on a review of: i) international and South African academic literature on resilience, mitigation, adaptation and pathways (with a focus on capacities); ii) capacity strengthening tools - particularly the Climate Capacity Diagnosis & Development (CaDD) tool; and iii) the current landscape of climate-related capacity development in South Africa.

2. A capacities framework for CRD pathways

2.1. Capacity clusters

Key capacities needed to enact a CRD pathways approach were identified from a review of relevant literature. These capacities are consolidated into eight capacity clusters summarised below in Table 1. Some of the capacities that have been identified as important for CRD Pathways planning can be considered generic capacities (i.e. needed for development in general, not only climate compatible development), some relate to dealing with climate change as a complex, cross-scalar and multidimensional problem, while some new capacities were identified to specifically support engaging with the novel aspects of CRD Pathways. Table 1 presents these capacities and relevant clusters, positioned relative to the literature, and suggests where these capacities might be found or most needed. The "type" of capacity is also noted using the following icons: * = generic; ** = climate change specific; *** = pathways specific.

Table 1. Characterising CRD Pathways capacities

Capacity cluster	Capacities	Sources	Distribution of capacities
Awareness of decisions and actions that may be impacted by or impact on climate change **	● Understanding how climate-related problems and opportunities affect organisations and operations ● Collective awareness of climate-related problems	From Capacity Diagnosis & Development (CaDD) framework, which is based on evidence from practical applications with over 2000 organisations	Organisations championing climate action (e.g. PCC, CSIR, DEFF, WWF, etc.), have high levels of this awareness, but every actor needs an awareness of how decisions & actions they are taking or are influenced by links to climate change if they are to support or make adaptive and mitigative interventions and alternative development options.
Leadership *	● Orchestrating between multiple, diverse actors ● Nurturing innovation and change ● Promoting collective responsibility ● Advocating and resourcing action ● Negotiating trade-offs ● Challenging assumptions and routines	Gupta et al., 2010; McNicol, 2021; Sellberg et al., 2018	Leadership should be distributed across various political, scientific, civic, religious, business, cultural and administrative organisations and social groups relevant to the CRD pathway. Special attention needed to build leadership capacity within historically marginalised groups. Governments often have the

Capacity cluster	Capacities	Sources	Distribution of capacities
	● Exercising transparency and accountability		power to mobilise capacities and resources into action.
Working across levels, sectors, disciplines, organisations & teams **	● Communicating and collaborating across knowledge and spatial boundaries ● Relational expertise to build trust and respect ● Understanding and empathy motives of various actors ● Facilitating engagement between different actors and knowledge holders ● Surfacing conflicts and working with these	Butler et al., 2016; Cockburn et al., 2020; Engle, 2011; Glaas et al., 2010; Gupta et al., 2010; McNicol, 2021; Moser, Coffee & Seville, 2017; Pelling et al., 2008; Schauppenlehner-Kloyber & Penker, 2015; Schuttenberg & Guth, 2015; Weber & Khademian, 2008	This capacity can exist in various forms, spread across structures and communication processes or driven strongly by an intermediary body (e.g. PCC, COGTA, SALGA). Actors can take responsibility for realising this capacity to varying degrees, strongly linked with leadership.
Fostering a learning culture ***	● Facilitating joint reflection ● Adaptive management ● Reframing problems as necessary ● Challenging assumptions ● Iterative action and reflection processes ● Ensuring that delivery experience has feedback loops to strategic direction, and that strategic direction has feedback loops to delivery experience	Butler et al., 2016; Engle, 2011; Eriksen et al., 2021; Fünfgeld, Lonsdale & Bosomworth, 2018; Glaas et al., 2010; Gupta et al., 2010; McNicol, 2021; Moser, Coffee & Seville, 2017; Pahl-Wostl, 2009, Pelling et al., 2008; Schauppenlehner-Kloyber & Penker, 2015; Schuttenberg & Guth, 2015; Weber & Khademian, 2008	Leaders (e.g. Directors, CEOs, Managers, Premiers, Mayors) often have the power to promote a learning culture (i.e. establishing structures and processes that enable reflection, adaptive management etc.). This type of capacity can become more distributed over time as actors “learn how to learn”.
Costing & resourcing development & risk management interventions *	● Costing options and potential (avoided) losses ● Mobilising and allocating resources and tracking expenditure	Engle, 2011; Gupta et al., 2010; Moser, Coffee & Seville, 2017; Weber & Khademian, 2008	Actor groups that are involved in designing activities along a CRD pathway require capacity to cost and resource options.
Designing, acting & maintaining climate risk management interventions **	● Strategic planning and decision making ● Acting according to plan ● Maintenance and adjustment of interventions	Fünfgeld, Lonsdale & Bosomworth, 2018; McNicol, 2021; Schuttenberg & Guth, 2015	Actor groups that take action along the CRD pathway require capacity to design, act and maintain interventions. This capacity is strongly linked to capacities to “cost and resource” and “technical expertise”
Technical expertise in assessing climate-related risks & opportunities **	● Monitoring risk indicators ● Analysing diverse sources of data and information about risks and opportunities ● Identifying impacts, evaluating trade-offs and synergies, identifying thresholds. ● Monitoring information to understand changes in the	Moser, Coffee & Seville, 2017; Fünfgeld, Lonsdale & Bosomworth, 2018	Technical expertise can be “housed” or facilitated by a particular set of actors who participate in the CRD Pathways process (e.g. research organisations like universities, CSIR, Sustainable Energy Africa). Technical expertise will be underpinned by a wide range of evidence and data, including scientific climate change

Capacity cluster	Capacities	Sources	Distribution of capacities
	system		information.
Promoting justice and equity ***	● Fostering inclusion ● Deconstructing inequalities ● Fairly assessing and (re)distributing costs and benefits ● Supporting distributive and transformative justice (agency)	Engle, 2011; Eriksen et al., 2021; Gupta et al., 2010; Moser, Coffee & Seville, 2017; Pahl-Wostl, 2009; Schuttenberg & Guth, 2015; Weber & Khademian, 2008	Decision shapers and takers often have the power to implement processes and structures for inclusion, and to support distributive and transformative justice (e.g. businesses, government bodies). It is, however, important for all actors to understand and exercise justice and equity in everyday practices.
Managing uncertainties **	● Retaining flexibility and responsiveness in the face of standardisation & reliability ● Detecting signs of change and switching options / measures / practices ● Allowing for and encouraging some redundancies	Gupta et al., 2010; McNicol, 2021	This capacity links strongly to learning capacities. Decision shapers and takers have the power to mobilise capacities for managing uncertainty (e.g. Executive Management Teams, Strategic Policy Units, Portfolio Committees). Like “fostering a learning culture”, this type of capacity will likely become more distributed over time

2.2. Assessing and strengthening capacities

This section provides guidance for assessing the capacities presented above to support CRD pathways planning. The guidance builds on evidence related to methods for assessing and strengthening adaptive capacities, as well as capacities for building resilience and mitigating climate change, identified in the literature. Critiques of efforts to apply generalised capacity assessment models were deeply considered during the development of this guidance, particularly those related to data quality to assess dimensions of capacities, standardisation and weighting of indicators, understanding capacity influences at various scales, causality of capacity and/or capacity gaps and the unclear nature of assumptions associated with indicators and capacities (Parks, 2012; Sullivan et al., 2006, Lindholm et al., 2007, Chenoweth, 2008; Engle, 2011). With these critiques in mind, a simple and flexible approach is proposed to assess capacities, which should be adapted to suit the context in which it is implemented. Importantly, the guidance cannot be objectively applied, and information that is generated relevant to the various capacities must be interpreted in relation to the specific context with the set of actors that will be engaged. The guidance is less concerned with generating accurate and specific measures of capacities, and more with supporting a reflective and informative exercise that helps actors relevant to the CRD pathway(s) consider capacity strengths, gaps and priorities. Such participatory processes are in themselves capacity strengthening activities: by better understanding and facing challenges associated with mobilising or strengthening capacities for CRD Pathways planning, actors can take actions to overcome these, especially if they can support and hold each other to mutual account in doing so.

Table 2 presents indicators for the capacity clusters based on the various capacities within these clusters (identified during the literature review) and tools that have been developed to assess associated capacities. The table includes a total of nine capacity clusters and 27 indicators. The numbers of indicators differ across capacity clusters as a result of their various dimensions. The table also includes prompts/questions that are helpful for reflecting on the indicators of capacities. By considering the indicators and reflecting on these questions/prompts, actors can consider the extent to which various capacities are/should be distributed across individuals, organisations and relationships to support CRD pathways. While capacity resides in individuals within organisations and in organisational units (based on their structures, processes and working culture), some aspects of capacity to act on and learn about acting on climate change develop in the relationships and collective action between (often diverse) individuals and organisational units. This requires not only focussing on assessing and strengthening individual capacities, but also growing distributed capacities within the social 'ecosystem' or network of organisations as well.

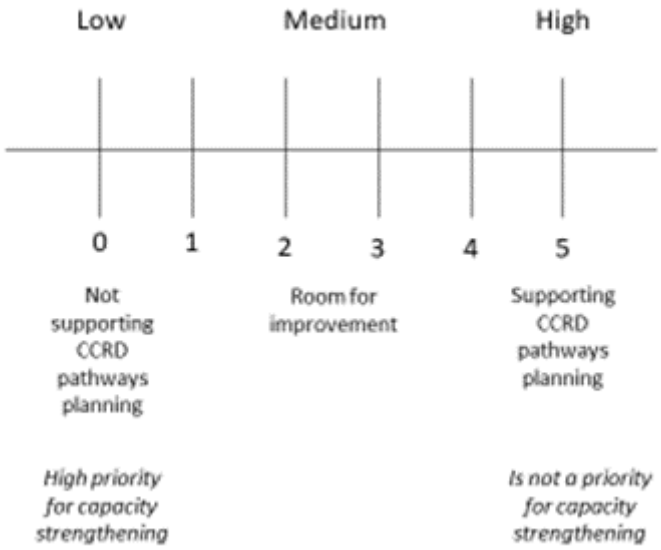
Capacity cluster	Indicators	Prompts/questions
Awareness	Institutional awareness	Do actors have a common understanding of how climate-related problems are likely to impact their institution/sector?
	Individual awareness of climate-related problems	Are actors aware of climate-related problems and how they pertain to their work / life / areas of influence?
Leadership	Effective delegation	Do actors understand their roles? Are tasks effectively distributed between actors or sectors?
	Shared ownership of the problem	Do leaders encourage actors towards collective action? Is there a sense of collective responsibility?
	Innovation and agency (e.g. champions)	Are actors encouraged to innovate and are they granted agency? Do champions exist across organisations (who are these)?
	Transparency and accountability	Is information on decision-making readily available? Are systems in place to hold people accountable?
Working across levels, sectors, disciplines, organisations & teams	Systems and processes for collaboration (e.g. intermediaries)	Is collaboration within and between other institution(s)/sector(s) common practice? Is the institution making use of knowledge brokers (or other intermediary mechanisms) to bridge gaps?
	Transdisciplinarity, co-production and plural knowledge types	Are multiple frames/opinions/definitions of the problem considered? (whose?) Are both scientific and local perspectives included? Is knowledge co-creation occuring?
	Empathy, respect and trust	Do actors respect and trust one another? Do actors understand the motives, outlooks and guiding principles of others?
	Effective communication channels	Are there channels/systems in place for communication across levels, sectors, disciplines etc? Are knowledge brokers utilised to bridge communication gaps between different levels (government levels, sectors, various organisation, disciplines etc.)?
	Evaluating trade-offs and synergies between	Is information available to understand the trade-offs and synergies between various response options?

Capacity cluster	Indicators	Prompts/questions
	options[1]	Are development options being compared to understand these trade-offs and synergies?
Fostering a learning culture	Adaptive management	Are there systems in place to monitor successes and challenges of interventions, detect signals of changing conditions, and to integrate these back into the design of activities?
	Evaluation, reflection and reframing of problems	Are there mechanisms in place for systematic monitoring, evaluation and collective as well as individual reflection on what is working and what is not working? Are opportunities intentionally created for reframing problems?
	Reflexivity and interrogating underlying assumptions	Are there opportunities for interrogating assumptions about the drivers of problems and potential outcomes of development options?
Costing & resourcing development & risk management interventions	Developing budgets and mobilising finances	Are financial implications (i.e. capital, operating and maintenance costs) for a given intervention adequately considered? Is there (co)financing available? Can the organisation/group access additional finances if necessary? Have opportunity costs (i.e. (the foregone alternative use of that money) and non-economic costs been considered ? Have the economic costs of not putting in place an intervention been considered (e.g. adaptation option)?
	Deploying human resources and developing expertise	Does the organisation have the human labour and the expertise to support an intervention? Does the organisation understand what expertise is needed for a given intervention?
	Directing resources away from fossil fuel	Is there active effort at directing resources away from fossil fuels towards more sustainable options?
Designing, acting & maintaining climate risk management interventions	Strategic planning and decision making	Do actors have the expertise and knowledge to develop strategic plans and make decisions consistent with strategy? Are plans fair/equitable and can they occur over multiple time horizons?
	Acting according to plan	Are organisations acting according to plan? Are successes and challenges considered based on monitoring and evaluation? Is the organisation actively addressing any challenges?
	Maintenance	Does the organisation have the ability to maintain a continued response over time (including maintaining resources, infrastructure and practices)?
Technical expertise in assessing climate-related risks & opportunities	Analysing current and future climate risks	Does the organisation understand climate variability and change, and how this might impact them? Does the organisation have access to scientific information? Does the organisation use climate information to understand current and future risks?
	Monitoring risk and updating plans	Are risks being continuously monitored? Are there processes/mechanisms for the organisation to understand how biophysical, socio-economic and political risks are changing in their environment? Are risk changes incorporated into plans and decision making?

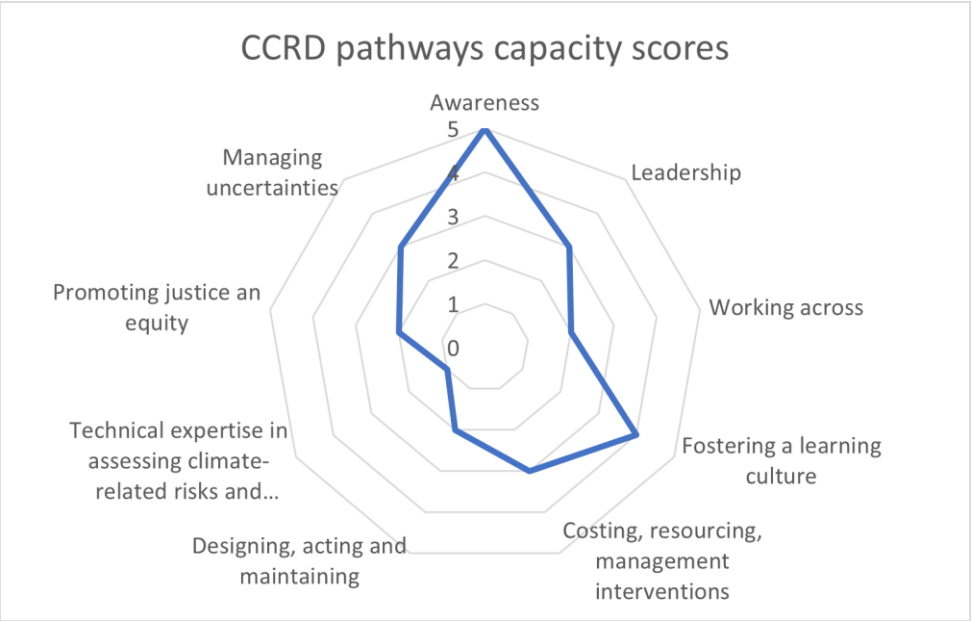
[1] Technical expertise plays a big role in understanding various trade-offs and synergies into the future.

Capacity cluster	Indicators	Prompts/questions
Promoting justice and equity	Recognitional justice	Is there acknowledgment of structural inequalities within and across organisations? Are there active plans to address these structural inequalities? Do all actors have the space, resources and agency to articulate and unsettle structural inequalities?
	Distributive justice	Are the costs, responsibilities, harms and benefits of development options fairly distributed?
	Procedural justice	Are procedures fair? Are decision making processes truly inclusive and transparent?
Managing uncertainties	Flexibility and adaptability	Does the organisation support adaptability and change of plans based on new information and changing circumstances? Does the organisation have the ability to improvise in the face of future uncertainty?
	Redundancy	Are there alternative / back-up systems enabling some continuity of service provision when primary systems are damaged (e.g. alternative route to hospital if bridge on main route is flooded)? Is there excess capacity to enable the maintenance of core functionality in the event of disturbances? Does the organisation have multiple plans or action paths in order to achieve success in an intervention?

While the flexibility and subjectivity of the framework must be appreciated, consistency and comparability (across context or over time) can be introduced by representing findings using simple scales for each capacity cluster and a radar chart to represent overall CRD Pathways planning capacity (see Figure 1 and 2 below). The simple scoring scale is adapted from Brown et al. (2010) who developed a "low cost, repeatable self-assessment process" for assessing adaptive capacity (pg. 562). Importantly, lower scores do not indicate a lack of capacity within a context or across a group of stakeholders, but that these capacities are not currently supporting CRD Pathways planning.



Adapted from Brown et al. (2010)[2]



Two approaches are suggested below to assess capacities, both of which are rooted in *subjective* scoring of capacity clusters based on dialogue and research of the capacity indicators presented in Table 2. Participatory assessments are useful to reveal structures, relationships and processes that contribute to (or hinder) capacities associated with CRD pathways planning. Such participatory approaches can enable a variety of actors (including community members) to collectively assess these systems dimensions (Butler et al., 2016). The approaches can be tweaked or combined to suit the context and/or assessment need. Importantly, the extent of the capacity assessment needs to be defined/bound at the beginning of the assessment (e.g. CRD capacity is assessed for a location, group of actors and/or sectors). Both approaches include at least two participatory engagements to: i) agree on the validity of capacities and indicators in the context (at the beginning); and ii) explore the results of the assessment (at the end).

Desktop and self-assessment

This approach can be used to undertake a (mostly) desktop-based assessment to get a sense of capacities. Alternatively, it can be in-depth, including interviews with actors, which are useful for comparative analyses. This approach can be undertaken by researchers/consultants and validated by a group of actors within the CRD pathways landscape. The suggested steps associated with this approach are described below.

1. Host a meeting (or series of meetings) with a set of actors relevant to the CRD pathway to introduce the capacities framework and consider the various capacities in the context of the assessment. Reflect on the following questions during these meetings: are all of the capacities described in the framework relevant to the context/actors being assessed? Are the indicators relevant? Should some of the indicators be removed or added?

[2] Brown, P. R., Nelson, R., Jacobs, B., Kokic, P., Tracey, J., Ahmed, M., & DeVoil, P. (2010). Enabling natural resource managers to self-assess their adaptive capacity. Agricultural Systems, 103(8), 562–568. https://doi.org/10.1016/j.agsy.2010.06.004

2. Gather policy documents, reports, plans and other grey literature relevant to the context and/or actors as information sources.
3. *Optional: undertake interviews with key informants using a questionnaire that is designed to explore the relevant capacities through the agreed upon indicators*.
4. Assess documents (and interviews) through the lens of the capacity clusters. Consider the questions/prompts associated with each of the indicators to create a narrative overview of the capacity distribution/strengths/needs in the context.
5. Use the narrative overview to suggest capacity scores and a radar chart of CRD capacities.
6. Host a meeting (or series of meetings) with relevant actors to share the findings from the desktop assessment, proposed scales and radar chart. Evidence should be provided to substantiate the capacity scores. These scores and the radar chart should then be validated with actors, and the following questions explored: i) what is the state of various capacities: which are low and which are strong? ii) What is standing in the way of low capacities? iii) What are the highest priority actions for strengthening capacities? Who has the power to mobilise capacities? Who needs to do what? By when?
7. Prepare a capacity strengthening priorities report and build an accountability structure around seeing through and monitoring progress on actions. This may require embedding the capacity strengthening plan in a suitable oversight committee.

Participatory self-assessment

Participatory self-assessment approaches can be low-cost and quick compared with in-depth surveys (Brown et al., 2010). Participatory approaches can be useful for establishing a shared understanding of CRD Pathways, to build trust across different actors, and to understand development concerns. The steps that are suggested below can be implemented over a single- or multi-day workshop, which can be facilitated by a researcher or consultant (i.e. a trusted outsider), or someone internal to the organisation if those skills are in-house (i.e. a trusted insider). Ideally, the state of capacities would be explored deeply on one day, and priorities/options for strengthening capacities explored on a second day. The suggested steps associated with this approach are described below.

1. Introduce and explore the concept of capacities associated with CRD pathways planning.
2. Collectively consider the various capacities in the context of the assessment. Key questions that guide this step are as follows: are all of the capacities described in the framework relevant to the context/actors being assessed? Are the indicators relevant? Should some of the indicators be removed or added?
3. Host focused discussions (e.g. breakout groups) to explore and score the various capacities. Groups can use the questions and prompts presented in Table 2 to explore these capacities, and evidence should be provided/suggested to support the responses/scores.
4. Gather outputs from focused discussions to generate a radar chart of capacities.
5. Explore the radar chart in plenary (with option to explore in more depth in breakout groups again) using the following question: i) what is the state of various capacities: which are low and which are strong? ii) What is standing in the way of low capacities? iii) What are the highest priority actions for strengthening capacities? Who has the power to mobilise capacities? Who needs to do what?

6. Document the results and the commitments to next steps in terms of highest priority actions to be taken, by whom, by when, with what resources, to strengthen capacities. Ensure these commitments are embedded in the necessary team plans, budgets and performance management tools.

Tailoring an existing climate-related capacity assessment tool

The two methods described above can be applied using a number of tools, from a custom-made Excel spreadsheet to a set of cards and posters to work more manually with groups of people. Each organisation or social group undertaking an assessment could develop or make use of what works for them. This enables for context specificity, but can make comparison between capacity assessments and the aggregation or meta-analysis of findings across multiple assessments difficult. In light of the CRD pathways approach requiring the distribution of capacities and orchestration of actions across many actors operating in different sectors and scales, the ability to aggregate capacity assessments and coordinate strengthening efforts could prove valuable, if not essential. This requires a systematic approach that enables some flexibility to account for contextual differences yet enough standardisation that the results can be readily drawn together to arrive at insights regarding the social system of organisations and actors. There is an existing tool - the Climate Capacity Diagnosis & Development (CaDD) tool - that holds promise for making this possible, without having to invest a lot of time, effort and resources in building something from scratch. Some modifications to the tool may be necessary, which the tool developers are open to doing collaboratively.

CaDD has been developed to provide organisations in the public, private and civil society sectors with a structured way of assessing and directing the strengthening of their collective capacity to manage climate risks and leverage climate opportunities in both the adaptation and mitigation domains. The tool is centred on a set of questions related to capacity metrics, which help to identify the strengths of the organisation, on which capacity development efforts can build, and the weaknesses that need to be addressed to prepare and respond adequately to changing climate conditions and imperatives. CaDD has and can also be used to assess and direct the capacity strengthening of a system of organisations, which offers scalability and relevance to national actors - such as the PCC and DFFE in the context of South Africa - who are responsible for orchestrating climate action to support the realisation of national commitments and policies across diverse sub-national contexts, and the connecting up and scaling out of local initiatives adapting to the climate and reducing GHG emissions.

The CaDD software tool can be used online and/or in-person through interviews, meetings and workshops to answer a series of questions relating to organisational capacities for addressing climate change. There are two levels at which the tool can be applied: ‘Explorer’ and ‘Deep Dive’. The CaDD Explorer provides a rapid diagnostic of response levels in a given organisation and network or system of organisations (i.e. the capacity review can be readily scaled out). The CaDD Deep Dive explores capacity levels of an organisation in-depth, identifying and prioritising activities to enhance the organisation's levels across nine capacity attributes. These nine capacity attributes map closely onto the capacity clusters outlined in section 2.1 that emerged from reviewing pathways, adaptive and mitigation capacities literature. Outcomes from the CaDD Deep Dive can inform the design, resourcing and implementation of tailored capacity development interventions.

The CaDD framework and software is structured around a 6 by 9 matrix: six levels at which an organisation is responding to climate challenges and opportunities (from core business focussed and stakeholder responsive through to strategic resilience and championing climate action) and nine measurable attributes of capacity. These are:

1. Awareness: of what climate change means to the organisation and its operations, policies, communications, etc.
2. Agency: to identify, prioritise and develop actions that reduce climate risks and leverage any opportunities or co-benefits.
3. Leadership: to relate the vision and mission of the organisation to a changing climate and inspire teams, employees, shareholders and partners to translate that into the actions required to implement changes.
4. Agents of Change: capacity to identify, empower and support a group or "ecosystem" of champions at different levels so that they can effect change.
5. Working Together: capacity to involve, respect the needs of, communicate with, learn from, and act in collaboration with partners and stakeholders.
6. Learning: capacity to institutionalise learning from experience to improve procedures, strategies and mission.
7. Managing Operations: embedding of operational practices and procedures to monitor and respond proactively to climate risks and opportunities.
8. Scope and Coherence: capacity to develop, implement and adapt projects within a strategic programme of action suited to the scope, mandate and skillset of the organisation, updated in the light of what is learned from experimentation and changing conditions.
9. Expertise and Evidence: capacity to gather relevant evidence and bring it to bear on decision making within the organisation based on accessing and deploying the necessary skills, understanding and technical expertise to translate climate considerations into strategic and operational decisions.

The response levels and capacity attributes have been developed, tested and evidenced with thousands of organisations spanning more than a decade of research and application. The CaDD tool is based on the premise that organisations require foundational capacities to function, as well as innovative capacities to tackle climate change, which again aligns closely with the insights gleaned from reviewing the climate-related capacities literature. Capacity to dismantle structures that reproduce inequality and injustice and thereby perpetuate differential climate vulnerability is not adequately accounted for in the current version of CaDD. This will need to inform the modification of the tool for assessing capacity and prioritising capacity strengthening initiatives in the South African context.

3. Capacity strengthening challenges

Several potential challenges exist when attempting to assess and/or strengthen capacity for CRD pathways planning, which should be considered when implementing capacity assessment processes (e.g. one of the approaches suggested above). These challenges are summarised below.

- Assessing capacities with the aim of strengthening these must include consideration of who has the power to mobilise/support capacities.

- Participatory and collaborative processes for assessing and strengthening capacities are fraught with power imbalances. Participatory processes can be susceptible to elite capture because participants need to invest time, labour and/or material resources, which are not readily available to marginalised and poor communities. Levels of confidence in articulating inputs in a particular language (e.g. English) also reinforces power imbalances. Dealing with imbalances in participatory processes might mean targeting efforts at dismantling inequalities that exist between groups of different class, ethnicity, socioeconomic status, language and education level (Cockburn et al., 2020).

- A conducive political environment for respect and inclusion of diverse perspectives, vision and goal-setting, negotiation, transparency, accountability, and learning to adapt presents opportunities for strengthening capacities. This potential can, however, be undermined by repeated shifts in leadership, occurrences of gross misconduct and broken promises (Eriksen et al., 2021b). This breaks the formation of trusting, collaborative and critically constructive relations between actors (Schuttenberg and Guth, 2015, Butler et al., 2016). In some cases, technical expertise and perspectives/experiences can also be side-lined in favour of political priorities.

- Making technical and/or complex concepts practical and applicable across contexts can be challenging. Experiences and perspectives of potential climate risks and opportunities can differ from one context, and a strong CRD pathways process truly engages with these various perspectives but this can be challenging and resource intensive. A unique combination of capacities might be required to deal with these context-specific risks, or capitalise on opportunities. As a result, a 'best practice' approach to developing capacities can be of limited effectiveness (Glaas et al., 2010).

- Carrying out multi-stakeholder and multi-level work can prove extremely slow and challenging due to the increased levels of complexity and diversity of opinions (Schauppenlehner-Kloyber and Penker, 2015). Challenges related to working across boundaries can stem from competition for resources, incentives to "own" or "disown" problems, issues falling between mandates of agencies, differences in political party affiliation etc. Terminologies and phrases can also mean different things to actors, or actors use alternative language to communicate the same concept e.g. "managing for change" instead of "adaptive management" (Sellberg et al., 2018; pg no.913). Actors frame problems differently, value outcomes differently, disagree over cause and effect relationships, and hold divergent priorities for interventions depending on their position and circumstances. Working through this dissensus often leads to times of frustration and despondency.

4. Capacity strengthening opportunities in South Africa

A review of training programmes and other relevant interventions was undertaken to gain insight into the current landscape of climate-related capacity development in South Africa. This review was not meant to be exhaustive (i.e. documenting all capacity development programmes and interventions in the country) but aimed to provide an overview of the landscape.

The review included close to 50 programmes that are/have been implemented in an attempt to strengthen capacity for navigating climate risks (see Annex 1). Many of the programmes that were identified (64%) are ongoing, while 29% have concluded. Fifty percent of programmes that were identified have been funded internationally, while 24% have been funded by local institutions. The remaining percentage (26%) of programmes were either funded through client payment/fees, or information on their funding models was not readily available. Programmes have been implemented to develop the capacity of stakeholders at various levels including at the national, provincial/district, city and university level (Figure 1). University-level programmes are mainly educational programmes that aim to increase awareness and develop skills and expertise to equip individuals (often youth) to guide climate action. National level programmes have generally aimed to increase the capacity of government or support national level outcomes such as "inspire youth-led climate action in South Africa".

A comparison of the capacity development programmes that have been/are being implemented in South Africa with those capacities that are required to support a CRD pathways approach reveals gaps in the current capacity investment landscape. Many programmes (26%) have aimed to strengthen human resources/expertise for climate-related decision making in the country (Figure 2). It must, however, be noted that few of these programmes have focused on developing capacities to better access climate finance, or to direct finances and investments away from fossil fuels, redistribute resources or develop cost-effective climate response options. Many programmes (20%) have focused on strengthening leadership for climate-related activities, particularly by focusing on youth and encouraging thought-leaders for the future. While some of the programmes have touched on capacities associated with learning and multi-level work (~12% for both), these aspects were not extensively covered in the programmes. For example, very few programmes have focused on supporting second and third loop learning. The climate-related capacity development landscape in South Africa seems to include very few programmes that focus on dealing with trade-offs and enabling synergies, supporting equity, strengthening technical expertise, as well as designing, acting and maintaining climate risk management interventions. Programmes did not focus on developing capacities for managing uncertainty into the future.

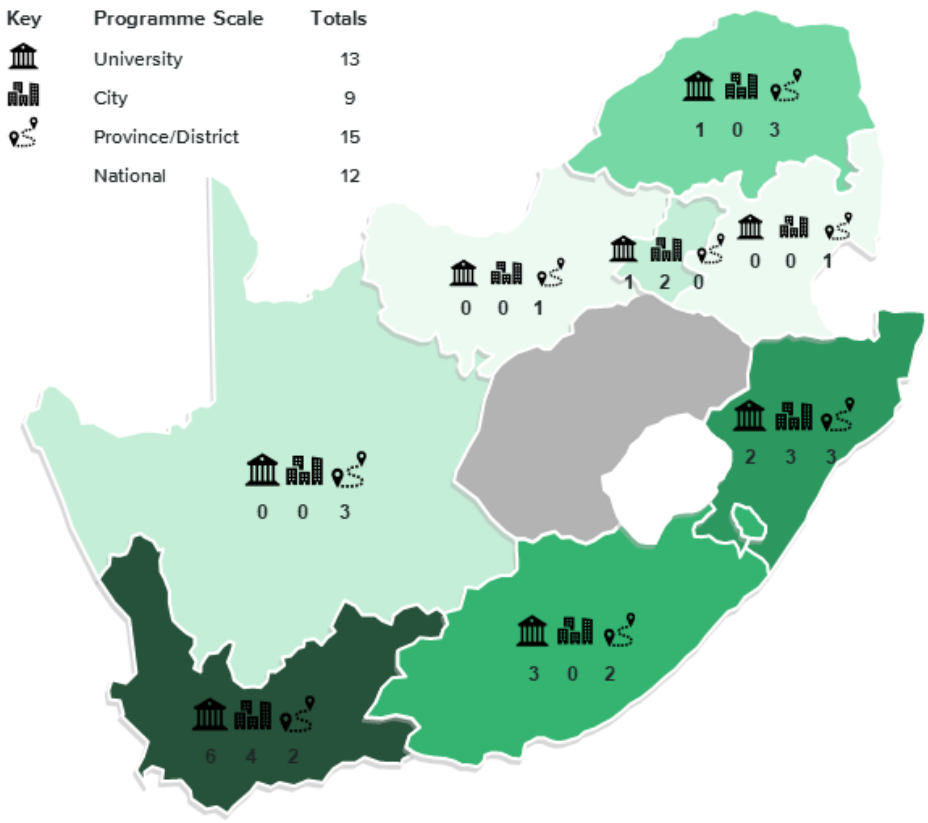


Figure 2: A representation of capacity building programmes by province and scale. Programe scales occurred at the provincial/district level, city level or university level.

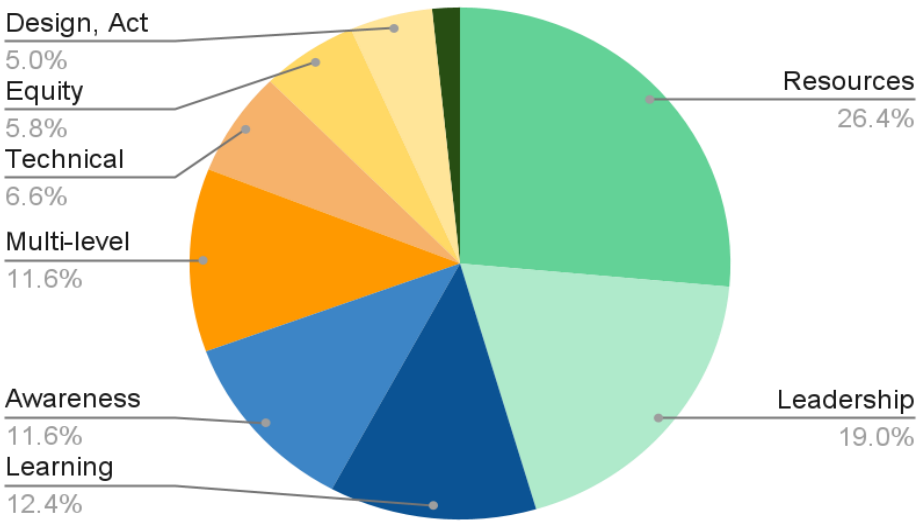


Figure 3: Distribution of the nine capacities within the identified capacity building programmes

5. Conclusion

The framework that is presented in this document was designed specifically to assess capacities associated with CRD pathways planning across stakeholder groups and networks of organisations in South Africa. A review of relevant literature and several capacity strengthening tools helped to identify nine capacity clusters that can support a CRD pathways approach, namely: i) awareness of decisions and actions that may be impacted by or impact on climate change; ii) leadership; iii) working across levels, sectors, disciplines, organisations and teams; iv) fostering a learning culture; v) costing and resourcing development and risk management interventions; vi) designing, acting and maintaining climate risk management interventions; vii) technical expertise in assessing climate-related risks and opportunities; viii) promoting justice and equity; and ix) managing uncertainty. Three approaches have been suggested for assessing these capacities, including a mix of desktop and participatory methods, which can be further tailored based on the contexts, needs of and resources available to actors. The approaches have been designed to be simple and adaptable, generating outcomes that can be compared to understand capacity patterns (e.g. distribution of capacities at one point in time and/or changes in capacities over time). The participatory nature of the proposed approaches supports strengthening CRD pathways capacities during application of the framework, and the outcomes will provide a well-informed point of departure for further capacity strengthening activities. The document includes information on the current landscape of climate-related capacity development in South Africa, which should be considered when investing in building CRD pathways capacities. Importantly, the framework should be implemented critically, with constant feedback, iteration and learning.

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Annex 1

Organisation	International/National Funding	Programme Name	Objectives	Relevant Capacities	Targeted To	Structure/Method	Past/Ongoing	Location
One World	N/A	N/A	One World provides consulting and training on a number of skills but majority of recent projects have focused on climate-smart financing	Resources	Multiple	Consulting Company	Ongoing	National
Department of Environmental Affairs	International	Capacity Building Programme to Implement South Africa's Climate National System	Relevant capacity building outputs included providing technical support and training on GHG inventory and mitigation action, established peer to peer exchange programmes, internationally and nationally, establishing relations between government and researchers, fast-tracking and training in adaptation monitoring and evaluating (enabling second loop learning), conducting 15 regional workshops and advising municipalities based on feedback (social learning), enhancing the ability to develop gender-responsive plans (equity). The project aimed to achieve transparency in processes (equity and leadership)	Equity, learning, multi-level work, leadership, resources, technical expertise	National Government, All levels of government	Multi-outcome-based project	Past	National
Multiple (See Link)	International	UKPact Multiple (See Link)	While numerous objectives and skills are likely to be achieved through this project some that relate to capacity building include providing training on technical expertise (for emerging green hydrogen market) and building skills and resources for the rollout of EVs the energy transition. Projects also aim to mobilise financing for a green economy and to involve community members in processes especially in coal-dependent municipalities	Resources, technical expertise, multi-level work, learning	Multiple levels of government and civil society	Multi-outcome-based project	Ongoing	Multiple (see link)
University of Venda, Fort Hare and Cape Town	International	South African / Flanders Climate Adaptation Research and Training Partnership (SAF-ADAPT)	SAF-ADAPT finances Masters, PhD and postdoctoral researchers and provides training workshops on climate resilience and aims to equip and upskill historically disadvantaged citizens. The programme promotes inter-university research partnerships and helps support adaptation practices across scale	Learning, equity, multi-level work, resources	Individuals, Civil Society	Educational Programme	Ongoing	University of Venda, Fort Hare and Cape Town
World Wide Fund, Institute of Economic Justice, South African Climate Action Network	Co-funded	Climate Ambition to Accountability Project (CAAP)	Strengthening connections within civil society community and developing youth climate champions through internships and other forms of training	Awareness, resources, leadership, multi-level work, equity	Youth, Civil Society	Multi-outcome-based project	Ongoing	Johannesburg, Cape Town
Department of Environment, Forestry and Fisheries	National	"Driving Force for Change" pilot youth support initiative	Financing youth led projects	Resources	Youth	Resourcing	Ongoing	National
SANBI	National	Capacity Development Programme	Providing workshops for teachers and education officials	Awareness	Youth	Educational Programme	N/A	National
USAid	International	Resilient Waters Program, Southern Africa Energy Program (SAEP), South Africa Low Emissions Development Program	Train relevant stakeholders on climate impacts assessment tools for water resources, develop early warning systems in Limpopo River Basin, improve access, integration and interpretation of climate related data and finance small-scale renewable energy projects	Resources, Technical expertise	Relevant individuals and communities	Multi-outcome-based project	Ongoing	National, Limpopo Basin
DEFF – in cooperation with CoGTA, SALGA and GIZ,	International	The Local Government Climate Change Support Programme in South Africa within the Vertical Integration and Learning for Low-Emission Development in Africa and Southeast Asia ICLEI	The LGCCSP improved capacities by providing a variety of municipal workshops and training on a range of topics including project designs and identifying financing opportunities, improving climate information, enabling horizontal and vertical dialogue, creating tools and guidelines for developing a climate response, providing time and resources for social learning to occur and creating an enabling work environment to allow for collaborative work	Resources, multi-level work, design plans, learning	Multiple levels of government	Multi-outcome-based project	Past	National

SANBI / South South North	International	Taking adaptation to the ground: A Small Grants Facility for enabling local level responses to climate change	Providing small grants to the two municipalities to assist in developing infrastructure and creating resilient livelihoods, increasing knowledge co-production and learning from the project outcomes.	Resources, learning	Local Communities	Multi-outcome-based project	Ongoing	Mopani District (Limpopo Province) and the Namakwa District (Northern Cape Province)
SANBI	International	Building Resilience in the Greater uMngeni Catchment	Develop early warning systems for local communities, climate-proof built infrastructure and develop guidelines and policy for climate proofing, empower officials and DAEA staff to mainstream CCA into development plans, invest in climate-smart farming, build the capacity of community champions to mainstream climate change, disseminate CC awareness material, partner with tertiary institutions to develop plans, exchange best practices and reflections during workshops and learning exchanges, develop policy recommendations on scaling adaptation plans	Technical expertise, resources, design plans, leadership, learning, awareness, multilevel work	Local Communities	Multi-outcome-based project	Ongoing	uMngeni Catchment (uMgungundlovu District Municipality (UMDM), KwaZulu Natal Province)
African Climate Development Initiative	National	ACDI Tailored Courses	N/A	N/A	Academia, government, the non-profit or private sector	Consulting Company	Ongoing	University of Cape Town
Climate Systems Analysis Group	National	CSAG Winter School	The courses provide information on a range of climate related topics such as the climate sciences, analysing and assessing risk, adaptation plan and policies etc.	Resources, Awareness	Individuals	Educational Programme	Ongoing	University of Cape Town
Southern African Regional Universities Association (SARUA)	International	SARUA Master's Curriculum Development and Capacity Building Project	SARUA aims to encourage thought leadership and provide capacity building support. The Masters curriculum covers a diversity of climate related topics in order to equip future practitioners, researchers and decision makers with necessary information. The curriculum emphasis transdisciplinarity, a systems approach, inclusivity and diversity.	Resources, leadership	Individuals	Educational Programme	Ongoing	Rhodes University
African Academy of Sciences' AESA and the Association of Commonwealth Universities (ACU)	International	Climate Impact Research Capacity and Leadership Enhancement (CIRCLE)	Developing skills and research in climate change	Resources	Individuals	Educational Programme	Ongoing	UNISA, UCT, University of Fort Hare
Future Climate For Africa	National	Fractal: Future Resilience For African Cities And Lands Future Climate	Objectives that relate to capacity building include opening communication channels to enable transdisciplinary work, ensuring inclusivity and knowledge co-production (social learning, peer to peer learning), skill building workshops and grants for knowledge sharing between cities, catalysing agency in Africa and understanding uncertainty	Multi-level work, equity, learning, resources, managing uncertainty	Urban citizens	Multi-outcome-based project	Past	Cape Town, Durban, and Johannesburg
DEFF	International	Climate Support Programme (CSP)	Developing and implementing national policy	Design and implement	National Government	Multi-outcome-based project	Past	National
partnership between FSD Africa, the University of Cambridge Institute for Sustainability Leadership (CISL), the Eastern & Southern African Management Institute (ESAMI) and the International Institute for Environment and Development (IIED).	N/A	Africa Climate Finance Leadership Programme	Expanding knowledge base of leaders, unlock international climate funds (i.e. Green Climate Fund), develop skills for innovation	Leadership (innovation), resources	Individuals ("leaders")	Educational Programme	Past	sub-Saharan Africa

African Group of Negotiators Expert Support (AGNES)	N/A	Climate Governance, Diplomacy And Negotiations Leadership Program	The course aims to improve the knowledge base of climate leaders so that they can actively and effectively engage in international CC discourse and pave the way for successful implementation of climate action	Leadership, resources	Individuals (relevant policy and decision makers, scientists, diplomates or members of civil society)	Educational Programme	Ongoing	Africa
South African Institute of International Affairs (SAIIA)	National	South African Youth Climate Action Plan (YCAP)	YCAP hopes inspire action among the youth and consolidate their ideas into policy recommendations and implementation plans. The projects aims to develop a new generation of leaders	Awareness, Leadership	Youth	Collaborative Project	Ongoing	National
DAAD	International	DAAD climapAfrica programme	Funding research that increases climate capacity building and equipping individuals with skills training. Enables international collaboration between postdoctoral fellows.	Resources, multi-level work	Individuals	Educational Programme	Ongoing	Africa
DEFF/DALRRD	International	Climate-Smart Agriculture Training of Public Extension Practitioners in South Africa	Train 100 extension practitioners from three provinces: Eastern Cape, Limpopo and North West provinces.	Resources (expertise)	Farmers	Educational Programme	(Potentially) ongoing	Eastern Cape, Limpopo and North West provinces
Western Cape Government	National	110% green	Webinars dispensing climate information to public and workshops on topics around water and energy	Learning, awareness	Civil society	Educational Programme	Ongoing	Western Cape
Sustainable Energy Africa	National	V-LED Training on Local Climate Action in South Africa	The project aims to develop the skills of government officials to enable climate plans to be implemented in municipalities	Learning, resources, design and implement	Provincial and municipal officials	Educational Programme	Past	National
SANCOR	International	Climate Change Training Programme	Training on strengthening institutions and developing capacity in the country	Learning, Resources (expertise)	Relevant qualified personal	Educational Programme	Past	Africa
Department or Rural Development and Land Reform's (DRDLR)	National	Climate Change Adaptation Training Programme	Providing training on a number of climate change topics such as CC information, vulnerability assessments, CCA responses, monitoring and evaluating and integrating CC into plans	Learning, Resources (expertise)	Development Practitioners	Educational Programme	Ongoing	National
Future Leaders of Change	International	Climate Change Warriors Project	Educational and awareness programmes, CCA training (on sustainable agriculture) in local communities, creating information flows between communities and experts	Awareness, Learning, Resources (expertise), multi-level work	Local communities, youth	Educational Programme, collaborative project	Past	Durban
South African Youth Change Climate Coalition (SAYCCC)	N/A	South African Youth Change Climate Coalition (SAYCCC)	SAYCC aims to increase awareness, advocacy and participation of young people in climate change spaces	Awareness	Youth	Educational Programme	Ongoing	Durban
IAIA	International	Call for training proposal	While the IAIA is calling for proposals for climate related training it is unclear what capacities will be increased. But this is potential for increasing learning and expertise around climate plans and action	Resources	N/A	Educational Programme	Ongoing	Cape Town
Climate and Development Knowledge Network (CDKN)	International	Mitigation Action Plans and Scenarios (MAPS) Programme	Training on climate science and designing and facilitating collaborative projects	Multi-level work, resources	Relevant Professionals	Educational Programme	Past	Africa
GreenCape and FNF South Africa	International	Active Climate Change Citizenship for a Just Transition in South Africa	The project aims to encourage active citizens, specifically among the youth, to advocate and communicate with the government their climate needs	Awareness, Leadership	Youth,community	Collaborative Project	Ongoing	Eastern, Western and Northern Cape
Climate Change, Agriculture and Food Security	International	Capacity Building Training For Media Representatives: Using Foresight For Reporting The Impacts Of Climate Change On Agriculture In Africa	The training aims to build the network of relevant media representatives, cultivate leadership in individuals undergoing training, raise community awareness on science based insights on CC through accessible formats and guide story development	Resources, awareness, leadership	Relevant Professionals	Educational Programme	Past	Africa

African Development Bank	International	GCF Training	The programme provides training to accessing GCF funds and training experts to support their government or institution. The programme facilitates collaboration in Africa	Resources	Relevant Professionals	Educational Programme	Ongoing	Africa
WWF	National	Climate Smart Smallholder Farming	Providing training on climate-smart farming and developing collective stewardship initiatives	Resources, multi-level work	Farmers and other relevant professionals	Educational Programme, collaborative project	Ongoing	Mopani District of Limpopo
African Climate Alliance	N/A	African Climate Alliance	Running many programmes that build the capacity of young people through training, exposure, and experience on relevant topics. Advocating for climate justice, encouraging participation and develop individual agency. Workshops and dialogues to increase climate literacy.	Leadership, awareness, equity	Youth	Educational Programme, collaborative project	Ongoing	N/A
South African Risk and Vulnerability Atlas	N/A	South African Risk and Vulnerability Atlas	Providing training on workshop on assessing climate risk	Technical expertise	Relevant Individuals	Educational Programme	Ongoing	National
Capacity for Disaster Reduction Initiative (CADRI)	International	Climate Risk Informed Decision Analysis (CRIDA)	Provide training of risk analysis and addressing an uncertain future	Technical expertise, managing uncertainty	Relevant Professionals	Educational Programme	Past	Stellenbosch University
ICIWaRM	National	ICIWARM				Educational Programme	Past	Kruger National Park
UNESCO	International	Addressing climate risk and building adaptive capacity in South Africa's Biosphere Reserves (linked to CRIDA)	Developing early warning capacity and indicators for changing climate and increase capacity of stakeholders, including increasing access and use of innovative technology. Takes into account the gendered nature of the climate crisis	Equity, technical expertise, resources	Civil Society, community, relevant professional	Multi-outcome-based project	Ongoing	Vhembe District (Limpopo), Kruger to Canyons (Mpumalanga/Limpopo), Marico (North West), Cape Winelands (Western Cape), Gouritz Cluster (Western Cape)
Witwatersrand University	N/A	Global Change Institute	Programmes include training students on climate research and enabling social learning	Resources, learning	Civil Society	Educational Programme	Ongoing	Witwatersrand University
University of KwaZulu-Natal	N/A	STEC@UKZN	Programme aiming to raise awareness on climate risks, to school children	Awareness	Youth	Educational Programme	Past	University of KwaZulu-Natal
CSIR	International	The Climate Technology Centre And Network (CTCN)	Providing technical support and providing advice on climate technologies and facilitating research. Includes tailored training and capacity building	Technical expertise, resources	Relevant professionals	Educational Programme, Consulting	Ongoing	Africa
UN Habitat	International	Central KwaZulu-Natal Climate Change Compact (Compact KZN)	Enabling multi-level governance. Fostering vertical and horizontal collaboration and communication	Multi-level work, learning	Government officials	Collaborative Project	Ongoing	KwaZulu-Natal
University of KwaZulu-Natal (UKZN) and eThekwini Municipality (EM).	National	Durban Research Action Partnership (D'RAP)	The project forms a trans-disciplinary research partnership and guides implementation of local policy	Multi-level work, design and implement	Relevant professionals	Collaborative Project	Ongoing	University of KwaZulu-Natal (UKZN) and eThekwini Municipality (EM).
90by2030	N/A	N/A	Working with stakeholders to guide decision making towards climate justice, developing youth climate leadership, increasing access to information, enabling public participation	Leadership, awareness, design and implement (strategic decision making), equity	Youth, civil society	Consulting Company, Educational Programme	Ongoing	Cape Town

SouthSouthNorth	International	Southern Africa Climate Finance Partnership (SACFP)	Enabling the use of knowledge brokers and facilitating learning exchanges, aiding in developing financially feasible climate responses and accessing climate finance, piloting youth internship programme	Multi-level work, learning, resources	Civil Society	Consulting Company, Educational Programme	Ongoing	Africa
Stellenbosch University	N/A	School for Climate Studies	Imparting climate information to students and encouraging research partnerships	Awareness, resources	Civil society, youth	Educational Programme	Ongoing	Stellenbosch University
LandNNES	International	Land Network National Engagement Strategy (LandNNES)	The programme aims to develop climate champions and to support small-scale farmers in becoming resilient to climatic impacts	Leadership	Civil Society, Farmers	Consulting Company	Ongoing	KZN, Northern Cape