Deliverable

4

Water Research Commission

Project Number: **C2022/2023-00746**

Project Title: **Dissemination and scaling of a decision support framework for CCA for smallholder farmers in South Africa**

Deliverable No.4: Development of CoPs and multi stakeholder platforms.

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1. INTRODUCTION

This section provides a brief summary of the project vision, outcomes and operational details.

AIMS	
No	**Aim**
1.	Create and strengthen integrated institutional frameworks and mechanisms for scaling up proven multi-benefit approaches that promote collective action and coherent policies.
2.	Scaling up integrated approaches and practices in CbCCA.
3.	Monitoring and assessment of environmental benefits and agro-ecosystem resilience.
4.	Improvement of water resource management and governance, including community ownership and bottom-up approaches.

OUTCOME

Vertical and horizontal integration of this community- based climate change adaptation (CbCCA) model and process lead to improved water and environmental resources management, improved rural livelihoods and improved climate resilience for smallholder farmers in communal tenure areas of South Africa.

EXPECTED IMPACTS

1. Scaling out and scaling up of the CRA frameworks and implementation strategies lead to greater resilience and food security for smallholder farmers in their locality.
2. Incorporation of the smallholder decision support framework and CRA implementation into a range of programmatic and institutional processes
3. Improved awareness and implementation of appropriate agricultural and water management practices and CbCCA in a range of bioclimatic and institutional settings
4. Contribution of a robust CC resilience impact measurement tool for local, regional and national monitoring processes.
5. Concrete examples and models for ownership and management of local group-based water access and infrastructure.

5. Chronology of activities

1. Desktop review of CbCCA policy and implementation presently undertaken in South Africa
2. Set up CoPs:
    a. Village based learning groups: A minimum of 1-3 LGs per province will be brought on board.
    b. Innovation platforms: 3 LG clusters, one for each province consisting of a minimum of 9- 36 LGs will be identified to engage coherently in this research and dissemination process.

c. Multistakeholder platforms: Engage existing multistakeholder platforms such as the uMzimvubu catchment partnership, SANBI- Living Catchments Programme, the Adaptation Network, etc.

3. Develop roles and implementation parameters for each CoP

    a. Village based learning groups: CCA learning and review cycles, farmer level experimentation, CRA practices refinement, local food systems development, water and resource conservation access and management and participation and sharing in and across villages.

    b. Innovation Platforms (IP): Clusters of LGs learn and share together with local and regional stakeholders for knowledge mediation and co-creation and engagement of Government Departments and officials (1-2 sessions annually for each IP)

    c. Multistakeholder platforms: Development of CbCCA frameworks, implementation processes (including for example linkages to IDPS and disaster risk reduction planning and implementation at DM and LM level), reporting frameworks for the NDC to the CCA strategy, consideration of models for measurement of resilience and impact (1- 2 sessions annually for each multi stakeholder platform)

4. Cyclical implementation for all three CoP levels (information provision and sharing, analysis, action, and review) within the following thematic focus areas: Climate resilient agriculture practices, smallholder microfinance options, local food systems and marketing and community owned water and resources access and conservation management plans and processes. Each of these thematic areas is to be led by one of the senior researchers and a small sub-team.

5. Monitoring and evaluation: Consisting of the following broad actions:

    a. Focus on 3-4 main quantitative indicators e.g. water productivity, production yields, soil organic carbon and soil health

    b. Indicator development for resilience and impact and

    c. Exploration of further useful models to develop an overarching framework.

6. Production of synthesis reports, handbooks and process manuals emanating from steps 1-4 with the primary aim of dissemination of information.

7. And refinement of the CbCCA decision support platform, incorporating updated data sets and further information form this research and dissemination process.

DELIVERABLES				
No.	**Deliverable Title**	**Description**	**Target Date**	**Amount**
1	Desk top review for CbCCA in South Africa	Desk top review of South African policy, implementation frameworks and stakeholder platforms for CCA.	01/Aug/2022	R100 000,00

2	Report: Monitoring framework, ratified by multiple stakeholders	Exploration of appropriate monitoring tools to suite the contextual needs for evidence-based planning and implementation.	02/Dec/2022	R100 000,00
3	Handbook on scenarios and options for successful smallholder financial services within the South Africa	Summarize VSLA interventions in SA, Govt and Non-Govt and design best bet implementation process for smallholder microfinance options.	28/Feb/2022	R100 000,00
4	Development of CoPs and multi stakeholder platforms	Design development parameters, roles and implementation frameworks for CoPs at all levels, CRA learning groups, Innovation and multi stakeholder platforms; within the CbCCA framework.	04/Aug/2023	R133 000,00
5	Report: Local food systems and marketing strategies contextualized - Guidelines for implementation	Guidelines and case studies for building resilience in local food systems and local marketing strategies towards sustainable local food systems (local value chain)	08/Dec/2023	R133 000,00
6	Case studies: encouraging community ownership of water and natural resources access and management	Case studies (x3) towards providing an evidence base for encouraging community ownership of natural resource management through bottom-up approaches and institutional recognition of these processes.	28/Feb/2024	R134 000,00
7	Case studies: CbCCA implementation case studies in 3 different agroecological zones in SA	CbCCA implementation case studies in 3 different agroecological zones within South Africa	12/Aug/2024	R133 000,00
8	Refined CbCCA decision support framework with updated databases and CRA practices	Refined CbCCA DSS database and methodology with inclusion of further viable and appropriate CRA practices	13/Dec/2024	R133 000,00
9	Manual for implementation of successful multistakeholder platforms in CbCCA	Methodology and process manual for successful multi stakeholder platform development in CbCCA	28/Feb/2025	R134 000,00
10	Final Report	Final report: Summary of all findings, guidelines and case studies, learning and recommendations	18/Aug/2025 (Feb 2026)	R400 000,00

Deliverable 4 focusses on design parameters, roles and implementation frameworks for CoPs at all levels, CRA learning groups, Innovation and multi stakeholder platforms; within the CbCCA framework. In addition, work has continued within the three levels of Communities of practice (CoP) and progress is reported upon in this report.

2. PROCESS PLANNING AND PROGRESS TO DATE

The intention is threefold, as describe below and shown in the diagram:

- Expand introduction and implementation of the CbCCA DSS framework within the areas of operation of MDF with a number of different communities. Work with existing communities as the basis of the case studies in specific thematic areas.
- Introduce and implement the CbCCA DSS framework with a range of other role-players expanding into new areas, including different agroecological zones and
- Work at multistakeholder level to introduce the methodology as an option for adaptation planning and action, both within civil society and also including Government stakeholders. This is the first step towards institutionalization of the process and will involve mainly working within existing multistakeholder platforms and networks as the starting point.
- Further exploration of the categories of stakeholders and the roles and relationships between stakeholders is important for the present research brief.

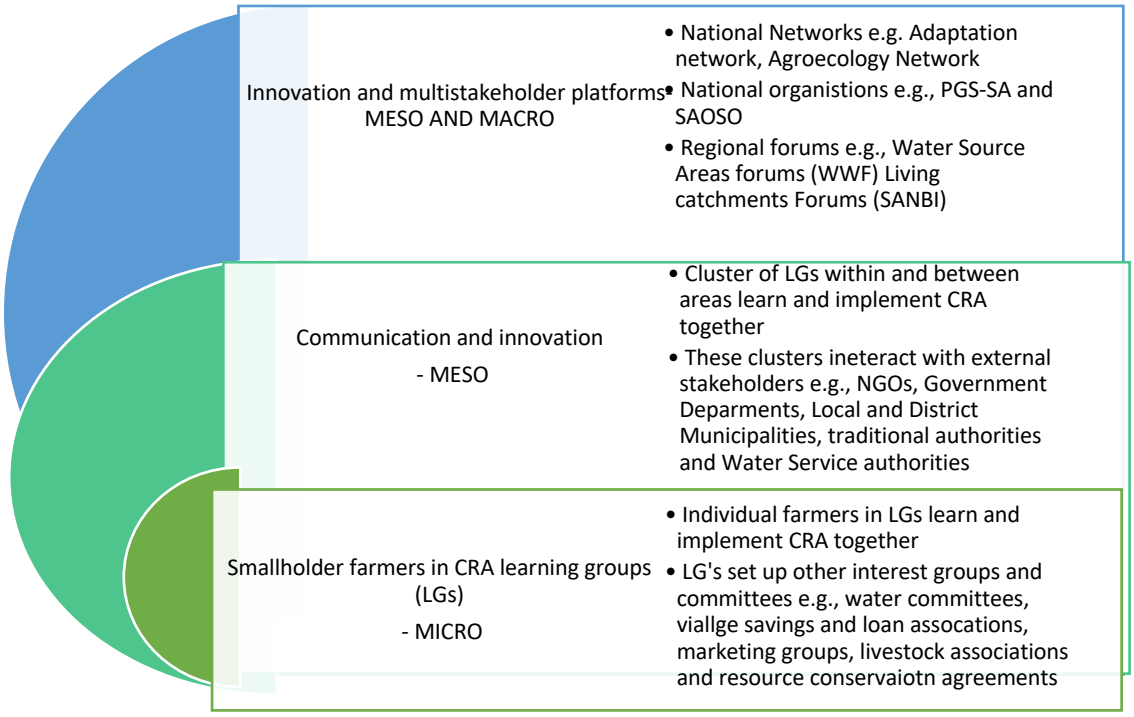


Figure 1: Conceptualization of stakeholder platforms at multiple levels to support CbCCA

Smallholder farmers in climate resilient agriculture learning groups

This process has been initiated by continuing and strengthening specific CRA learning groups, which have been supported by MDF in the past and who have done well in implementation and building of social agency. These groups will provide the focus for further exploration of food systems, water stewardship and governance and engagement with local and district municipalities.

CRA learning group summary:

Province	Area	Villages	No of participants
KZN	Bergville	Ezibomvini, Stulwane, Vimbukahlo, Eqeleni, Emadakaneni	130

	Midlands	Ozwathini, Gobizembe, Mayizekanye, Ndlaveleni	110
	SKZN	Mahhehle,Mariathal, Centocow, Plainhill, Ngongonini	90
Limpopo	Sekororo-Lestitele	Sedawa, Turkey, Mulati, Santeng, Worcester, Sophaya	75
EC	Matatiele	Ned, Nchodu, Nkau, Rashule, Mzongwana	90
	5	25	495

Table 1: Micro-level CoP engagement: February to July 2023

Note: Collaborative strategies in bold undertaken during this reporting period

Description	Date	Activity
Establishing learning groups at village level	2022/11/25, 12/09 2022/11/15, 11/29, **2023/02/07** **2023/02/09** **2023/01/18** **2023/03/27** **2023/06/15**	Limpopo: Sophaya SKZN: Mahhehle -**CCA workshop x 2 days,** **Bergville: Eqeleni** **EC: Ned, Nkau** **Limpopo: Madeira** **Midlands: Ndlaveleni**
Training and mentoring for climate resilient agriculture	2022/12/02 2022/10/26 2022/10/08-14 2022/11/23,24,29 **2022/02/10** **2022/02/27, 03/28** **2022/03/08, 03/17, 03/28** **2022/03/15** **2023/03/07,08** **2023/03/29,30** **2023/03/24,27,30** **2023/04/, 2023/05, 2023/06** **2023/04/21,25, 05/26, 06/08** **2023/04/19,20** **2023/06/22**	Midlands: Ozwathini contouring workshop SKZN: Mahhehle – tower gardens EC-Matatiele: Drip irrigation workshops in 5 villages SKZN: CA demonstration workshops in 3 villages **SKZN: Plainhill Drip irrigation training** **Limpopo: Sofaya trench beds** **SKZN: Mahhehle tower gardens, poultry production, trench beds** **SKZN: Mariathal gardens and experimentation** **Bgvl: Madakaneni, Mahlathini – gardening training** **EC: Ned, Nchodu poultry production** **EC: Nec, Nchodu, Mzongwana- Pest and disease control** **Limpopo and KZN: trench bed training with assembling of tunnels for 45 households across 8 villages, including distribution of seedlings, mixed cropping and mulching learning inputs and drip irrigation** **Limpopo: Willows, Sedawa, Mametja Sophaya. Bergville-Matwetha, Emadakaneni – Natural Pest and Disease control** **Bergville, SKZN: Poultry production: eMadakaeneni, Mjwetha, Mariathal, Mahhehle, Centocow** **EC: Ned, Nkau, Rashule, Nchodu- Soil and water conesration**
Cyclical implementation through mentoring for capacity development for LG at local level	 2022/08/16,17,18,19,30 2022/10/16 2022/11/21-24 **2023/01/24-30** **ONGOING**	CCA review and planning workshops -Bergville: CA review and planning (5) -Midlands: CA review and planning (3) -Limpopo: CCA review and planning (4) **CCA prioritization of practices** **-Matatiele: 5 villages (Ned, Nchodu, Rahsule, Nkau, Mzongwana** **-All areas: garden monitoring, poultry support,tunnel and drip kit installations,VSLAs monthly meetings**
Income diversification and economic empowerment of local farmers (LG at local level)	 2022/10/02,11/03, 12/04, **2023/02/02,03/02** 2022/10/08, 11/07, **12/02** 2022/11/05,06,07 **2023/01/27** **2023/01/26** **2022/12/13** **2023/02/14** **2023/02/14** **Jan-June 2023** **2023/03/15,16**	Market days: monthly farmers markets -Midlands: Bamshela (Ozwathini) -SKZN: Creighton (Centocow) - Bergville: Bergville town Market exploration workshops -Midlands: Mayizekanye, Gobizembe **-EC_Ned-Nchodu market day in Matatiele** **-SKZN: Mariathal** **PGS follow-up w/s Limpopo** **SKZN: Mahhehle** **VSLA introduction** **-SKZN: Mahhehle** **VSLA meetings and share outs** **-Bergville: 9** **-SKZN: Ngongonini (2), Centocow (4)** **-Midlands: Ozwathini (6)** **Limpopo: (7)** **Youth tala table value adding training**

Implementation and capacity development for innovation (3) and multi-stakeholder platforms (3)	2022/11/18 2022/11/10 2022/12/01 **2023/02/23** **2023/02/28** **2023/03/08,09** **2023/03/89,29,** **May-July 2023** **2023/03/30, 06/02** **2023/04/26** **2023/05/09** **2023/07/10-15**	-SKZN: Centocow P&D control cross visit and learning workshop -uThukela water source forum: Visioning and action planning – Bergville -Adaptation Network AGM -**Regenerative Agric farmers' day in Bergville incl Asset research, uThukela Water Source Forum, uThukela Development Agency** **-Adaptation Network: CCA financing dialogue** **-SANBI_gender mainstreaming dialogue** **-WRC-ESS: Bglv Ezibomvini, Stulwane – resource management mapping and planning** **Bergillve:Stulwnae weekly community resource management workdays** **-Okahlamba LED forum** **-Farmers X visit between Bulwer (supported by the INR0 and Bergville around CRA, fodder and restoration** **-PGS-SA: market training input: Online training Session 5** **-Giyani Local Scale Climate resilience Project: Introduction of CCA model and local water governance options**
Indicator development for evidence-based indicators, M&E and handbook development	**2023/01/30- 02/03** **2023/02/02** **2023/01/18** **2023/01/18** **2023/02/20** **March-May 2023** **June 2023**	**Limpopo: Focus Group discussions for VSLA and microfinance for the rural poor x 3 (Turkey, Worcester, Santeng)** **Garden monitoring:** **-SKZN: Plainhill** **-EC: 5 villages** **CA monitoring** **-EC:5 villages** **-KZN: Bergville -30, Midlands 15, SKZN 15** **-All areas: Poultry production list** **-All areas: Livelihoods survey for farmgate sales and asset accumulation**
Implementation of sustainable water management	2023/01/03-02/03 **2023/03/07** **2023/03/25, 06/15** **2023/04/25, 06/01,02, 06/14.** **2023/07/26-28**	KZN: Bergville: Stulwane – Conflict man and upgrading spring protection**.** **EC: Nkau: Water walk and meetings for spring protection and reticulation.** **KZN: Bgvl Stulwane_ Engineer visits (Alain Marechal) for scenario development and follow up planning meetings with community. Set up committee, work parties and start on quotes and budget outline** **KZN: Bglv Vimbukhalo: Governance of communal borehole water supply**
Organisational & capacity development	2022/11/17 2022/12/05 2023/02/13 2023/02/09, 02/16 **2023/03/06** **2023/03/13** **2023/04/17** **2023/05/26** **2023/06/12** **2023/07/04**	-MDF AGM and organisational capacity development workshop -Mentoring and planning with new finance officer to implement SODI financial reporting system - Internal short learning event for rainfall and runoff results, as well as soil fertility and Organic carbon - Mentoring in CCA workshop implementation. Temakholo from Midlands assisted Bergville team **-Team session on gender mainstreaming** **- UKZN- Ecological mapping and use of resource planning – Bgvl team** **-VSLAs review and discussion re group based rules, BLF updates** **- Nutrient analysis for livestock fodder options: facilitated by Brigid Letty from the INR** **-Small business development support planning and Livelihoods survey** **-MDF AGM and organisational capacity development workshop**

Communication and innovation

A Regenerative Agriculture farmers day was held in Emmaus Bergville on the 23rd of February 2023. External stakeholder involvement included: Ezemvelo-KNZ Wildlife, Maloti Drakensberg Transfrontier Park, AGT Foods, PANNAR Seed, Okhahlamba LM, KZN DARD, uThukela Development Agency, UKZN and UFS, Centre for Water Resources research (UKZN) and WWF among others. Smallholder farmers from Midlands (30) attended as well as around 180 local participants.

Figure 2: Above: The packed community hall for the CA farmers' open day event in Emmaus, Bergville and A field site visit to Dlezakhe Hlongwane in Stulwane to interact with the CA trials he has undertaken. Here visitors are viewing his livestock fodder production plots- Lespedeza, short season yellow maize and a perennial grass(tall Fescue).

Tala table youth network value adding training (15-16 March 2023): A youth group consisting of 2 youths per vialgle in 6 viallges are receving ongoing trianing nad mentoring in entrepreneurship and small bsuniess development linked to the CRA learning groups in their villages in the mametaj-sekororo region of Limpopo. This is a 2 year process undertaken jointly by AWARD and MDF, and funded by DKA (German chruch funder).

Th session in March oncsisted of reviewing the market tables already set up and undertakne by the group and a one day trianing nad dmeosntraiton sesison in value adding. Here the group was divded into two and each spent time preapring cetraing value added products consisting of sweet chilli sauce, pesto, vegetalbe atjar, wild melon jam, lemon maramlade and sweet potato bites. Thereafter the youth were provided with small seed budgets to produce nad sell a vlaue added product at hteir tala talbes (green tables) in their villages.

Figure 3: The youth busy reviewing thier marketing activities to date

Adaptation network cross visit of 22 farmers engaged in CRA and resource conservation in Impendle KZN (with support from the Institute of Natural Resources) to Bergville to engage with CRA learning group activities there (CA, fodder production and restoration activities) on 25th April 2023

Figure 4: Above left: The group of Impendle farmers on their farmers' cross visit to Bergville and Above right: Khulekani Dladla explains to the group his fodder production and supplementation processes.

Multistakeholder platforms

To date the research team has participated in a range multistakeholder platforms, networks and communities of practices (CoPs) towards developing a framework for awareness raising, dissemination and incorporation of the CbCCA-DSS methodology into local and regional planning processes and developing methodological coherence for a number of the themes to be explored in this brief.

In this present period of February to July 2023 the following stakeholder engagement activities have been undertaken:

- SANBI: CCA and gender mainstreaming dialogue. Preparation of presentation and programme – 8-9 March 2023

- Northern Drakensberg catchment forum. Online meeting 11th April 2023 – to report back progress and plan full platform meeting for 23rd May
- PGS-SA Online morganic market development course: 10 Modules between April-June 2023. MDF presentation of Module 5: Local farmer's markets (9th May 2023)
- Giyani Local Scale Climate resilience Project. Inclusion of the CCA framework and local water governance options into the programme. (8-11 May and 10-15 July 2023). Progress for this activity is provided below.
- Fodder and Rangeland management workshop: For 4 villages in Bergville, including inputs from Working on fire, SAEON, INR and community level experimentation outcomes (21st July 2023)

Conceptual discussion on a range of topics including vulnerability assessments, the role of agroecology in CCA, methods for monitoring and evaluation of multistakeholder processes, development of stakeholder platforms and inclusion of volumetric water benefit accounting as a tool for implementation of integrated water resources management have been ongoing.

The table below outlines actions and meetings to date.

Table 2: Planning and multi stakeholder interactions for the CCA-DSSII research process: August 2023

Organisation	Activity - Description	Dates
Asset Research-Maize Trust, SODI	Regenerative Agriculture farmers' open day in Bergville	23rd Feb 2023
ESS research - WRC	UKZN research in ecosystem services mapping supported by MDF: water walks, focus group discussions, planning, eco-champs, spring protection work in Stulwane, thematic and mapping workshops in Ezibomvini and Stulwane, **local level planning and implementation**	23rd September 2022 14th October 2022 13,29,30 March 2023 **1-30th May 2023**
WWF Water source forum	uThukela catchment partnership: Stakeholder meetings, online and in person at OLM board room Bergville (new name: Northern Drakensberg Collaborative). **Development of vision, membership profile, constitution and core team and full collaborative meetings**	29th September 2022 10th November 2022 **11th April 2023** **23rd May 2023**
SANBI- Living Catchment Programme	Social facilitation capacity building workshop – Western Cape; M Malinga Olifants' water indaba: M Malinga, N Mbokazi, H Hlongwane, B Maimela and E Kruger Video on local initiatives in catchment management	3rd-5th October 2022 30th Oct-2nd Nov 2022 24th March 2023
SANBI	Climate change adaptation and gender mainstreaming dialogue – presentation and participation **SANBI newsletter- runoff impacts of restoration and CA**	8th-9th March 2023 **4th June 2023**
Adaptation Network	Policy input and AGM Ongoing input and involvement in the Capacity development working group: to implement the new Civil Society Organisation Skills Enhancement and Excellence Development (CSO SEED) project, funded by the Flanders government. Some of these activities include youth-led participatory videos on adaptation initiatives and some thematic field visits and exchanges between AN CSO member projects. **Meetings with AN to discuss capacity building and outline CCA training for Socio technical Interface NGO in Hammanskraal**	13th October 2022 1st December 2022 7th , 8th Feb 2023 15th March 2023 **11th May 2023** **15th June 2023**
PGS-SA	Quarterly meeting: Discuss mapping of PGS organisations, finalisation of certificate and use of seals and logos. Finalisation of smallholder farm assessment form PGS-Certification working group **Online market development training: Input into session 5**	17th Nov 2022 13th Feb 2023 **9th May 2023**

Okhahlamba LM	Agriculture and Land summit: MDF presentation and marketing stall: All Bergville staff, farmers representatives and eco champs **Okahlamba LED forum meetings** **OLM – support with transport for farmers' markets and tractors for field preparation**	30th November 2022 **30th March 2023,7th June 2023** **Ongoing**
Afromontane research Centre	Maloti-Drakensberg Climate Change Workshop Wageningen/UFS: Land futures course - Bgvl	12-14 December 2022 7-10th March 2023
Water Research Commission/ AWARD	**Giyani Local Scale Climate Resilience Project: Support for CCA and VSLAs**	**8-10th May 2023** **10th-14th July 2023**
Umzimvubu Catchment Partnership and ERS– *Nicky McCleod, Sissie Mathela*	Webinar to review CRA and spring protection implementation and plan for future projects **Planning for combined spring protection in Nkau and next deliverable**	8th Nov 2022 **15th June 2023**
AWARD – Derick du Toit	Meeting in Hoedspruit to discuss AWARD's contribution Youth induction programme– Tala Table network Planning for CRA learning group expansion, Mametja-Sekororo PGS continuation	2nd November 2022 30th January 2023 **22nd March 2023** **8th May 2023**
Karen Kotshky	Learning in M&E interest group meeting. Discussions re methodology for UCP and Tsitsa project multi stakeholder engagement evaluation Discussions and MoU development for M&E framework and indicator development	11th November 2022 **15th May 2023** **24th May 2023**

2.1 GLSCRP_CCA AND LOCAL WATER GOVERNANCE INCLUSION

The Giyani Local scale Climate Resilience Programme is a multistakeholder research and innovation process, funded by the Government of Flanders and spearheaded by the Water Research Commission with a focus on the Multiple Use Systems Model, the water-energy food nexus and indotruction of appropriate technology and innovations into the water use systems of both community water supply systems and agricultural production projects in the Giyani area of the Mopani District Municipality(MDM), to demonstrate practical water linked climate change adaptations at local level.

Programme partners include the Water Research Commission, The University of the Western Cape, MDM, Department of Water and Sanitation and the local Water Service Authority, the Department of Agriculture, Local Office of the Premier, COGTA, Traditional Authorities and NGO partners Tsogang, and AWARD among others.

Implementation and innovation options have been designed and are being implemented in 9 sites; 5 community water supply options and 4 agricultural cooperative support options. Innovations to be introduced include solar systems for boreholes and reticulation, reverse osmosis for water purification, and also drip irrigation and hydroponic systems for agriculture. Local scale water treatment options are also being explored.

Mahlathini Development Foundation has joined the team to integrate the CCA framework developed into this process and provide further thinking and options for local water governance systems within the water-energy-food nexus aspects of the programme. It was agreed with the primary implementers that the focus would be in Mayephu village (communal water supply) and in the Dzuvadzi youth organic agricultural cooperative (Loloka village), to explore both adaptation options and local water management and governance.

a. CCA Workshop Mayephu

DATE:2023/07/12-13

ATTENDANCE: 24 participant (6 men, 18 women)

FACILITATION TEAM: Erna and Betty, (MDF) Thembhani and Basani (AWARD/Tsogang)

The workshop programme was the basic Climate Change Adaptation exploration process, designed within this research brief and consisted of exploring climate change impacts, agriculture (past, present and future) and adaptive strategies, both local and suggested to be able to prioritize adaptation practices in the community. Below are brief summaries of discussions held.

- **Climate change impacts**

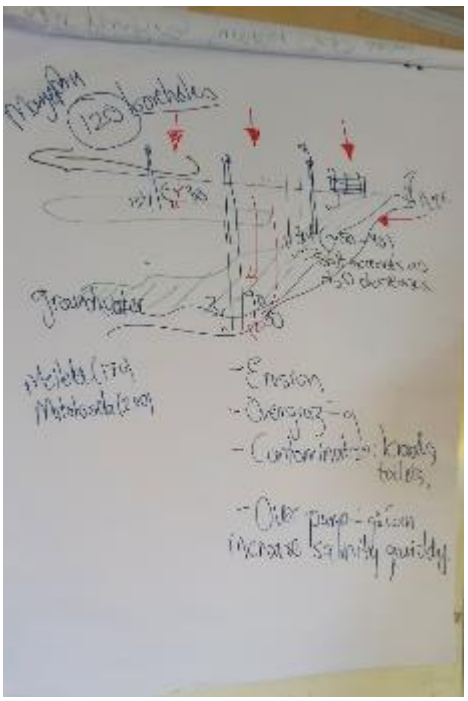
- Warmer in winter, allowing planting of tomatoes and beans, less cold.
- Generally hotter
- Used to just do dryland cropping. Now dryland cropping is too risky – need to irrigate.
- Climate change due to CO_2 emissions, depletion of ozone, green house effect. Some people knew the terms others wanted a bit of an explanation.
- Less rain, area is drier.

- **Past- present**

- Relied on rainfall and rivers. Now need to irrigate. Many more boreholes for drinking and irrigation as the rivers are running dry.
- There were dams in the past, now dried up.
- Maize yields have decreased significantly.
- In the past we ate food form our gardens, now buying from shops.
- In the past used manure and compost, now buy inorganic fertilizer and even compost from NTK and other suppliers.
- Used to eat fresh food, now much more processed and unsure of the quality or 'age' of food we buy.
- There are now more pests and diseases, and we are forced to use bought pesticides. Specifically, aphids are now more common, and we make our own brews using sunlight bar soap mixed with 'Blue Death'.
- In the past we use to dry morogo and meat, but nowadays we just put things in the fridge.
- We made a mixture of peanuts and maize into flours to use – called Shibugu. Can keep for a long time and would be put in jars as travel food.
- Used to farm for subsistence now commercial even if it is on a small scale.
- We used to get morogo up until June and planted around September and October. Now that has changed – not even sure when the seasons are anymore. And so sometimes do not plant at all. Sometimes just small plots in our gardens now, but when rain starts will go to the bigger farms.
- Rainfall events are more localised – it can rain in parts of the village, while the rest is dry.
- Now El Ninos seem to be more common. Erna talked a bit about weather systems and increase in severity and frequency of drought.
- Jafta: there is a drop in the water levels of the boreholes – from May-June it drops until it starts rising again in October, but now that isn't really happening, as the levels have remained low throughout the year for the past 2-3 seasons.

- There was a question about the reliability of weather predictions – people can prepare, for example, one can reduce livestock if a drought is coming. A short input on this was also provided.
- Boreholes have become salty in the last few years. On the question of why participants mentioned that for household boreholes, due to costs people only drill until they first hit water, for drilling there are also 2nd and 3rd strikes the deeper you go – the companies will remove the cores to show you. – Older people think it just happens, as it depends on the rock where you find the water. Some boreholes that are drilled start out salty, others become salty over time. One person thought it was due to air pollution.

A short input on groundwater was provided to explain how and why boreholes dry up. The point that boreholes dry up due to over pumping or become saltier as a result is acknowledged by the group although it was hard for them to admit this. They felt that climate change has had a much bigger impact on the groundwater levels than their boreholes and also that in admitting this they would need to reduce the water they are using, which is already too little.



Erna presented a rough diagram showing that over pumping and reduction of groundwater leads to salinity through less water being available into which water-soluble salts are dissolved. The reduction in availability is also due to a reduction in recharge of groundwater, which generally is at a level of 5-10% of the annual rainfall. In areas where there is erosion, overgrazing, lack of soil cover, and over pumping the recharge can not match the water being removed. In addition, climate change has considerably reduced the recharge of boreholes in the area.

Erna also talked to recharge areas around boreholes (50m,400m) and good practices there – no kraals, toilets or other polluting discharge, erosion control, ground cover, no grazing, better infiltration, berms, vegetation, etc. It is best to fence off these areas and undertake a concentrated effort in land management to ensure the best possible results.

Erna also presented the water quality results for the Mayephu borehole that was tested (UWC/Tsogang). (Jovanovic & Maswanganye, November 2022)

Of the parameters, the only one not within the SANS limits for drinking water is nitrate (NO_3), which **was measured as 204,65mg/L, and should be <48,7mg/L.** The borehole itself is one of three drilled between 2008 and 2022 below the village, in the grazing area surrounding the village where livestock kraals are situated. One kraal is within 50m of these boreholes. The water committee has tried to ask the owner nicely about removing the kraal as they were made aware that this is the cause of the water contamination. Initially the owner was somewhat resistant. NOTE; As the owner was in this workshop and in discussions for the need for purification of drinking water and the potential implications of lower water availability due to the purification, a meeting was held after this workshop to further discuss the issue. Agreement from the owner was now instantaneous. The committee further set up a meeting with the contractor and Tsogang the following day to outline that they would remove the kraal and the built-up manure by hiring a TLB to assist and would then

prefer not to have the reverse osmosis plant, given that their water quality is already within drinking standards, if this source of contamination is removed.

Participants were also worried that the solar system would provide less water than the present arrangement. Given the reduction in capacity of the boreholes, presently pumping is undertaken continuously for 5 days to fill the main reservoir (capacity is around 700 000L). This provides around 72 litres per person per day (1940 people in the village). Around 117 000L of water is pumped per day. The solar system is being designed to provide around 22 300L per day (Jovanovic & Maswanganye, November 2022), from the one borehole where it has now been installed, which is a 20-40% reduction. However, the pump operator explained that this is a hybrid system, and that solar pumping would be undertaken only when electricity from the main supply is unavailable (ie during loadshedding).

Other suggestions around management in this workshop, which were eventually discounted in favour of not having the reverse osmosis were:

- Pumping on a separate day for the reverse osmosis and drinking water – but participants acknowledged that this would be tricky as the system would also contain unpurified water on other days
- Pumping the purified water into 10 00l JoJo tanks. The suggestion was to speak to Mopani DM about repurposing the two tanks already in the village. People were concerned that these tanks may be very far away from some of the households.

There are many, many boreholes in this area, not only in Mayephu but also surrounding villages: Mayephu (120), Mzilela (170), Matotosela (300).

For the individual household boreholes, people haven't thought much about contamination and have been only focused on salt and getting water, so haven't considered that toilets and kraals at household level could have an impact.

Some suggestions from participants regarding management of this situation included the following:

- Instead of drilling individual boreholes, people should consider sharing between households.
- Households should be more careful in placement of toilets and should consider joining in the already existing practice of placing livestock kraals on the periphery of the village. There are already security team set up in the village that patrol at night to manage the theft of livestock which is rampant in the area. NOTE: In this regard community members are aware that people in the village assist the thieves, despite not being directly involved themselves.

Seasonality diagrams

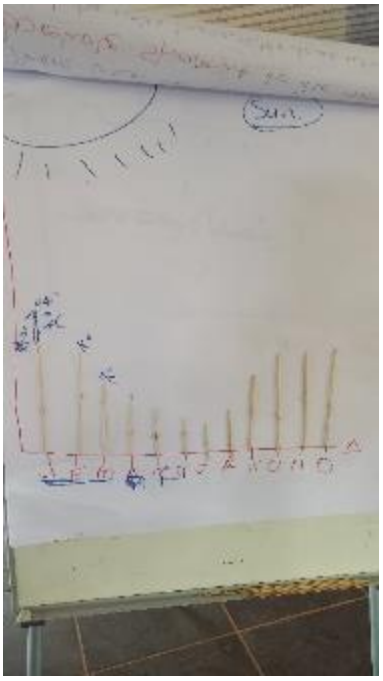
Because of the reasonably small group of participants this exercise was conducted in plenary. It consists of looking at monthly temperatures and rainfall patterns in the past and how this has changed in the last few years.

- Temperature in January are 36 up to 40°C, until March
- March temperatures are between 31-34 °C
- April temperatures are between 29-30 °C.
- May temperatures are between 24-25°C.
- June has cold temperatures.
- August, we have warm temperatures.

- October through December are hot.
- Last year and this year some winter rainfall in June- July, which is unusual.

Changes: Hotter throughout by 3-5°C

Rainfall; Is coming much later. Only started last year in November. Now yields are 20x80kg maize (4ha), which is around 1,6tons/ha. It can be as little as 8 bags, as it was last year. In the past the yields were double that, at around 3,2tons/ha. Showing a yield reduction of around 50% in dryland maize. Some farmers last year had no yield at all. If you plough after the 1st rain there is still a chance, but if you wait for 2nd rain then the risk is high. Also, much more problems with pests now.



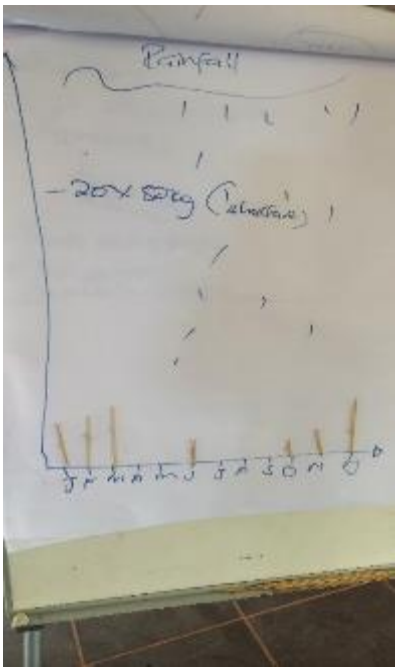


Figure 5: Above: *The seasonality diagram for temperature developed in Mayephu. The largest difference has been in temperatures between January and may, which have increased according to the participants by an average of around 4 °C.* Below: the seasonality diagram for rainfall and changes.

The habit is to store maize in small structures with grass roofs and closed at the sides with cow dung which also controls post-harvest pests. Also built off the ground and fires are built underneath to fumigate.

Local adaptation strategies

- Farm in very small plots. Even in the fields, 1ha at a time and plant each at a different time, to spread the risk.
- Vegetables are planted throughout the year. It is now possible to even plant beans and tomatoes at any time and still get a good harvest. In the past it was not possible as winters were somehow colder. In the small plots pest and disease control is an issue. Affects us mostly on tomatoes- red spider mite is very common. Aphids in okra.
- Spray pesticides such as Cypermethrin, Methomex and 'Delegate" on tomatoes, (R7000/l), sprayed after 1st rain. Note: Delegate 's active ingredient is spinetoram, a neurotoxic insecticide, registered for stored grains and not tomatoes. The other two pesticides are broad acting contact pesticides and systemic pesticides respectively.
- There are issues with birds (guinea fowl, crows and others) as well as issues with rats eating crops in the fields.
- Drip irrigation is now being used with ridges and furrows for planting maize.

PRESENTATION ON CCA PRACTICES

After comparison of the participants' understanding of the changes with the scientific or academic predictions for the area, the correlation between the two is largely clear and very good. The predicted hotter and drier weather with more extreme rainfall events in summer is well corroborated by the community level experience.
Principles used in adapting to climate change in cropping include minimising external inputs, maximising diversity, focusing on soil health and natural soil building techniques, taking care of the environment, using available water efficiently, and working, planning and learning together.

GENERAL PRACTICES:
These are practices that are important in homesteads, fields and the broader environment and consists of understanding and marking contours in fields and gardens as well as when undertaking erosion control and rangeland management measures. Further understanding and working with water movement in a plot, field or catchment is important to control erosion and run-off and provide for run-on into areas where more water is required or can safely be infiltrated into the soil. In addition considering sun, wind and aspect in garden ad field planning is necessary.
Understanding soil structure and soil type is also important to be able to know which soil amelioration practices are appropriate under which conditions. This includes levels of acidity/alkalinity, levels of organic matter, balance between sand, clay and silt, -Soil structure, run-off control, contours (made with line levels), also looking at water flow in the yards and fields (garden layout to accommodate for sun, water and wind).

For field cropping and intensive gardening reducing tillage is an important concept, as this improves soil structure, soil organic matter, water infiltration and water holding capacity and potentially also soil fertility and soil health if the necessary crop diversity and cover crops are included in the system. Including fodder crops and legumes can also be an advantage.

Farmers in the workshop mentioned that they have already thought about conservation tillage, but they are struggling with finding advice and the correct planters to try out this system.

ACTION: Planned for bringing up a two-row planter end Sept early October to try out in the fields.

Further practices considered included:

- Contour ridges: for better infiltration and can also plan water loving plants such as bananas on the ridges.
- Diversion ditches and cut off drains in the homesteads: to maximise water infiltration in the gardens.
- Furrows and ridges: can be combined with mulching and planting fruit trees.
- Banana circles: for erosion control and inclusion of organic matter in the soil.
- Mulching: is important for controlling evaporation and soil temperature.
- Tunnels: shade cloth structures for microclimate control
- Rainwater harvesting: Either JoJos' or underground tanks, to store large quantities of water.
- Drip irrigation: also, with grey water.
- Greywater management: bucket drip kits - tower gardens, keyhole beds (bag planting).
- Trench beds: increased organic matter for water holding and fertility.

The next step in the workshop process would be to jointly prioritize practices that participants would like to try out and set up a process of mentoring and experimentation in these practices. This step was left over until the following meeting.

b. Household visits and community baseline

Household visits are undertaken to document local best practise options in farming and climate change adaptation and to interview individual household members to develop a baseline for the community. A total of 9 households were visited, chosen to represent different levels of water access in the community; those reliant on communal standpipes, those who additionally have their own informal yard connections and those also have individual boreholes in addition to the previous 2 options. In addition, we focused on households where productive activities such as gardening and small livestock production are undertaken. In reality, households who need to rely on the communal standpipes are not engaged in any multiple use activities, and barely receive enough water for household use – especially given the process in the community of only being able to access water for 1 day/week. This is necessitated due to the time it takes to fill the community reservoir and the large number of households in the community.

The table below summarises the socio-economic baseline information.

Table 3: Socio-Economic baseline for Mayephu Village (GLSCRP):July 2023

	Participants with boreholes and yard taps	**Participants with yard taps only**
Demographic information		
Gender (F)	56%	
Average Age	59 years	
Household head	67%	
No of household members	6	
Dependency ratio	1,5	
Highest level of education		
Primary school	33%	
High school	33%	
Tertiary	33%	
Income (Social grants, employment, agricultural activities		
Average monthly income in Rands	R4 288	R3 610
Social grants (% of hh)	100%	100%
Employment (% of hh)	11%	
Farming activities (% of hh)	100%	44%
Agricultural activities		
Ave size of hh gardens (m^2)	150	25
Ave size of fields (ha)	4	-
Drip irrigation	Yes	Yes
Flood irrigation	-	Yes
No of livestock		
Cattle (% of hh, no of cattle)	83% - 34	-
Goats	67% - 25	-
Poultry	67% -19	-
Fruit trees: Naartjie, pawpaw, guava, orange, lemon, macadamia nut, litchi, moringa, banana, mango, sugar-cane		
No of trees	30-40	5-10

In essence, poverty and lack of access to water has curtailed livelihood options and activities for a large proportion of the community, significantly. Households who can afford their own boreholes and infrastructure development have a significant advantage and are involved in household gardening, livestock husbandry and field cropping (cooperatives with water irrigation infrastructure).

Adaptive strategies employed in household gardens.

- Impressive diversity of vegetable crops including for example tomatoes, mustard spinach, swiss chard, cabbage, kale, lettuce, beetroot, onions, spring onions, green peppers, pumpkins, sweet potatoes, cowpeas, beans, luffa, cleome (traditional green) and okra.
- Planting at different times of the year- tomatoes and beans can now be planted in winter as well and green peppers can survive throughout the year
- Use of furrows for short furrow flood irrigation and drip irrigation in the gardens
- Protection of gardens (wind and heat) with barriers of fruit trees and indigenous trees (such as moringa, marula and mokgogoma)
- Irrigation basins for fruit trees.
- Use of manure and compost for fertility.

Below are a few indicative photographs.

Figure 6: Above Left to Right: A mixture of vegetable crops in a household garden incl. tomatoes, onions, mustard spinach, *and sweet potatoes. A* well-established *garden with fruit trees interspersed with vegetable beds and the borehole in the foreground. A garden border of* well-established *fruit trees – paw-paws, bananas and sugar cane and a small goat pen next to a garden with evidence of garden wastes and greens fed to the goats.*

Potential adaptive strategies to be introduced:

- Mulching
- Mixed cropping
- Liquid manures
- In field rainwater harvesting: Diversion ditches, swales, contours, furrows and ridges
- Deep composting beds: trench beds, eco0cricles, shallow trenches
- Greywater management: tower gardens, keyhole beds.
- Legumes, cover crops and fodder crops.

c. The Mayephu water management system

A bulk infrastructure water supply system linked to the Letavi river and 4 other villages (eNondweni, Shlakathi, Mzilela and Nkashani) was set up in 2007. It worked well until 2016 when, due to drought and expansion of the Mayephu village population, this bulk system came under pressure, despite installation of a booster pump to the village. After 2016 there have been additional pumping problems due to loadshedding and the village no longer received water form this system, despite assurances that this should still be possible.

The Mopani District Municipality (MDM) started drilling boreholes as additional and alternative water supply options, one in2007, one in 2016 and one in 2022, all close together below the village close to one of the main water courses in the area. These were dug down to 130m depth. The boreholes pump into the same reservoir initially used for the bulk supply system.

"Initially just one of the boreholes was strong enough to fill 50% of the reservoir in 24hrs", according to Mr Jafta?? , the pump operator. Now, only 7 years later, all three boreholes pump continuously for 5 days to fill the reservoir, which has a capacity of around 700 000liters.

The water from the reservoir is reticulate into standpipes along the roads in the village; 60 were installed around 2008, and another 108 taps were installed in 2017.

There are 365 households with a population of 1940 people (adjusted to 1620 for this study) in the village. According to Jafta a whopping 300 of these households have made illegal connections either to taps or directly to Jo-Jo tanks in their yards. This sounds very chaotic, but he asserts that the distribution between households is in fact generally fair and reasonably even. The practise is that he opens the reservoir on a Friday afternoon, and by the next day the reservoir is empty. Everyone spends that day filling all containers, drums, and Jo-Jo in their homesteads to last them for the week until the following Friday. People have a combination of around for example up to 30x50l buckets, on average 2-5 210l drums and or 1x2500l JoJo tank (roughly 100 households have Jo-Jo tanks).

In addition, around 150 of the households have their own private boreholes in addition to these illegal yard connections. Most of these boreholes were drilled before 2007, when people were still collecting water from the nearby (`1km) Molatsi river, either when it was in flow in summer or from sand drilled shallow abstraction sites in winter. It appears that most of these boreholes are comparatively shallow- between 50m-90m deep and a large proportion have now become very salty.

A local practise to test if the water is too salty for household use and irrigation is to make a cup of tea with 'Cremora'. If this milk substitute separates in the cup, then the water has a high level of salt. The MDM boreholes are not very salty, and this water can safely be used for irrigation. For some of the private boreholes using this water leads to yellowing and stunting in their crops.

A note on household water allocations: If one assumes the water is spread reasonably evenly across all households then each household will receive around 2000l of water per week. For a household of 4 people this equates to around 71lper person per day, which is well above the 25lpppd for the 'free water' allocation, but still rather low for multiple purpose use. Foreseeably around 300-350l/ week can be spared for irrigating small gardens – which can only sustain a garden of around 15m^2 of mixed vegetable production. See small case study below.

Water allocations in the village is not evenly spread. In particular, all participants who have their own boreholes also have informal yard connections and use both sources of water. These households number around 120 (33%) and can sustain both much larger gardens (around 200m^2),

small and large livestock and fruit orchards (~20-30trees per household). They have access to in excess of 10 000L of water per week, compared to around 3000L/week for households with yard taps, 180 households (49%) and only around 800L/week for households reliant on the communal standpipes, around 65 households (18%). Clearly the latter grouping cannot be considered to have equitable access to water. Largely this is based on household vulnerability and poverty and an inability to provide storage options or afford an informal connection. The community by and large does not consider it as their responsibility to assist these households. There are a few individuals in the community who do provide access to water from their own sources to some of these households.

A note on water quantity: Clearly the groundwater supply in the area is dwindling fast and is considered to be a combination of both climate change and over pumping of existing boreholes – the increasing saltiness of the borehole water and longer pumping times required attesting to this observation. In general community members are still hoping for more water to be supplied, despite also understanding that they are in fact being well looked after under the circumstances.

Presently borehole pumping rates are 2,7l/s and it is estimated that a quantity of 11700l is pumped on a daily basis from the 3 boreholes. The solar system can provide around 22 300 per day, from the one borehole where it has now been installed (Jovanovic & Maswanganye, November 2022), which is a potential reduction of 20-40%. Batteries are being installed, but at the time it was unclear whether they would provide further pumping capacity as they are also there to power an electric fence around the installation and potentially the reverse osmosis plant. However, the pump operator explained that this is a hybrid system, and that solar pumping would be undertaken only when electricity from the main supply is unavailable (ie during loadshedding).

A note on water quality: Analysis of water samples have been undertaken**.** Na (mg/l) content of higher than 30mg/l is considered a limit for good quality irrigation water. The MDM boreholes in Mayephu have a Na content of ~77mg/l, which is however still well within the range of acceptable drinking quality water (value of Na needs to be<200mg/l). Of the parameters, the only one not within the SANS limits for drinking water is nitrate (NO_3), which **was measured as 204,65mg/L, and should be <48,7mg/L** (Jovanovic & Maswanganye, November 2022)**.**

Guiding principles for community involvement in water management.

1 Community members need to be engaged not only in feasibility and baseline assessments and information provision, but also in the design and implementation phases of a water scheme.
2 They need to engage with and negotiate all parameters of the scheme to be able to take responsibility for further operation, management and maintenance.
3 Community members are willing and able to make rational and considered decision around water use and management if provided with appropriate information on which to base such decisions.
4 Community engagement needs to be broader than just the committees and operators at all stages of the discussion: Feasibility, design, implementation, operation and maintenance.
5 Committees should in these cases be well represented – traditional authorities, local government councillors, active water users in the areas, such as crop and livestock farmers and individuals who can represent more vulnerable groups in the village
6 Local level governance systems need to be respected but also interrogated in terms of acceptable levels of provision for equity in access to water within the community. (See notes on governance and equity)

7 In complex programmes suggestions for systems are made, these are refined in the planning and implementation and yet further changes can occur during the contractual and commissioning phases. Expectations are raised in each phase and community members often remember well what was "promised' at the beginning. This process requires careful explanation on an ongoing basis. NOTE: the tendency is to not provide detail or make specific 'promises' to avoid the resultant conflict, but the better practise is to explain the changes and difficulties as the process unfolds, which despite being a lot more intensive has the advantage of also increasing community level understanding of the issues and problems involved and this level of transparency builds trust and rapport between the role players, as well as a level of accountability in expenditure.

8 Ongoing monitoring of water levels, specifically for borehole schemes, with a coherent system of reporting is important. In this respect provision of dip meters will be required. Scheme operators need to have someone to report to who can make decisions regarding use, over-use and remedial actions that can be taken.

9 In general, demand for water is increasing while the environment's ability to supply water, is decreasing- and at a rate much faster than can easily be accommodated. Management of catchments and recharge areas is crucial, but presently not considered. Rangeland management and livestock numbers will need to be considered much more seriously.

Local level governance and equity

At community level arrangements are more often than not already in place, although they would be considered informal. Often these arrangements will not fulfil the requirements of the Water Service Authorities but provide for a level of stability and equity within the community.

Water committees are voluntary structures and members do have a certain level authority within the community but are not able to effectively police any rules. They cannot control or officially/legally enforce any of the rules agreed to be the community. As such informal arrangements are developed. Often it relies on community members contributing in time and in small regular payments to an agreed activity, such as water infrastructure maintenance or borehole pumping costs for example. The committee keeps records of those community members who pay and those who do not. Generally, those community members who resist the rulings or do not pay are considered not to be part of the process and their opinions or complaints or difficulties are then not taken into account.

At village level this is a manageable beneficiation system and can allow for a stable and ongoing operational system, without too much conflict. There is however a chance that vulnerable households and individuals are excluded from a service which should benefit all community members. Households with very high levels of poverty are more often than not also households where members engage in socially high risk and unacceptable behaviours, which ostracises them from the rest of the community. Other prejudices may also surface, especially around unmarried women with children and 'foreigners'.

Recommendations:

- Understanding and acceptance of local level governance arrangements, which can be locally managed is important.
- Institutional engagement in punitive measures for those who have informal or illegal connections is unlikely to have a positive outcome.

- Engagement of the governance committees and community as a whole in being more equitable in terms of their access arrangements is important.
- Hoarding of water and water provision options, by those households which can afford it and have power within the community should be dissuaded. Here, a user pays arrangement can potentially be negotiated. At the very least, they should not have more access to communal water than everyone else in the community.
- Payment for water use in excess of an agreed amount, can be used towards setting up a community level fund for maintenance and operations.

Security concerns

In Mayephu, as in other villages and communities in South Africa there has been a huge upsurge in theft and lawless behaviour, a situation which is very hard for communities themselves to manage and almost impossible for the state. Local security arrangements are being more commonplace. In Mayephu for example there are already 24hr patrols in place to monitor livestock. Livestock theft in the area is rampant, often undertaking by groups from outside the village, but likely assisted by individuals form the area. The livestock association has divided itself up into small patrols who are on duty for a day or night shift and these patrols are rotated within the association's membership. The suggestion is that a similar process should be instituted for patrolling the Solar power borehole installation initially and that the fees paid to the water committee could in time be used to employ a guard. Committee members have provisionally suggested R20/household per month for this service. They believe that this process would work in Mayephu, given that they already have the livestock guarding process, with monthly individual payments of R10/livestock owner as an existing example.

Local savings groups

There are no broad-based local level savings groups in this village. Even the well known stokvels which are very common across South Africa do not exist here. There are however local savings arrangements for households to assist each other with funeral arrangements, which is basically a rotational system of contributions towards funerals made by a group of individuals.

d. Household water use case study for Mayephu village

Background

Multiple Use Services (MUS) for water are systems designed to supply water and for provision of water services in rural areas (Van Koppen, et al., 2009). They are based on both infrastructural and governance components as an enabling environment for the delivery of secure and reliable water resources and the integration of multiple water users (domestic, irrigation, livestock etc.). Multiple sources of water, with multiple storage options, provide water for multiple uses at community level. Combining MUS with alternative sources of energy is a promising option to reduce environmental impacts and costs.

Under the GLSCRP (Giyani local scale climate resilience project), a joint innovation development process funded by the Flanders Government, managed by the Water Research Commission and implemented by the University of the Western Cape, Tsogang and AWARD, among others, MUS systems are being piloted for local scale supply and community level management of water resources. The aim of this process is to investigate the technical, socio-economic and environmental

feasibility for the establishment of Alternative Water Source (AWS) systems, different groundwater options and Multiple Use Water Services (MUS) in rural communities of Greater Giyani Municipality (Limpopo) in order to provide a secure water source for domestic and agricultural purposes (Jovanovic & Maswanganye, November 2022).

Mayephu Village is one of the prioritized communities for village level water supply, using groundwater, solar electricity for pumping and potentially reverse osmosis for purification of drinking water. Livestock drinking troughs were also included in the planning, using the 3 existing community level boreholes.

Description of existing water infrastructure

Mayephu village is in Dzumeri in Giyani and falls within Ward 27 of the Mopani District Municipality. There are 365 households in the village with a total population of 1940 people.
Water for the village was provided through a bulk supply scheme from the Letavi River until around 2007, when water shortages started to make this supply unreliable. Subsequently due to a combination of climate change, infrastructural inefficiencies and load shedding the supply became very unreliable. The system has now been completely replaced by 3 community level boreholes, installed in 2007, 2016 and 2022 respectively to supply water and also to increase water availability due to the ever-increasing population in the village. Water is pumped to the village reservoir and reticulated via roughly 108 communal standpipes.

There are a number of private household boreholes in the village, estimated at around 120 boreholes in the village. Many of these were drilled before the bulk water scheme was introduced in the area.

In addition, there are two cooperative farms on the outskirts of the village:

- Emvuleni Primary Agriculture Cooperative (5ha), with 2 boreholes, of which only 1 is active. The 1st borehole was drilled in2013 to a depth of 80m but has now become salty. The 2nd, now in operation is 120m deep. The cooperative has 5 members and employs around 8 people. 3Ha of the area is under drip irrigation.
- Mayephu crop agricultural cooperative (4ha), with 1 borehole reticulated to 2 JoJo tanks, supplied with a diesel pump. The cooperative has 4 members who do the cropping themselves and presently have roughly 1ha under drip irrigation.

Water use in the village

The water supply system has been developed to fill the village reservoir (700 000L) once a week. Pumping is continuous for 6 days, to achieve this. Taps are then opened on a Friday afternoon. By the next day the reservoir is empty, and pumping begins again.
Water allocation and operation is managed by a water committee, consisting of 15 members, which includes a pump operator, employed through the MDM. The traditional and ward councils are also represented, as are the cooperatives and the livestock association.

Households have adapted to this system by collecting their water for the week by having containers (25L), drums(210L) and JoJo tanks (2200L), which they fill either from the standpipes, or from informal tap connections in their yards. It is estimated there are close to 300 of these 'informal' taps in the village.

Generally, there are 4 household types in the village:

1 Those with only 25L container storage options (roughly 700L/week) – equivalent to 18,9L/pppd
2 Those with 25L and 210L drum storage options (roughly 1400L/week) – equivalent to 37,7L/pppd
3 Those with containers, drums and JoJo tanks (roughly 3000L/week) -equivalent to 80,9L/pppd
4 Those with all of the above and their own boreholes (roughly 3000L/week plus roughly 2500L-5000l/week from their own systems)- equivalent to 200L/pppd

This infrastructure is expected to be provided by the households themselves and access to water relies entirely on what each household can manage. Water is used for household purposes, keeping of small livestock (chickens and goats) and household gardens.

In reality, it is only those households in the 4th group, with their own boreholes who have managed to maintain reasonably sized household gardens (200-400m^2). For households in the 3rd group, with JoJo tanks filled from the communal system roughly 30% have much smaller gardens (20-100m^2). The households in groups 1 and 2 are not active in productive activities. Below, examples for each group are provided from a village level walk undertaken.

Group 1 < 20L per person/day allocation
These households are extremely vulnerable and poor, consisting in the most part of woman headed households, pensioners, 'foreigners' or new entrants into the village. These households do not have access to their own yard taps and use the communal standpipes. Around 17% of households are in this category.

Group 2 <40L per person/day
These households seem somewhat more secure and a proportion of them do undertake productive use in the form of very small gardens in their homes. They do have yard taps. Around 25% of households are in this category. Households in this category can at best supplement their household food supply to a small extent but do have enough water for general household use.

Figure 7: Right and far right: Households with yard connections, containers, and drums for water provision, of which a proportion have very small gardens (20-100m^2).

Group 3 < 90L per person/day
This group functionally is very similar to group 2, with either now productive activities or very small household gardens, which are generally slightly larger than the Group 2 participants averaging around 200m^2. Around 24% of the community fall within this category. A few of the participants do have small livestock in the form of traditional poultry.

Group 4 >200l per person/day

Households in this category have small livestock (chickens, goats) as well as well established, thriving household gardens. In addition, participants in this group have small, but diverse fruit orchards.

Figure 8: Right to far right. Example of a household borehole with storage tanks, a goat enclosure and a chicken house at different households. Insert is of a traditional laying box, with eggs.

Figure 9: Above left to right: Household gardens with a wide range of crops (mustard, tomatoes, cabbage, onions, marrows, spinach etc) and examples of small orchards (citrus, bananas, paw-paws, macadamia nuts, sugar cane avocados, mangoes and litchis)

Irrigation practices in the gardens consist mainly of hosepipes and buckets irrigating into adaptations of short furrow irrigation, or drip irrigation. All householders interviewed are very aware of salinity issues in their water and management practices and have already adapted their crop varieties, watering regimes and soil management to accommodate for this. The use of ridges and furrows is further considered a good practise in this regard. There is however potential for mulching, intercropping and methods of incorporating soil organic matter, to further assist.

There are some beautiful examples also of integration of traditional crops such as Cleome, pumpkins and gourds and Luffa for example into the gardening systems.

Figure 10: Left to right; traditional crops- pumpkins/gourds, cleome and Luffa.

There is a clear progression from no productive activities to household gardens, to further inclusion of small livestock to inclusion also of fruit trees, depending on the amount of water consistently available to households. It indicates that these communities are intrinsically aware of water demand for productive activities and would undertake a much larger range of activities if water wasn't limiting. In addition, dryland field cropping, which was a common practise in the past, has become unviable under the present climatic conditions. It has become too dry and hot to produce dryland maize and is now risky even for traditional crops such as sorghum, cowpeas, jugo beans, ground nuts and pumpkins. For the latter people will still take a chance and plant these crops when reasonable amounts of early summer rainfall is in evidence.

e. Case study of 4 local cooperatives

The table below provides a summary of the operations of the 4 agricultural cooperatives visited around Giyani. Two of the four are to receive support from the GLSCRP.

	Matsambo Ngamba Project	**Duvadzi youth organic agricultural cooperative**	**Mayephu crop agricultural cooperative**	**Emvuleni primary agriculture cooperative**
Location and membership	Dzumeri :3 and 8 labourers (Mrs Delina Ngamba)	Loloka: 1 and 9 labourers (Mr Patrick Sukhela)	Mayephu, 4 (Mr MIringo Ndleve)	Mayephu: 5 (Mr Dnaile Mnisi)
Size and area under production	6,8ha 2ha under production	8ha 2ha's under production at a time	4ha 1ha under production	5ha 3ha under production
Income considerations	Not making much profit, just maintaining. Pumping costs can be high due to laodshedding	Income of ~R16 155/ month. Expenses include labour, electricity, seedlings, fertilizer, pesticides, equipment, packaging, fuel and transport. Actual profit low.	No real income made to date.	
Water source	Presently 1 operational borehole (of 2), with electrical pump	Presently 1 operational borehole (of 4) – Electricity for pumping. Present borehole is 120m deep, but still salty	Presently 1 operations borehole (of 2). Still pumping with fuel.	Presently I operational borehole (of 2). The 1st became too salty and a deeper borehole was drilled.
Irrigation	Pumping of borehole for 3hrs per section, on	Pumping of borehole for 3hrs per section, on alternate days	Pumping of borehole for 3hrs per section,	Pumping of borehole for 2.5hrs per section,

	alternate days (50mx30m plots). Drip irrigation	(50mx34m plots). Drip irrigation	on alternate days (50mx30m plots). Drip irrigation	on alternate days (50mx30m plots). Pumping for 5hrs/day. Drip irrigation
Water management	Switched to stronger less salty borehole (tried 10x before managing to get 2 working boreholes). There is a 5000L JoJo storage tank.	River water is less than borehole water, but much better quality for crops.	2x10 000l JoJos for drip irrigation system. Bought own pressure pump for the system. Originally pumped from a nearby river, but that ran dry in 2016	_After planting seedlings, hardens them for around 10 days before irrigation, to also reduce weed infestation (
Cropping system	2ha under production. Rotates crops. Uses manure and crop residues alongside fertilizers	Put between 0,5 to 2ha under production depending on resources and rest the rest of the field. Rotate crops. Uses manure and crop residues alongside fertilizers	Organic. Make compost from chicken manure, sawdust, grass and weeds and use that on the beds.	Rotates crops. Uses compost alongside fertilizers.
Cropping practices	Ploughing before preparation of furrows and ridges and laying drip irrigation lines	Ploughing before preparation of furrows and ridges and laying drip irrigation lines	Ploughing before preparation of furrows and ridges and laying drip irrigation lines	Ploughing before preparation of furrows and ridges and laying drip irrigation lines
Crops planted	Maize, tomatoes, spinach, baby marrows, okra and green pepper. Ground nuts and jugo beans in summer	Onions, mustard spinach, Swiss chard, butternut, ground nuts, tomatoes, okra, kale, rape, chillis, green peppers	Onions, beetroot, maize, okra, butternut, tomatoes	Tomatoes, onions, baby marrows, okra, green beans, mustard spinach, Swiss chard, green peppers and chillis.
Issues	-No issues mentioned.	Used dryland cropping of maize, cowpeas and groundnuts to prepare plots for irrigated winter cropping (provision of organic matter) – not possible since 2016 due to CC	Monkeys, diseases in tomatoes, cost of fuel, labour constraints, locals can't afford competitive prices	Poorly fenced – livestock invasions Diseases are very prevalent. No water storage facilities– have to pump and irrigate directly.
Adaptations used	-Herbicide for burn down prior to planting, for residue retention -Fertilizer application through dripper lines - 3 -year rotations, done in a planned system.	-Butternut as a rotation crop has worked well -Use of manure (3t/ha) in combination with crop residues and fertilizer has had good results – building up his herds of cattle, goats and pigs for this purpose)	-Organic farming – zero use of pesticides and use of OPV seed	-None
Adaptations planned	-Use of wate water from treatment plant for watering mangoes and flowers	-Planting lucerne -Fencing larger area and including livestock in the system -Hybrid water source to incl. borehole and shallow wells from nearby river -Fruit: mangoes, bananas, pineapples	-None	-None
Suggested improvements	-Mulching, close spacing and mixed cropping, to further manage salinity issues	-Bird resistant sorghum -Summer cover crops -Mulching, close spacing and mixed cropping	-Mulching, close spacing and mixed cropping -Improved organic matter and crop	-Mulching, close spacing and mixed cropping - Improved organic matter and crop

			management practices	management practices
Marketing	Supply via CP Minaar transport to JHB and CT fresh produce markets. Presently looking for more local markets, as prices at fresh produce markets only determined after delivery, but transport costs paid upfront. Leads to heavy losses at times.	No longer sells to fresh produce markets in major centres. Focusing on local sales to PnP, Savemore and Boxer. Sells 2-3x/week.	Local sales only; school feeding scheme, Tzaneen lodge, local traders	Supply via CP Minaar transport to JHB and CT fresh produce markets. Maintains a fresh produce stall along the main road
DoA and other support	-Hydroponics unit (2 units of 3000 planting stations each), -Toilets and on site treatment.	Has put in grant proposals annually for the last 4-5 years- but with little support. DoA forgot about his proposal last year. -GLSCRP- Solar pumping, drip irrigation. ***NOTE: Mr Sukhela has requested solar on a different borehole to the plan and insists on the need for a shallow well to be linked into the system as well.***	Can not put in a grant request as registration of borehole cannot be completed without DoA support- which is not being provided. ***Note: They need support for borehole registration. Soil sample results have not been returned by DoA***	Some previous support from DoA- with borehole and irrigation. No support at present.

NOTES:

1. Except for the Mayephu Crop Cooperative, none of the other 3 farms actually operate as cooperatives. Two are now family concerns and the other is managed by 1 remaining member of the cooperative.
2. Changing from diesel powered to electrical borehole pumping systems has enabled cooperatives to make an income rather than barely managing to pay costs. The Mayephu crop cooperative is still relying on a diesel pump, which costs them around R600/ week – and precludes them from making an income. Patrick from Duvadzi has been able to realize a profit since switching to electricity and is now able to consistently pay his labour and expand his area of production from 0,5ha to 2ha at a time.
3. The LEDA training in finances, business management and marketing has been beneficial to cooperative members who are now using some of the information to improve their operations. There has not been much positive feedback regarding these trainings for community members in general however. Patrick was of the impressions that there needs to be follow-up after trainings and even tests to ensure that participants are learning and implementing information. Trainings by themselves are not very useful.
4. Generally cooperative members are well informed in terms of their soils, water management practices, crops and cropping practices. All displayed an impressive knowledge of requirements, and problem-solving ability with new pests and diseases as well as new climate constraints being experienced.
5. On all 4 cooperatives members are already taking steps to manage salinity and salinisation of their soils – using drip irrigation judiciously, making use of furrows and ridges to avoid salt build up in crop rooting zones, growing crops that are more tolerant to salinity, managing boreholes not to over pump and using organic matter in their soils.

6. New and quite devastating disease of tomatoes and baby marrows has been noticed in the area this season. It started last s eason but was not too widespread in the beginning. A number of pesticides have been used to spray the tomatoes to counteract this disease, but to little effect. Farmers were unable to identify the disease. An internet search has identified 3 whitefly transmitted tomato viruses that have been increasing dramatically in the Limpopo province, namely: Tomato chlorosis crinivirus (ToCV), Tomato torrado virus (ToTV) and Tomato curly stunt begomovirus (ToCSV) (Moodley, Gubba, & Mafongoya, 2019). These viruses diseases are also hosted in a number of weed species. The marked edge effect of these diseases is indicative of whitefly populations 'flying' in from other locations- most likely ZCC tomato farms in the region.


Figure 11: Right and far right: Virus diseases on tomatoes and baby marrows at the Mnisi cooperative in Mayephu. The results have been devastating with total crop failure in both crops.

Patrick from Duvadzi farm, has already decided not to plant tomatoes for the foreseeable future and is concentrating on leaf crops. He has made a decision not to plant crops that have a long turnaround time (cabbages and onions) and can only be harvested once, in favour of crops that allow for multiple picking.

7. All cooperatives are aware of mulching and the potential benefits but have found that the competition for grass from livestock has made this practise untenable.
8. All cooperatives have contributed significantly financially in terms of the infrastructure on their farms and aim to maintain any further granted infrastructure to the best of their abilities. Financial contributions on their part in terms of operations and maintenance is assumed.

Below are a few indicative photographs




Figure 12: Above Left to Right: Beautiful mustard spinach at Duvadzi farm. Packing *for the* local market *stall at Emvuleni Coop. We3ll tended* onions *at Mayephu crop Coop and* well-tended*, mulched tomatoes at Matsambo Ngamba Project.*

3. DEVELOPMENT OF COPS AND MULTISTAKEHOLDER PLATFORMS

3.1 DESKTOP REVIEW POLICY UPDATED

Update to desktop review of South African policy and implementation frameworks and stakeholder platforms for community-based climate change adaptation (Cb-CCA)

By Karen Kotschy, July 2023

Introduction

This document seeks to update and deepen the review submitted on 1 August 2022, WRC Deliverable No.1, entitled *"Desk top review of progress and present implementation of South African policy and implementation frameworks and stakeholder platforms for CCA"*. It provides a more in depth focus on policy and discussion of further potential frameworks.

The South African policy context

The Climate Change Bill (B9-2022) was tabled in Parliament in February 2022 by the Department of Forestry, Fisheries and the Environment, and is currently undergoing extensive public consultation. It has generated wide interest, with approximately 13 200 written submissions received so far by Parliament.[1] While the Bill has been under development for some time (since 2018), the pending promulgation of the Bill into the Climate Change Act will form the first legal framework for South Africa's response to the impacts of climate change, and will formalise the requirements for provincial and municipal structures to develop climate change needs analyses and implementation plans. It also provides for the establishment of some important climate-related multi-stakeholder forums (see Section 4 below).

The following principles for the interpretation and application of the Climate Change Act are congruent with community-based climate change adaptation:

- Principle 3(d): a contribution to a just transition towards low-carbon, **climate-resilient and ecologically sustainable economies and societies** which contribute to the creation of decent work for all, social inclusion and the eradication of poverty. While this is most often considered in terms of the "just energy transition" away from coal and towards renewable energy sources, it applies equally well to CCA by smallholder farmers.
- Principle 3(f): the need for decision-making to consider the **special needs and circumstance of localities and people that are particularly vulnerable to the adverse effects of climate change, including vulnerable workers and groups such as women, especially poor and rural women**, children, especially infants and child-headed families, the aged, the poor, the sick and the physically challenged.

[1] https://pmg.org.za/blog/TrackingtheClimateChangeBillinParliament

The Climate Change Bill specifies that national adaptation objectives must be set up and incorporated into all relevant national planning instruments, policies, and programmes, along with indicators for measuring progress towards achieving the national adaptation objectives. The Minister must collate, compile and synthesise information relevant to the achievement of the national adaptation objectives and thereafter publish a Synthesis Adaptation Report for consideration by Cabinet and to be used in national and international reporting processes.

A policy area which has gained much traction recently in South Africa is **Ecosystem-based adaptation** (EbA) which is an area in which the DFFE is active. Ecosystem-based adaptation is defined as "*sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities*" (Convention on Biological Diversity, 2010). The rationale for EbA is laid out in the National Climate Change Adaptation Strategy (NCCAS), under the key message "Adapting to build a strong South Africa" (DEFF, 2019a). The recent comprehensive review of CCA approaches and conceptual frames by Singh et al. (2021), includes EbA as one of the 11 key approaches/frames. How EbA articulates with related approaches such as community-based CCA, community-based natural resource management and disaster risk reduction is nicely covered by Aronson et al. (2019).

EbA has potential for use as a theoretical and policy framing for work with smallholder farmers in South Africa, because:

- It integrates ecosystem stewardship, natural resource management and climate change adaptation, all of which are important aspects of smallholder farmers' activities.
- It has potential to create a bridge between smallholder farmers and other stakeholders within multi-stakeholder platforms in rural landscapes (e.g. those concerned with biodiversity protection, water resources management and economic development).
- It is a concept that opens the door to new funding streams (Aronson et al., 2019).
- Municipalities in the upper Thukela catchment have been identified as priority municipalities for EbA, with Okhahlamba Local Muncipality featuring at **number 1** (DEFF, 2019b; Figure 1). This could provide an additional entry point through which to engage municipalities in the project CoPs and multi-stakeholder forums, although it is acknowledged that these municipalities are small and severely lacking in capacity (Okhahlamba, for example, does not have any environmental management staff).

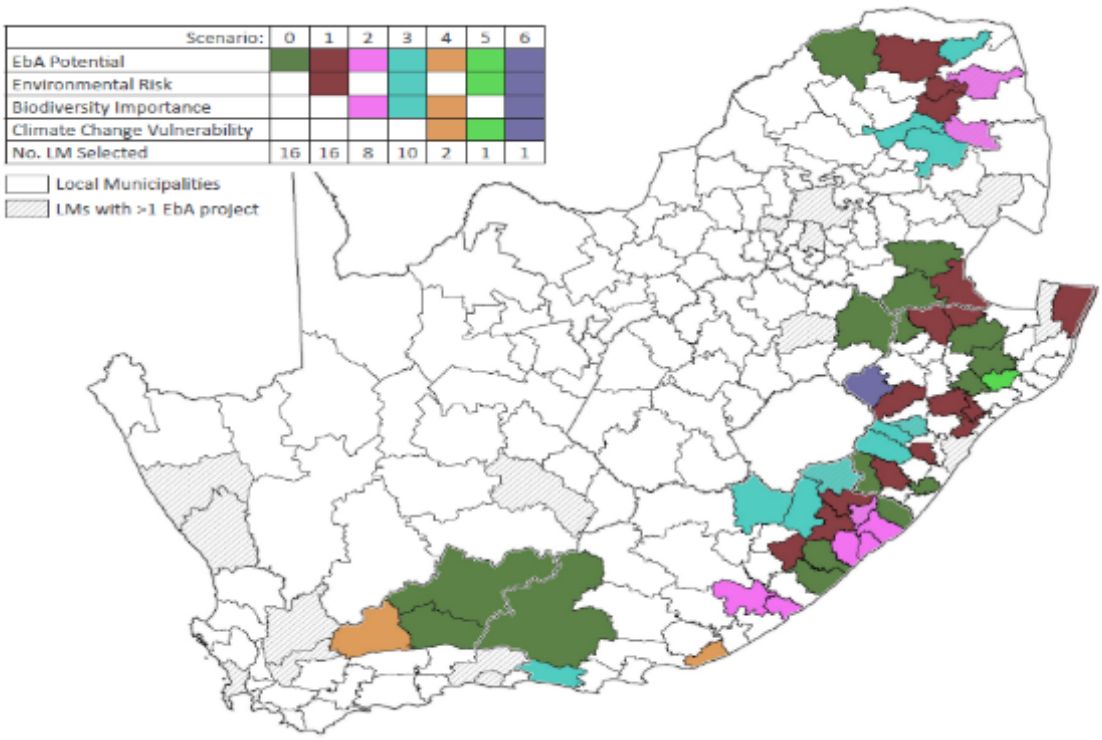


Figure 13: Final prioritisation of local municipalities based on the biome-level EbA score. The selected local municipalities represent the top quartile of EbA scores (i.e. local municipalities with high EbA potential). Local municipalities are classified into seven implementation scenarios based on high values (top quartile) for risk of ecosystems being lost to human development; biodiversity importance and vulnerability of ecosystems to climate change. Source: DEFF, 2019b.

The following criteria have been defined for any activity, initiative or strategy to qualify as EbA (FEBA, 2017):

- EbA should reduce social and environmental vulnerability to climate change.
- EbA should generate social benefits and support the most vulnerable.
- EbA should restore, maintain or improve ecosystems and biodiversity.
- EbA should be mainstreamed into policies at multiple levels.
- EbA should support equitable governance and enhance capacities.

A final area of policy is **provincial and municipal government climate adaptation policy**. The Climate Change Bill requires MECs and mayors of metropolitan and district municipalities to undertake a climate change needs and response assessment for their province, metropolitan or district municipality, and a climate change response implementation plan, which will form part of the Integrated Development Plan (IDP). The time frames for developing these plans have been delayed because of the delays in the passage of the Bill through Parliament (in part due to COVID-19). The disconnect between what is expected of provincial and district structures and their ability to meet the requirements has been covered in the previous review. However, at some point in the near future these requirements will become legally binding, and the provincial and municipal climate change plans will be relevant policy documents with which this work should engage.

CCA tools and frameworks

Two important national information portals are the **National Climate Change Information System** (NCCIS) and the **National Climate Change Response Database** (NCCRD). The NCCIS is hosted by the DFFE and can be found at https://nccis.environment.gov.za/

The NCCIS is intended as an overarching portal for climate change information in South Africa, with an intention to develop linked provincial sites in due course. The NCCIS offers a series of decision support tools to inform policy and decision-making. These include the National Climate Change Response Database, as well as the Let's Respond Toolkit (see Table 1), the CSIR Green Book's Risk Tool, the South African Risk and Vulnerability Atlas (SARVA 3.0), and various other data collections from the South African Weather Service, SAEON and SANBI related to climate change.

The NCCRD is a database of climate change adaptation and mitigation projects or interventions. Although the catalogue of adaptation projects is still rather small, users are encouraged to add their projects as a way of incorporating what is happening on the ground into national adaptation reporting, monitoring and evaluation. The activities under the current WRC project and related work should be submitted on this platform.

At the level of local government, a fair amount of support for climate change integration is available, through the Department of Cooperative Governance and Traditional Affairs (CoGTA), the South African Local Government Association (SALGA), NGOs such as ICLEI, and tools such as the Let's Respond Toolkit and the Green Book (Table 2). Further guidance on embedding climate change adaptation within local government is provided by AWARD (2020).

Table 4: Local government climate change support organisations and tools.

Organisation/tool	**Description**
SALGA: Environment and Climate Change within the Municipal Services and Infrastructure Directorate	SALGA advises and supports municipalities in the drive to deliver on services to communities. SALGA's National office is based in Pretoria with offices in each of the nine provinces. SALGA has eight directorates and several working groups. They provide specific advice to councilors on their role regarding climate change.
CoGTA	CoGTA is supporting integration of CC into municipal planning. A recent analysis of 2021/22 IDPs shows there is still not adequate mainstreaming of CC despite support by SALGA and the Let's Respond toolkit. They are trying to promote common thinking on support among SALGA, CoGTA, DFFE and DARDLEA. They suggest a planning process for CC similar to the IDP process. CoGTA wants standardised KPIs and targets for CC in the District Development Model (DDM) "One Plan-One Budget". They want to "develop a culture of performance management", including evaluating IDPs on the process followed for CC.
ICLEI	Provides various CC support to municipalities, directly and through SSA Covenant of Mayors (36 countries in Africa) e.g. GHG inventories, RVAs, training, peer exchanges, tools, resources, unlocking climate finance. Developed Phase 1 Just Transition Strategy (under Urban-LEDS project).

Green Book (CSIR, 2019)	An online planning support tool that provides quantitative scientific evidence on the likely impacts of climate change and urbanisation on South Africa's cities and towns, as well as presenting a number of adaptation actions that can be implemented by local government to support climate resilient development. The Green Book was co-funded by the CSIR and the International Development Research Centre (IDRC), between 2016 and 2019. The CSIR has partnered with the National Disaster Management Centre (NDMC) and co-developed this product with universities, government departments, NGOs and other peer groups. It provides evidence of current and future (2050) climate risks and vulnerability for every local municipality in South Africa (including settlements) in the form of climate-change projections, multidimensional vulnerability indicators, population-growth projections, and climate hazard and impact modelling. Based on this evidence, the Green Book developed a menu of planning-related adaptation actions and offers support in the selection of appropriate actions from this menu to be integrated into local development strategies and plans.
Let's Respond Toolkit (Sustainable Energy Africa and Palmer Devlopment Group, 2012)	The Let's Respond Toolkit (DEA and GIZ) has been developed to integrate climate change risks and opportunities into municipal planning, building on the initial LTAS research process and providing an online resource of information as well as tools to respond to climate change at a local level as part of the Local Government Climate Change Support Programme (DEA, 2017). It includes a vulnerability assessment toolkit, climate change response plan templates and a stakeholder engagement toolkit.

Multi-stakeholder platforms for CCA

The Climate Change Bill mandates the establishment of provincial and local government climate change forums. Existing Premiers' intergovernmental forums are to act as **Provincial Forums on Climate Change**, to both coordinate and report to the President's Coordinating Council on climate change activities in their provinces. Similarly, municipal district intergovernmental forums are also to serve as **Municipal Forums on Climate Change**, and are expected to coordinate climate change action in their districts and report to the Provincial Climate Change Forum. Technical support structures may be established if needed. These provincial and municipal forums on climate change are inter-governmental forums in that they are intended to bring together officials from different government departments to address climate change in a cross-cutting way. They are not, however, true multi-stakeholder platforms.

While some provinces and municipalities do have effective climate change forums (e.g. the forum coordinated by DARDLEA in Mpumalanga), most of these are yet to be established.

The **Presidential Climate Commission** is an important national multi-stakeholder forum provided for in the Climate Change Bill, and which is now operational. It includes representatives from civil

society, business, government and organised labour, with the purpose of advising, monitoring and evaluating progress towards the country's adaptation goals.

At District Municipality level the **Disaster Management Advisory Forums** also act as multi-stakeholder forums for climate change response. These forums comprise all the relevant stakeholders and role players in disaster risk management in the municipality, including non-governmental and community-based organisations, individuals or groups with special technical expertise, representatives of the local municipalities in the district and representatives of neighbouring district municipalities. Forums must meet at least four times a year and must include the following members:

- Designated focal points in municipal departments and entities who are involved in the management of disaster risk or the administration of any other national legislation aimed at dealing with an occurrence defined as a disaster in terms of section 1 of the DM Act, including the district and provincial Disaster Risk Management Centres.
- Experts in disaster risk management
- Heads of neighbouring disaster risk management centres.
- Representatives of each of the local municipalities within the district, as follows (chairpersons of disaster risk management coordinating structures in local municipalities, municipal managers).
- Local representatives of national and provincial organs of state and local emergency and essential services (health, emergency medical services, safety and security)
- Regional/local representatives of other relevant national organs of state (Departments of Agriculture, Education, Health, Home Affairs, Social Development, Water and Sanitation.
- Regional Tourism Boards
- Parastatals providing essential services (airports, ESKOM, SAFCOL, SANParks, SANRAL, SAWS, Transnet, Telkom)
- Representatives of organised business.
- Representatives of organised labour.
- Representatives of the South African Local Government Association (SALGA).
- A representative of the Disaster Management Institute of Southern Africa (DMISA).
- Non-governmental and community-based organisations and other relevant role players such as Councils of Traditional Leaders, the South African Council of Churches (SACC), Agricultural and farm workers' associations, South African Red Cross Society
- Representatives of institutions of higher learning, including universities, colleges and scientific and research centres
- Representatives of the media.

As can be seen from the above list, the DMAFs are significant multi-stakeholder forums which also include role-players from the agricultural and water sectors. Besides disaster response and preparedness, their role includes development and maintenance of disaster risk management information and communication systems, including early warning systems – which often include climate-related information. They are also meant to "assist, by means of focused, integrated and holistic risk reduction strategies within the broader context of sustainable development, with the creation of resilient individuals, households and communities who are alert and self-reliant",[2] which

[2] http://www.waterberg.gov.za/docs/dmp/SP%2010.pdf

speaks to a more proactive, adaptation-type approach rather than simply a reactive disaster-response type approach. While the functionality of these forums will vary across districts, and not all of the stakeholders will be relevant to adaptation initiatives, they do provide an already-established forum within which adaptation issues could be included and relevant stakeholders engaged.

Catchment Management Forums (CMFs) are public forums under the national Department of Water and Sanitation, specifically focused on water resources management. They may be established for a river catchment or portion of a catchment. Their role is to provide stakeholders with relevant and up-to-date information, to provide advice and input into water management processes, to implement decisions and to act as a watchdog (AWARD, 2014). CMFs are required to identify and secure the participation of relevant stakeholders. While CMFs are important where they are well-established and functional, they are more relevant for integrating climate change concerns into water resources management and for water-related climate change adaptation. However, they can also serve as a means of identifying and engaging relevant stakeholder for agriculture-related community-based CCA.

Another relevant type of regional-level forum that is gradually becoming more widely established across the country is **multi-stakeholder catchment-based forums known variously as catchment partnerships, water source partnerships or water funds**, which aim to bring a variety of land and water users together to facilitate integrated management of land and water. Such partnerships have been established in many catchments, including the uMzimvubu (the Umzimvubu Catchment Partnership), the uThukela (the newly formed Northern Berg Collaborative), the uMngeni (the Umgeni Ecological Infrastructure Partnership) and the uMKhomazi (the uMkhomazi Working Group). The Living Catchments Programme has provided significant funding (DSI, WRC and SANBI) to support such partnerships over a ten-year period (2015-2025) in selected river catchments.[3] However, these partnerships are also often led and resourced by NGO and civil society partners rather than government.

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3.2 Local CoPs

a. Background

The focus for the local individuals and groups is on co-creation of knowledge, social learning and innovation related to climate change adaptation. To increase the impact of knowledge, we need to move beyond a focus on knowledge products (on the infomediary and knowledge translation end of the spectrum in the diagram below), to "knowledge activities" that revolve around the creation of strong, lasting, and reflexive relationships between the science and policy worlds and beyond for collaborative co-construction and synthesis processes.

There is a need for an engaged approach that sees knowledge users as partners in defining the questions, interpreting the answers, and contributing their expertise and learning and provides a more multifaceted appreciation of climate change in which relationships, power dynamics, trust, and conflict management are as important as access to accurate information in moving towards climate resilience.

Many sources of knowledge (local, experience-based, indigenous, scientific) are relevant in the adaptation decision-making and implementation context. The role of a climate knowledge broker is as a facilitator of change, to ensure better decisions are taken (based on evidence, including multiple perspectives) and that these are effectively implemented for a more climate-resilient future.

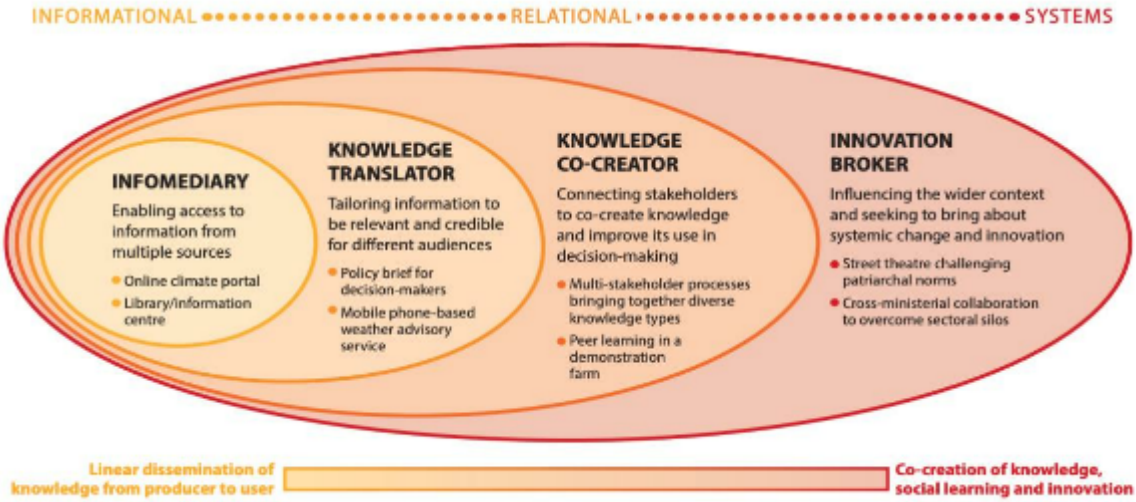

Figure 14: Spectrum of knowledge broker roles, adapted from Harvey et al. (2012) and Shaxson et al. (2012) (Scodanibbio, Cundill, & McNamara, 2023)

The concept of Communities of Practice (CoPs) to engage, understand and move towards action, as well as exchanging of lessons learned is one way to do this (Phipps & Morton, 2013).

Communities of practice (CoPs) are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. They often focus on sharing best practices and creating new knowledge. Interaction on an ongoing basis is an important part of this.

Essential elements of a CoP:

-Share experiences and know-how
-Discuss common issues and interests
-Collaborate in solving problems - Analyse causes and contributing factors
-Experiment with new ideas and novel approaches
-Capture/codify new know-how

Role of facilitator/innovation broker (Turnhout, Metze, Wyborn, & Klenk, 2020), (Butler, et al., 2022)

- Create bridges and foster a mutual understanding – and over time, trust – across a plurality of perspectives and actors. In so doing, encourage the identification of shared interests and agendas, and promote a broader understanding of these complex dynamics.
- Nurture and create space for more collaborative and transdisciplinary decision-making processes, grounded in political and social realities. Deliberately acknowledge and address power dynamics and consider the empowerment of more marginalised actors as a core goal.
- Develop, utilise and facilitate the use of interactive, experiential, solutions-oriented approaches.
- Undertake a suite of related, complementary activities to encourage change, evidence-based decision making and action.
- Approach knowledge brokering as an adaptive, circular process that needs to be strongly driven by reflection and learning.
- Challenge the constant drive toward disciplinary refinement as the only goal of research and promote a systems perspective.
- Create broader awareness.
- Showcase the importance of collaborative decision-making spaces as places that can lead to the cocreation of more sustainable, inclusive and effective solutions than those developed top-down.

There are different ways in which to implement and focus CoPs at a local level. Below are a few examples.

CoP and Learning Networks:

Community learning networks are connections formed and maintained by local people with the aim to share information and support each other's learning. They are generally called learning groups or social support groups. These networks are important in bringing together local people, development practitioners, researchers and other role players to access and share resources and information that can encourage communities to take up improved practices. Most importantly, community learning networks are an effective way for local people to share experiences and assist each other in understanding and implementing new practices (Steeples & Jones, 2002). Community learning networks have similar features to CoPs but may include wider platforms of learning and sharing such as community engagement forums, information days and farmer to farmer learning through cross visits. These networks are connected through shared practice and are capable of sharing knowledge and identity. In the context of climate smart agriculture practices, these platforms provide farmers the opportunity to share their experiences on the practices implemented to mitigate the effects of climate change.

CoP and Farmer Field Schools:
Farmer Field Schools (FFS) are hands-on practical learning schools based on adult education principles and experiential learning. FFS provide a platform for farmers to convene, make field observations, relate those observations to the ecosystems and apply previous and new information to make informed decisions. FFS is implemented through groups with a common interest to investigate a certain topic. Topics can include IPM, organic agriculture, crop production and animal husbandry amongst others. In FFS, what is meaningful is decided by the farmers through exploration and discovery, learning is a result of experience, learning is an evolutionary process and each person has a unique experience of reality. Group managed trials are at the heart of FFS as the learning space is in the field where the trial is conducted (Duveskog, 2013).

CoP and Participatory Innovation Development (PID):
Local innovation is the process by which people find new and improved ways of doing things and take initiative to try out these new practices using their own resources. They may be doing this as a way of exploring new possibilities and discovering alternatives to coping with changes in their natural resource base, asset availability or other socio-economic contexts which may be a result of changes in policy, natural disasters or other external factors. Through these processes of exploring, experimenting and adopting new practices, people come up with local innovations that were developed and are understood by them. Local innovation can take place at an individual level, through groups or may include the community at large (PROLINNOVA, 2009). The emphasis is on people being actively involved in discovering and exploring new ways of doing things. Participatory Innovation Development which can also be referred to as farmer led joint research is a process whereby local people work together with researchers and development practitioners to investigate possible ways to improve their livelihoods. Research in this context entails going beyond on field trials but also looking at the value chain, community relationships and ways to manage communal resources. With the current global issue of climate change, PID is of significant importance in helping farmers explore ways of adapting and improve the resilience of their farming systems through improved climate smart practices such as those encompassed in conservation agriculture (Wettasinha, Wongtschowski, & Waters-Bayer, 2009).

CoP and Community Savings Groups:
Community savings groups have been around for a long time and are prevalent in villages is in Africa, Asia and Latin America where banking services are absent. Savings are also called rotating savings and credit association (ROSCAs'), savings and credit groups (SCG's), village savings and loans associations (VSLAs) and "merry go round" and they all have similar objectives. Community managed savings and credit groups are a convenient way to save money, gain access to small loans, obtain emergency insurance and ultimately gain a means of livelihood in order to build economic empowerment. Savings groups are self-managed and respond directly to unmet financial services of the rural poor residing in remote areas (Seifert, 2016). In South Africa, savings groups have gained popularity in over the years, due to their convenience, financial security and ease of access. Financial exclusion from the mainstream economy has led to the development of community based solutions for the black population through savings groups where women make up the bulk of the members (Mathebula, 2014). Community savings groups provide a platform for farmers to learn skills on financial management, create networks for future business opportunities and improve/expand their existing enterprises. In this way, they can form an essential component of a community learning network.

Community of Practice in Stakeholder Engagement:
Communities of practice can play a significant role in linking practitioners, knowledge producers and policy processes to analyse, address and explore solutions to problems. There are three ways in which CoPs can link knowledge, policy and practice:

- Firstly, they can encourage collaboration between researchers, and practitioners. Researchers can capitalise on knowledge by practitioners to ensure that the problems they are working on are relevant. CoPs create an environment for reflection, interpretation and feedback.
- Secondly, CoPs can be useful in creating an environment where researchers can work together to influence policy.
- Lastly, CoPs can play a role in involving policy makers in knowledge generation, seeing that the domains of research and policy are interlinked by complex social networks.

Other ways in which CoPs can be useful to development practitioners, policy makers and researchers are when emphasis is placed on fostering learning, rather than trying to control CoP's. Organisations can focus on facilitation not technology, understand members' needs and capacities, recognise the two faces of communities as some communities can reject new ideas and practices and finally they need to be sensitive to the different stages of CoP development (Hearn & White, 2009)

The real challenge of communities of practice is to develop the community and the practice simultaneously. Community development refers to the development of skills of the people involved in coordination, facilitation and knowledge management of the community. Development of the practice entails that resources, information and knowledge are captured and enhanced over time. A community of practice has flexible boundaries, meaning that membership involves whoever is interested in the practice, members participate in different ways and to varying degrees (Wenger, Communities of Practice; Thinker, Learning as a Social System, 1998).

In this research process the village-based climate resilient agriculture (CRA) learning groups are the local CoPS and have been developed as a **facilitated process of locally led adaptation (LLA)**.

The following principles of LLA (Coger, et al., 2022) have been incorporated into this process:

1. Devolving decision making to the lowest appropriate level
2. Addressing structural inequalities faced by vulnerable and marginalized groups including women, youth, children and people living with disabilities.
3. Providing patient and predictable funding that can be accessed more easily: Supporting long-term development of local governance processes, capacity, and institutions.
4. Investing in local capabilities to leave an institutional legacy for adaptation initiatives over the long term.
5. Building a robust understanding of climate risk and uncertainty.
6. Flexible programming and learning: Enabling adaptive management.
7. Ensuring transparency and accountability.
8. Collaborative action and investment.

Shammin et al. (2022) highlight community-based initiatives as promising approaches to lessen the impacts of climate change while empowering people and bolstering community resilience. Local innovation and agency are critical complements of these programs in fostering sustained community

resilience. They posit that community-based approaches with direct engagement of the vulnerable population, and which are adequately supported by international agencies, national and local government, academics, experts, and nonprofit organizations, have the potential to develop locally relevant, culturally appropriate, and sustainable solutions. The authors adopt a "holistic approach to designing community-based adaptation programs that builds on past approaches while maximizing opportunities presented by recent developments in SDGs, resilience principles, and disaster risk reduction (DRR) initiatives" (p.12).

According to Shammin et al. (2022), community-based CCA can include activities in the following six broad categories: livelihood diversification, capacity building, ecosystem integrity, resource management, microfinance and insurance, and infrastructure.

Figure 15: Classification of community-based adaptation activities. Source: Shammin et al. (2022).

The kind of Cb-CCA model described by Shammin et al. (2022) is very similar to that envisaged in this project. It outlines features of the context, the process followed, and the outcomes, shown in in the figure below. It is a flexible model where programs may be initiated by the community, the government, or NGOs.

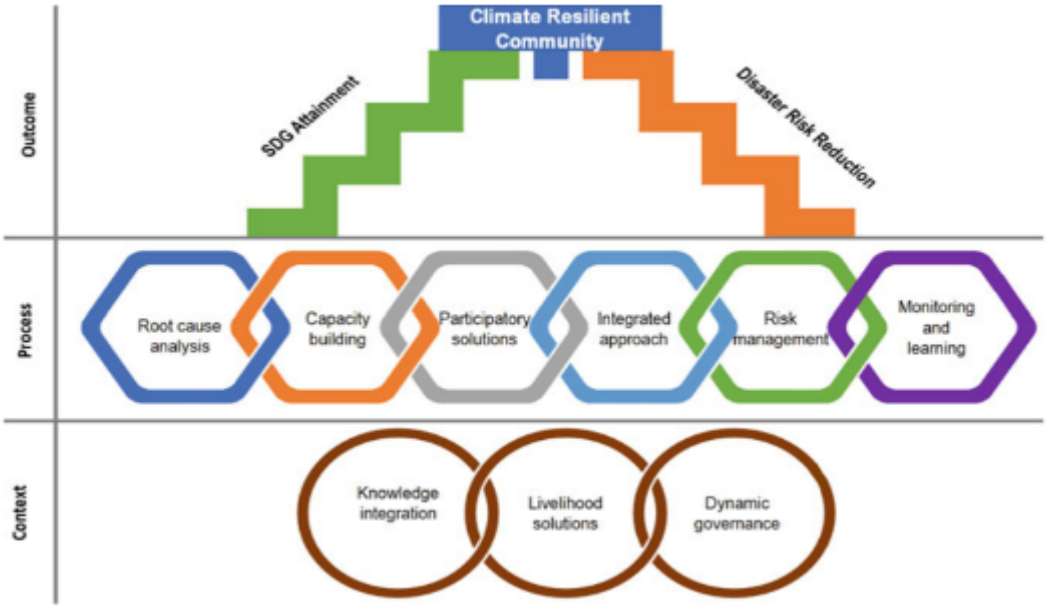

Figure 16 Community-based adaptation framework for climate adaptation and community resilience. Source: Shammin et al. (2022).

Solutions are developed in **context** by integrating indigenous knowledge, scientific information and global experiences. They focus on supporting livelihood opportunities, and they are governed at the community level, making use of existing social capital and other complementary programmes.

The **process** would include participatory solutions and iterative learning at the local level, complemented by transformative action at national, regional, and international scales. Monitoring and learning are a key part of the process. The scope would consider the impacts of climate change alongside poverty, ecological integrity, gender equality, and other development priorities.

The **outcomes** include proactive planning for maximising Sustainable Development Goal (SDG) attainment and disaster risk reduction, which allows CCA activities to tap into and find synergies with these cross-cutting imperatives.

The CRA learning groups provide a voluntary platform for community members to explore the impact of climate change on their resources, their livelihoods and farming systems, incorporating a wide range of perspectives (scientific, local and traditional). The cyclical process of innovation is shown below outlining also how the CRA learning groups become the central point for development of further focus areas and social organization and interact with external stakeholders.

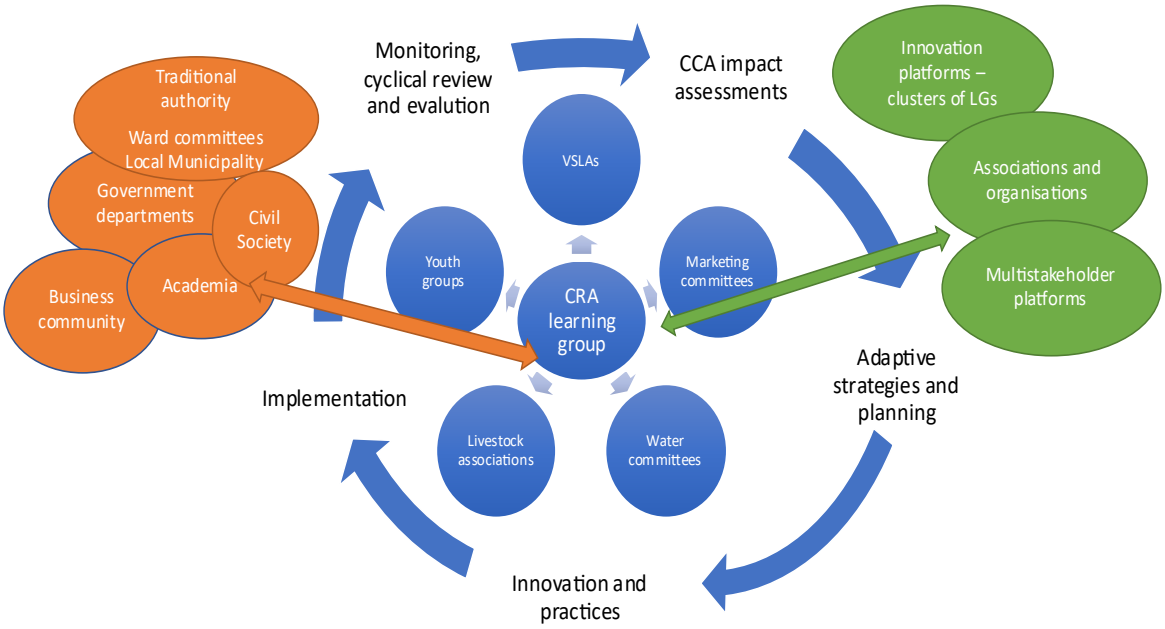

Figure 17: CRA learning groups and relationship building with local and external stakeholders.

Human-centered design (HCD), an empathy-driven approach to innovation that focuses on user needs and offers promise for the rapid design of innovations and practices for implementation has been linked to the adaptive planning process. This provides the cyclical backbone of the facilitation process of observation, analysis, ideation, co-creation of testable solutions, and implementation for the community-based climate change adaptation.

Local innovation in agriculture and natural resource management goes beyond technologies to socio-organizational arrangements such as new ways of regulating the use of resources, new ways of community organization, or new ways of stakeholder interaction. It is a process in which farmers and other stakeholders engage in joint exploration and experimentation leading to new technologies or socio-institutional arrangements for more sustainable livelihoods. This action-oriented approach promotes engagement in a process that strengthens the capacities of agricultural services to support community-led initiatives (Hartmann, 2009, Wettasinha et al., 2009).

One of the leading authorities on the process of participatory innovation development is the Centre for learning on sustainable agriculture - ILEIA based in the Netherlands. ILEIA has described PID as "a process between local communities and outside facilitators which involves:

- Gaining a joint understanding of the main characteristics and changes of that particular agro-ecological system.
- Defining priority problems.
- Experimenting locally with a variety of options derived both from indigenous knowledge … and from formal science, and
- Enhancing farmer's experimental capacities and farmer-to-farmer communication" (Reijntjes, Haverkort, & Waters-Bayer, 1992).

To summarise the PID steps

1. Getting started (getting to know each other);
2. Joint analysis of the situation – the problems and opportunities;
3. Looking for things to try to improve the local situation;
4. Trying them out in community-led participatory experimentation;
5. Jointly analysis and sharing the results; and
6. Strengthening the process, often through improving local organization and linkages with other actors in R&D, so that the PTD process will continue.

The methodological process of ensuring knowledge co-creation and innovation development in and beyond these CRA learning groups entails three broad facilitated interventions. This entails analysing the present situation, identifying intervention options and processes and implementing these and building improved systems and social agency. This is also a cyclical process where learning and implementation can be strengthened and deepened over time.

The overall outcomes of such as process are expected to be:

- Improved participatory decision making to support implementation and innovation.
- Improved governance - new community-based structures
- Improved governance improved rules and logistics within community-based structures.
- Improved governance- coherent collaboration with stakeholders and role players.

The process with steps outlined are shown in the diagram below.

DECISION SUPPORT FRAMEWORK/ FRAMEWORK TO SUPPORT INNOVATION AND DECISION MAKING					
PRESENT SITUATION →		**INTERVENTIONS AND PROCESSES TO BUILD SOCIAL AGENCY** →		**IMPROVED DECISION MAKING AND GOVERNANCE OUTCOMES**	
Actions	**Joint analysis**	**Actions/Outcomes**	**Co-learning**	**Actions/Outcomes**	**Joint decision making**
Focus group discussions and mapping: socio-ecological patches	Present situation in land use and management, including needs and issues (emerging from discussions)	Focus group discussions/ Thematic workshop: CC, resource issues (erosion, alien invasion, wetlands and rivers, water access, grazing management)	Socio-ecological mapping: Impact of human interventions and climate on the environment	Adaptive planning workshop using layered socio ecological maps (expert and community combined)	Management plan for water and land resources
Village walks for detailed resource discussions and mapping (key informants)		Community workshops on CC impact (social, economic, farming, resources). Adaptive strategies (communities and stakeholders combined)	CC impact and adaptive strategies		Build improved systems and social agency
Expert ecological mapping (GIS)incl EIA, Veld assessment, water resource survey etc. (with key informants)	Collect and analyse information	Prioritization of adaptive measures, and practices -	Village based learning groups	Further social organisations develop (including marketing, microfinance, water livestock etc.)	Linked youth groups in resource management and enterprise development
		Experimentation with new practices and innovations in Climate resilient agriculture (Individual smallholders and support organisations)	CRA experimentation and implementation	Iterative experimentation with CRA practices to tackle more complex issues,	Improved land use and coordination at community level
		Seasonal review and re-planning	Identify options and implement	Stakeholder engagement - innovation platforms and multistakeholder forums etc	
Focus group discussions, individual interviews	Local structures and decisions made by them, including factors that influence individual and community decision making (emerging from discussions)	Thematic focus areas: water access and management, livestock and grazing management, natural resources management,	Learning group discussions and prioritization of urgent issues	Committees discuss, plan, and implement (with support) prioritized actions in thematic areas	Community level structures develop for improved governance- with broader and equitable community involvement linked to local and traditional authorities
		Further engagement with stakeholders for expanded implementation options around water and resources management		LGs, committees, and community structures engage in resource management projects with a range of stakeholders	

OUTCOMES

- **Improved participatory decision making to support implementation and innovation.**
- **Improved governance - new community-based structures**
- **Improved governance improved rules and logistics within community-based structures.**
- **Improved governance- coherent collaboration with stakeholders and role players.**

Figure 18:Methodological process for innovation and social agency development within CoPs

b. Principles of operation: Learning Groups

Starting the process.

ENTRY INTO THE COMMUNITY

Community entry is a process of initiating, nurturing, and sustaining a desirable relationship with the community, to secure and sustain the community's interest. It helps to gain support from the community leaders, establishing a good working relationship in all aspects of a programme. The mode of entry into a community determines the success or failure of the project. The success of a facilitated change process is dependent on the relationship created during the entry process, therefore it is paramount that community entry should be carried out in a way that will maximise participation, reduce community conflict and enhance the sustainability of projects. (Neighbours Initiative Alliance , 2018)

The general steps for community entry are by now well known. In the communal tenure areas, permission for entry needs to be obtained from either or both the traditional authorities and the local ward council authorities and then broad-based community meetings and conversations introducing the particular process are required prior to starting an initiative.

It is important in the early stages to inform the local authorities, but not necessarily to expect them to manage the community engagement process. More often than not these authorities are partisan and prejudiced in favour of processes that can benefit them directly. Thus, conversations need to be held widely in the community. This can be done through interviews with individuals (vocal persons and community leaders), focus groups discussions (groups in community including farmers' organisations, development committees, church groups, feeding schemes and the like), mapping (initial transect walks followed later by more detailed mapping), or house to house calls.

Introductory meetings are held to outline the project/process, the expectations and potential outcomes and benefits and overall timing of the interventions. Here it is important to clearly state what specific benefit is foreseen for the community and what is expected of them in return, but to be sure not to make unrealistic promises or share overall budgets at this stage- as it causes very unrealistic expectations and also potential conflict later in the day.

Community consultations are also very important. For example, instead of imposing strategies on communities, suggestions of the best strategies come from the community. This is because the community understands its issues and most times have the best strategies to tackle the issues. The communities will also share what their priorities and needs are.

Once the entry process has been established a broad-based invitation to as many community members as possible, focusing on those who are active in farming and land use, is made to kick start the process. Involvement of all community groups and stakeholders that benefit from the water system or project will build relationships which will bridge gaps between barriers that become 'sticky subjects' for many projects and process.

Participant selection

Once the processes have been introduced, the initial situational analysis workshops are conducted. These are still open to the whole community, with an emphasis on the thematic process of the intervention, in this case climate change and adaptation. It is best to start with a community level analysis of climate change issues, adaptive strategies and options and adaptive practices that can be prioritized and to start on learning and interventions, before embarking on detailed analysis and eco system services mapping, as the latter initially entails many smaller processes (focus groups village

walks, mapping etc) that can be onerous for community members if the context within which they are doing this is not well defined. Participants need to appreciate the 'why' of these activities, beyond just gathering information for outsiders.

This also allows for setting up of a CRA learning group, where participants learn and implement together in a way that assists in building coherence and cooperation, which makes subsequent participatory mapping and analysis a whole lot easier and more productive. It also allows for a natural or organic participant selection process, based on interest and need and negates the necessity for outsider stipulation of criteria for participation to a large extent.

Having said this, discussing criteria for participation at a community level with input form the facilitation team is also a requirement. It helps to provide focus, but also to keep the group open to new membership in the longer term and to allow for conscious involvement of more vulnerable community members and groups.

There is a trend in these kind of groups for people who have been active since the initiation of the group to try and exclude people who want to join later, mostly on the basis of effort and time. This also related to certain prejudices in the community against particularly vulnerable community members as they are often seen as taking resources from the group rather than contributing to the joint efforts. These issues need to be facilitated in the group to ensure a willingness to bring on board new people and mentor them through the processes and to also allow for vulnerable individuals to engage.

Criteria for selecting and working with participants in CRA learning groups have been suggested by the senior MDF field work team as:

- A need to focus on household level- rather than group-based projects such as community gardens or cooperatives.
- Community members self- select to be part of a CoP using a list of criteria that they have been involved in setting up.
- Participants should already be actively involved in Agriculture.
- Participants should be selected in geographical clusters so that they are reasonably close to each other to facilitate their interaction.
- Choices for participants should be gender inclusive.
- The gardens/fields should be fenced: With regard to this criterium, they felt it is a good idea for the experimentation side of things but can cause issues of giving preference to better resourced individuals in the community. Sometimes these individuals are also not that keen to use their fenced land for the implementation.
- It would be an idea to set up a CoP that is open to all smallholders/ producers but have central group or person such as a local facilitator, who liaises and organises, to divert power from the research team. CoPs need to become strong enough to help members address issues. These CoPs are also engaged in self-monitoring and collecting and analysing data, according to the principles of Participatory Action Research.
- There should be a selected number of participants for inputs/data collection per site. It does not have to be everyone involved as long as the criteria for receiving inputs and doing data collection are clearly set out and are acceptable to the broader CoP.
- It is a good idea to map all the stakeholders involved with the CoP and to recognise the contribution of other organisations in the community – so that different organisations do not work at cross purposes in one area.

- It would also be an idea to create a participatory landscape map (with photos) – such as a transect walk, that represents the system, the issues, the adaptation and the successes of the CoP (pers comm M Dlamini, T Mathebula 2022).

CRA learning group chronology of activities.

The learning group process is initiated as a series of workshops and individual discussions to elucidate the local context, needs and issues in the community and motivation for action (Kruger, 2021).

In these community level workshops/dialogues facilitation tools have been designed that can assist in the analysis. A number of different tools have been designed for the following explorations/workshop activities: Differentiating between weather and climate change, unpacking changes in the environment and livelihoods, assessing those most affected by climate change, exploring impacts of climate change and exploring current practices and adaptations already being implemented to respond to these changes.

Below is a chronology of steps or processes to be undertaken at community level, assuming there is already some level of relationship and interest**.** These steps work towards building a CoP /learning group:

- Understanding climate change and impact (academic understanding, community understanding, including the climate change impact map and seasonality diagrams)
- Climate change and agriculture (farmers' roles and responsibilities, current practices/challenges)
- Changes, reasons and responses (what are we doing already, what do we think we can do that will help, willingness to change)
- Discussions around change (most important problems, what do we foresee in the future based on what we are doing, effectiveness of our adaptation responses)
- Who do we want to work with (outside organisations, local institutions, learning groups, other community organisations? Are there new relationships or new ways of working together that can help)
- Is anyone doing new and interesting things (local innovations to consider – what has been tried and how well has it worked?)
- Prioritisation of adaptive measures:
    - Reality map (present agricultural practices and impact).
    - Walk about in village.
    - Desktop review for appropriate practices or to research practices suggested by participants.
    - Focus group discussions.
    - Prioritising (defining criteria).
    - Practices that mostly match criteria (short visual introductions for likely doable practices in the area, introduce about 5 practices – facilitator's judgement call) Link to local practices.
    - Ranking exercise linking criteria to practices.
    - Learning group members choose practices they would like to implement or experiment with. This could mean:
        - Subgroups dealing with different topics (e.g., gardens, fields livestock)

- Whole learning group doing practices in succession (e.g., start with gardens first)
- Defining a chronology of activities e.g., start with trench beds and mulching, then implement diversion ditches and stone bunds etc.
- Individuals choose an initial set of 5 practices for example and then upon review decide how to build on that in a following season.

- Implementation/trying out new ideas: training and mentoring, demonstrations, cross visits, specialist support and
- Monitoring and review: Participatory development of indicators, evidence based qualitative and quantitative indicators, citizen science, seasonal review and re-planning sessions.

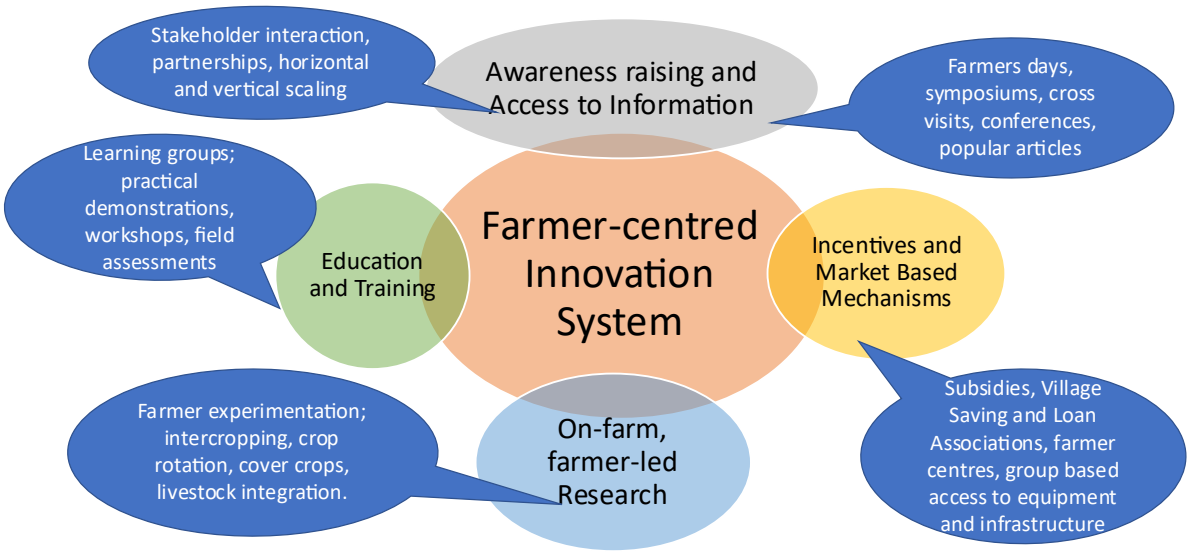

Figure 19: A diagram outlining different sets of activities undertaken in a CRA learning group

This approach takes cognisance of the complexity of introduction of CRA into a farming system, including working with smallholder farmers as partners in the knowledge co-creation process through on-farm research and experiential learning, as well as embedding the process into the existing socio-political environments and economic value chains

In the smallholder context introduction of CRA into the farming system requires the design, introduction and facilitation of a reasonably complex IS (innovation system) approach by the implementers, and of practice, labour and resources (including natural and financial resources) by the farmers that have system wide implications. A strongly participatory facilitation process is required to ensure synergies across the activities and the knowledge co-creation crucial to the success of the process.

Interested individuals in a local area or village come together to form a learning group. A number of farmers in that group then volunteer to undertake on-farm experimentation, which creates an environment where the whole group learns throughout the season by observations and reflections of the trials' implementation and results. They compare various CRA treatments with their standard practices, which are planted as control plots. This provides an opportunity to explore all aspects of the

cropping system, its socio-economic context and feasibility, as well as the grain and legume value chain in the area. They work together to share labour and equipment, set up Village Savings and Loan Associations (VSLAs), do bulk buying, set up farmer centres and arrange for local processing and marketing options. They bring new farmers interested in CRA on board throughout the process.

This process allows also for longer term monitoring and research into biophysical and socio-economic changes in the areas of operation.

Horizontal expansion (scaling out) from village nodes to surrounding farmers and villages in the area, working with organised farmer groups (or IPs) in collaboration with stakeholders in the region has shown great promise for expansion of interest in and longer-term sustainability of the implementation of CRA practices among smallholders. It means that a number of villages in close proximity become involved and this provides an opportunity for organising farmers around issues in the value chain such as bulk buying, transport, storage and marketing. It creates an option to set up farmer service centres at central nodes that can provide easy access to inputs and services. The model also provides for learning over a period, which has proven essential to allow each participant farmer to experiment with and master/adapt the CRA principles for at least 4 years. The more experienced farmers become mentors to the new entrants, and some undertake the role of local facilitation and support to their villages and groups. It also provides a platform where other farmers and interested parties in the area can engage and become involved. (Smith, Kruger, Knot, & Blignaut, 2017)

Facilitation considerations

The results of a focus group discussion undertaken with 8 of Mahlathini development Foundation's field staff on July 3rd 2023 are presented in summary below. The discussion centered around the following questions:

1. Field based understanding of the terms participation and gender mainstreaming focusing on learning, skills and knowledge development and changes in value systems of facilitators.

LEARNING:

- Facilitators need to be pro-active and creative and able to think on their feet. They need to understand themselves before being able to understand others.
- Working with people is often chaotic and facilitators need to learn patience in staying with people through their arguments and immediate concerns and need to learn good listening skills to distill pertinent information and needs.
- In communities, things take time to change. It also takes time for facilitators to grow into their roles.
- Facilitators need to learn ways of managing conflict.
- They need to understand how people at community level are using their power and the impact this has on other people in the community.
- They need to stive for fairness, but not immediately discount opinions and approaches that appear conservative, authoritarian or ineffective. This can take a toll on a facilitator's energy and motivation.
- The infield cycle of sharing information and skills and helping younger facilitators is important and the best way to learn, as formal training in facilitation skills is hard to achieve coherently.

- Facilitators need to be sensitive to community members as they go through many hardships. This is often a very emotional process and can be draining and lead to burn-out.
- As a young woman in a facilitation role, one has to learn to stand up for yourself and stick to your convictions and not be intimidated by dominant men in the community.
- Respect is a two-way street.
- Facilitators need to be emotionally strong, and this work helps to make on stronger.

SKILLS and KNOWLEDGE

- Time management.
- Social and listening skills.
- How to navigate chaotic situations.
- Communication, public speaking and facilitation.
- Being sensitive and respectful to each other as staff.
- Striking a balance between peoples' development and holding their hands.
- Technical skills related to water resource management. Examples are assessing stream flow, strength of springs, water quality and condition of natural resources and also things like how tanks, couplings, valves and piping work as well as map reading, taking GPS points and the like.
- Learn to always find new ways of doing things. Once you start to relax into what you already know, you become less effective.
- After some time the philosophical underpinning of water and resource conservation become part of how one sees the world and you become a lot more sensitive n noticing issues such as bad land use management practices, water flows that can cause erosion, veld condition and the like.

VALUES

- Being grounded and humble.
- Being prepared to acknowledge and correct mistakes.
- Understand your own weaknesses and how they impact on others.

c. Challenges

Some challenges that have been identified in using participatory approaches include the following (Stringer et al, 2009):

- They do not take place in a power vacuum: when previously marginalised groups are empowered, conflict may arise with existing power structures which has not been anticipated or planned for and may not be managed successfully.
- Insistence on consensus can discourage minority perspectives from being expressed, creating - 'dysfunctional consensuses.
- The perception of co-ownership in the project may raise participants' expectations; if the project team does not fulfil this suspicion, cynicism and distrust may take root.
- Participants may lack the technical knowledge to participate at some levels, if required to make decisions or engage in debates they could feel forced into areas where they aren't competent.

These challenges should be taken into consideration in the planning and implementation of this project to optimise the possibility for meaningful participation.

3.3 INNOVATION PLATFORMS

Innovation platforms aim to counter weaknesses in innovation systems by building interaction amongst different kinds of actors and their organisations, promoting change in practices, institutions, and policies and to effectively deploy available human and financial resources to solve problems and capitalise on opportunities (Davies, et al., 2018) . Regardless of whether innovation platforms are established at local or higher levels, they can explore technological, organisational, and institutional solutions, making them ideal for addressing problems in an integrated manner (Schut, et al., 2019). In a way, the formation and operation of innovations platforms is an organisational or institutional innovation in itself. It entails changes in ways of collaborating, interacting and in relationships between actors and organisations to overcome obstacles and improve the impact of their collective action.

In general terms, innovation platforms are useful when (1) persons or organisations that represent different socio-economic backgrounds, interests and perspectives have a stake in a particular problem or solution; (2) multiple persons or organisations want or need to experiment jointly on aspects that they cannot solve individually or that benefit from synergies; (3) new solutions require a combination of new technologies (technological innovation), effective collaboration (organisational innovation) and/or new rule, funding and incentive structures (institutional or policy innovation) and (4) actors and organisations are willing to share knowledge, resources, benefits and risks, as well as sufficient common interest and trust to engage in collective innovation to address a common challenge (Buerkler, 2013). These conditions are also frequently mentioned in relation to other types of multi-stakeholder approaches such as public-private partnerships.

The functions of Innovation platforms have been characterised as shown (Hounkonnou, et al., 2018) in the table below.

Innovation platform functions	Description of activities to fulfil the functions
Knowledge generation and brokering	Experimentation, learning, knowledge development and exchange as central elements of innovation, with better integration and synergies among technical, organisational and institutional options.
Facilitation of multi-directional information flows	Exchange of information and views of those concerned through networks, allowing information to spread. Identifying and linking different actors, stimulating new actor relationships.
Creation of, or an increase in, momentum for change	Generating solutions in context, on the basis of shared expectations and vision, creates buy-in and unity among innovation platform members and legitimacy for the innovations being generated. It motivates collective action to develop and test innovations in a real-world context.
Guidance of research, policy and investment priorities	Prioritisation of challenges and innovation options based on preferences or expectations of informed stakeholders, for targeted resource allocation. Challenges and options can include access to information, technologies, finance or institutional gaps.
Market formation	Facilitation of (niche) market creation, in marginal areas, post-conflict zones, illustrating market opportunities, creating trust in market agents, transportation of produce to faraway markets.
Capacity development and building entrepreneurial skills	Creation of business opportunities by deploying new technologies, markets, learning and networking. Developing the system's inherent capacity to learn, self-organise and innovate, incubating new organisational forms, nurturing its members' skills (entrepreneurship, representation, coordination and communication).
Policy development and advocacy	Institutional support: facilitating and lobbying for institutional change (for example, policy innovation and new business models)
Resources mobilisation	Assembly of diverse resources (e.g. financial, human, social and physical resources) required to leverage change.

a. Open days/ stakeholder engagement and awareness raising

The Conservation Agriculture (CA) farmer level open days, and CA forum under the auspices of Asset Research and the Maize Trust's smallholder farmer innovation programme (SFIP) as well as the KZNDARD CA forum meetings and events are examples of combined farmer, organizational and institutional level events meant to share information on innovation development for awareness raising and implementation. These are a combination of bottom-up (farmer level open days) and top-down(KZNDARD research station open days) events which also include a wide range of role-players including the private sector and academic institutions.

b. Water committees

Focus will be provided here in Deliverable 6 (2024)

c. CRA learning groups-Water and resource conservation focus.

The Innovation platform here consists of a range of role players working together with the community to develop and implement water and resource conservation actions:

- Academic partners; UKZN- CWRR (Centre for Water Resources Research) and SAEON (South African Environmental Observation Network)
- NGO partners; INR (Institute of Natural Resources) and MDf (Mahlathini Development Foundation) and
- Institutional partners; TA's (traditional Authority), LM Ward Councilors (Local Municipality) and LED units (Local economic Development).

The table below summarizes work done with the Stulwane and Ezibomvini learning gorups in developing a participatory mapping of the resoruces and resource management plans to be undertaken by the communties and their partners.

Table 5: Local resrouce management plans for Ezibomvini and Sutlwane communities Bergville, KZN. March 2023 (MDF-UKZN_CWRR)

Local resource management areas for improved eco system services- Community defined		
Key Area	**Management required**	**Notes**
Grazing areas (Amadlelo) -Livestock feed and water, firewood, medicinal plants,	**Restoration and management**. -Clear Lantana and use poison after cutting to stop regrowth -Rotational grazing -Control wildfires and make firebreaks. Storage drums for emergencies with fire one can use -Explore financial benefit – grant/incentive mechanisms -Monitor and manage nutrition of veld (erosion control, overgrazing control, removal of poisonous weeds, re-seed of palatable species) -Awareness raising in the community and for livestock owners.	-Eco-champs to do clearing -Dip tank committees and livestock associations -Better community collaboration with dip tank committee as well as TA and councillors -Community workdays
Wetlands (Amacaphuza), -Reeds (incema) -Food and water for cattle, also in winter -Medicinal plants -Fire retardant	**Small management changes to manage condition of wetlands.** -Fencing to ensure good condition and make drinking troughs for livestock -Awareness raising on wetlands functions and services -Replanting important species into wetlands; then someone needs to police this and ensure people don't just harvest everything	-TA involvement and 'landowners' in wetland areas to outline rules and responsibilities -Community as a whole to follow these -Local water and land use committees to undertake specific actions related to water access and management

-Runoff and flood water management -Improved water quality -Fertile soils with earthworms	-Protection and restoration of important medicinal species for sale: Stop people with big bags who come in and take for selling -Avoid pigs coming in as they mess things up -Avoid fires and burning -Livestock inclusion managed e.g. –allow them in at certain times only. Or maybe make camps and move them. Or allow them to graze on the edges. Or cut and carry feed.	-Issues around rights around use of water and important medicinal plants need further interventions -Suggestion: talk to livestock association then bring their comments and suggestions to the water committee to continue the conversation and include all
Erosion control -To ensure availability and quality of water and soil resources	**Restoration** -Awareness raising and outline of responsible actions to enforce -Avoid expanding of minor erosion into dongas. -Prevent siltation and pollution. -Allow re-vegetation, naturally or through re-seeding -Prevent run-off -Check dams, brush packs, stone packs, -Prevent livestock from causing further damage -Control wildfire- make fire breaks Storage drums for emergencies with fire one can use	-TA and livestock committees to undertake some actions -Eco champs to assists -Some actions and contributions from community as a whole (e.g. loan of tractors, small financial contributions -External support -Continued support from UKZN and MDF in mapping, planning, proposal development, community structures and management
Alien trees -Eucalyptus, poplar, and wattle plantations, and patches	Small changes -Promote better management by 'owners' -Cut down and poison lantana and encroaching poplars -Ensure management of wattle patches -Remove trees from water sources and streams in all cases	-TA, Nkosi and 'owners" encouraged to undertake management activities as trees are useful in the community and cannot just be cleared.
Springs and streams -Water provision for drinking, laundry, irrigation, construction and livestock -Water quality and quantity - Issues are floods, livestock trampling, children use as toilet, litter	Protection, restoration, and management – must protect the water sources to ensure supply. - Should protect water so that livestock don't disturb the sources -Protect the springs; with fencing and the ditches above to avoid water from flowing in overland and contaminating these springs. -Check water quality. -Remove eutrophication. -Check springs regularly. -Drinking spots for livestock -Community awareness and education – and for children -Maintain the water infrastructure that is there. -Avoid doing laundry in the water sources and keeping them clean, no pampers, no urination, no use as toilet, no dumping of dead animals. -Protect springs with pipes to be able to irrigate the gardens (reticulation to taps) -Also use grey water for irrigation. - water harvesting and use. -Make sure children don't play around the water sources… or pollute them WATER ACCESS -Big issue	-TA, local municipality, water committees and localised groups of people using specific water sources to work together on access and management plans and implementation -Community must come together and make rules and regulations re hygiene and water -Those that are involved should talk to others and ensure they also learn - involve the TA councillors and Nkosi…. -Asking Mahlathini to help with fencing and funding for water access -Day to day activities of cleaning springs, digging furrows to reduce contamination to be done by locals -Dig refuse pits for disposal of waste – in each locality -Awareness raising and communications -Involve schools -Eco champs to assist with spring protection and management and schools' interventions

Below are a few indicative pictures of implementation by community members.

Figure 20: Right top; Community members in Stulwane (Bergville) working together to clear wattle in local water courses and Right bottom: Soil conservation structures constructed in Stulwane by community members on a voluntary basis.

3.4 Multistakeholder Platforms

Multistakeholder platforms are an example of CoPs and innovation platforms that specifically undertake to involve multiple stakeholders both horizontally and vertically.

The intention here is to distill the best practices options in setting up and managing multistakeholder platforms looking at guiding principles, roles and responsibilities, long term sustainability and MEL (monitoring, evaluation and learning) options.

Two cases are being explored:

- **The Northen Drakensberg collaborative**: The establishment of a multistakeholder platform in the Northen Drakensberg Wate Source Area around water and resource management. The focus here is on the principles, processes and best practise options for initiating a multistakeholder partnership in a highly contested space and
- **The Umzimvubu catchment Partnership**: This is a long standing, successful multistakeholder platform and provides a case for analysing principles and practise in long term sustainability and effectiveness of such platforms, as well as MEL aspects.

For both these platforms, engagement is ongoing, and the cases are being developed over time, to encompass a range of elements required in complex processes. This report provides a continuation of aspects explored in Deliverables 2 and 3 of this research brief.

Other learning about the functioning of multi-stakeholder platforms can be gleaned from such partnerships (past and present). such as the RESILIM-Olifants Program, and the Tsitsa Project (Tsitsa, Kotschy, Cockburn, Conde-Aller, & Rosenberg, 2021) Key learnings about multi-stakeholder

platforms contained in Pollard et al. (Pollard, Retief, & Clifford-Holmes, 2020) and (Kotshcy & Pollard, 2022) include:

- Relationship-building is important (and takes time).
- Crises often act as catalysts for collective action. If carefully considered, and supported by evidence, they can be a useful entry point and can help to prevent a perceived lack of action and implementation, from which many participatory forums suffer.
- Systems thinking is an important framework for the collaborative management and governance of complex socio-ecological systems.
- A style of practice that is adaptable and flexible is able to deal with uncertainty and builds the capacity to adapt to change.
- Multi-stakeholder forums should be seen as embarking on a collaborative learning journey, where what needs to be learned is not necessarily apparent at the start. Attention to how learning happens and how to support learning that enables growth and progress is foundational. They need to collectively figure it out what to do through practicing, experimenting, learning and adapting. A practice is produced over time by those who engage in it, as is a community of practice.
- Participatory modelling (conversation-based) approaches and causal loop diagrams can be useful for deriving a systemic, collaborative picture of risks and underlying drivers and impacts.
- Learning exchanges can be very successful as a way to foster interest, exposure and action.
- For institutionalisation of systemic, social learning to occur (i.e. for practices, processes and tools to be embedded), stakeholders need to be involved from the start. This does not only mean attendance at workshops and training events, but rather a facilitated expansive learning process (see Figure 6).

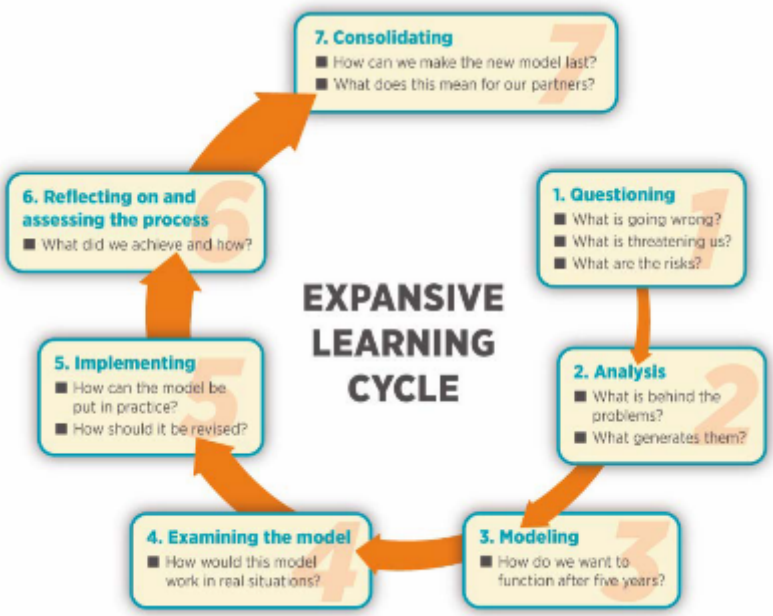

Figure 21 Expansive learning cycle. Source: Pollard et al. (2020

Learnings specific to monitoring, evaluation reflection and learning (MERL) for multi-stakeholder platforms (Tsitsa, Kotschy, Cockburn, Conde-Aller, & Rosenberg, 2021), (AWARD, 2019) include:

- When designing and also when monitoring and evaluating, both processes and outcomes should be considered.
- Participatory, learning-focused MERL can be a powerful tool for building collaboration, a common vision and a strong basis for ongoing strategic adaptive management. Different possible levels of inclusion of stakeholders within MERL processes are shown in Figure 7.
- An approach that includes and capacitates local residents brings multiple benefits including motivation, agency, capacity to participate in collective action, and changes in power relations.
- Participation and inclusivity must be explicitly planned for and appropriate capacity developed. Monitoring practices and tools must be developed to support this.
- Reflection practices do not emerge spontaneously; opportunities for reflection and sense-making need to be specifically designed and prioritised. They need to be cultivated with patience and consistency.
- A coordinating entity with secured long-term funding and strong partnerships should be prioritised, to act as a hub to manage knowledge, coordinate MERL activities, and to further strategic investment in the region.
- Resources must be allocated to support MERL personnel as well as MERL processes that involve other stakeholders.
- The MERL needs and purposes tend to change over time and the system needs to adapt. Appropriate resourcing therefore means not only an adequate budget, but a flexible budget.
- In addition to a responsive design, a successful MERL system requires a responsive disposition from implementers, funders and stakeholders alike.

a. The Northern Drakensberg Collaborative

The process towards establishing a strategic water source partnership (SWSP) in the Northern Drakensberg was initiated in May 2021, under the auspices of the SANBI Living Catchment Project (LCP), which aimed at convening stakeholders towards ensuring water security in the Upper uThukela. Since then, there have been a number of meetings aiming at bringing a diversity of stakeholders together, enabling knowledge sharing, developing a shared vision and encouraging collaboration towards establishing a catchment partnership.

The convening team, under the auspices of the WWF is led by the Institute of Natural Resources (INR), in collaboration with the Centre for Water Resources Research (CWRR) at University of KwaZulu-Natal (UKZN) and the Mahlathini Development Foundation (MDF). WildTrust and the Southern African Environmental Observation Network (SAEON) and the Expanded Freshwater and Terrestrial Environmental Observation Network (EFTEON) have been core partners in coordinating field activities and stakeholder engagements.

Thus far, a total of 112 stakeholders have participated, representing nearly 60 organizations, groups and communities from policy and government, operators, financial actors, interest and influential groups and users.

A value proposition and vision has been outlined Elements of the vision statements include:

- Collaboration among stakeholders.
- Empowered communities through ownership and stewardship.

- Protection and conservation of the environment and water sources.
- Functioning water infrastructure.
- Environmental education and awareness.
- Socio-economic growth.
- Fair access to clean water

The joint vision for the catchment is agreed as follows:
"Integration of different entities to conserve and utilize the landscape and its water, cultural and other natural resources fairly as well as to empower its people, build resilience and achieve sustainable socio-economic growth."

In viewing the vision as a long-term objective for the Upper uThukela Catchment, participants of the latest workshop identified top actions and activities needed to achieve the vision. The actions and activities were categorized according to the various parts of the vision statement (Table 1).

Table 6: Examples of actions and activities identified by participants towards achieving the catchment vision.

CATEGORY	ACTIONS/ACTIVITIES
Collaboration and integration of entities	- Spatial and non-spatial stakeholder mapping including where activities and projects take place - Situational analysis, including socio-economic status, education and needs for empowerment of people - Promote and encourage the political will from the authority and buy-in from the beneficiaries of projects - Ensure involvement of more stakeholders, and the most relevant entities (Communities, traditional leaders, NGOs) - Identify roles and responsibilities and stakeholders' level of influence - Data and information sharing (database, webpage, stakeholder engagements)
Conservation and use of water, natural and cultural resources	- Projects and skills development related to spring protection and development, invasive alien plants and bush encroachment, restoration activities, grazing management, fire management, nature conservation, environmental education - Identify and understand the significance of cultural resources
Empowerment (awareness and capacity building)	- Facilitate training and capacity building - Environmental education in schools - Community based conservation efforts
Resilience to climate change	- Climate change education - Empowerment around the green business value chain (e.g. in relation to charcoal and alien clearing practices) - Community-based climate change adaptation activities
Sustainable socio-economic growth, local livelihoods	- Increase livelihood options: animals, crops and poultry - job creation through working for water programs etc - Empower the beneficiaries (without dependency on external factors) - Long term project funding - Ecological infrastructure investments - Communities' contributing to tourism to benefit from the resources in the catchment

The biggest lessons and learnings for participants were the importance of inclusivity and diversity for fruitful collaboration, knowledge about the variety of projects and activities in the catchment and the important connections between water, land and people. Some key stakeholders are still not present during the meetings, despite their crucial role and authority around water distribution and allocation. uThukela District Municipality, uThukela Water, the Catchment Management Agency, Department of Water and Sanitation, Department of Agriculture, land reform and rural

development, local political leaders, traditional authorities, the forestry industry and the private sector. The convening team will continue making efforts to engage with these stakeholders to ensure their participation in upcoming meetings. The figure below outlines the present framework developed for the partnership.

Figure 21: The Northern Drakensberg Collaborative vision, principles and Actions: May 2023

Based on feedback from participants at various engagements, we can summarise the key benefits and services of the partnership, as:

- Networking – providing a vehicle for different stakeholders to engage with each other.
- Monitoring – allowing for monitoring of activities of the partners, service provides as well as the partnership itself.
- Reflection – allowing partners to reflect on their own and others' interventions within the catchment.
- Co-learning – through exchange visits, presentations and sharing of materials, partners can learn collectively.
- Fundraising – providing opportunities for partners to fundraise collectively rather than competing for available resources.
- Sharing – of information and experiences.
- Co-implementation – of interventions aimed achieving the goals and vision for the catchment.
- Lobbying – for improved services, or for preventing activities that can impact negatively on the catchment and its residents.
- Supporting research – the partnership will provide access to the landscape for researchers while also ensuring that local residents are treated with respect and receive feedback on research.

In order for the partnership to achieve its purpose and provide the range of anticipated services and benefits, partners also have to do the following:

- Commit – be willing to commit their time, energy and knowledge to the partnership.
- Collaborate – be willing to collaborate with others in a respectful, transparent manner.
- Participate – be willing to participate in activities such as exchange visits and meetings.
- Share – be willing to share knowledge and experiences openly and honestly.
- Resource – be willing to contribute human and other resources for a functional partnership.

Next steps include formalizing the structure of this partnership/ forum. It will be necessary to confirm that nature of the partnership and the type of agreement that partners are able to commit to, such as a memorandum of understanding (MoU). These aspects may change and develop over time as the partnership and its membership grows. The funding model also needs to be considered, whether the partners see it as part of their current activities in the catchment or whether it needs additional resources to be fully functional.

b. The Umzimvubu Catchment Partnership

Written by Nicky McLeod and Sissie Matela (ERS): Based on a reflection of processes and experiences by the authors as catchment convenors in the upper Umzimvubu landscape. This has included serving as the secretariat of the Umzimvubu Catchment Partnership (UCP) for 10 years since co-founding it in 2013, as well as the co-coordinator of the SANBI Living Catchments Project for the Umzimvubu Catchment from 2018 to 2023

Previously we considered an external evaluation of this partnership, as a means to outline successes, failures and best practice options for sustainable multistakeholder platforms. In this report we will focus on governance guidelines for the development of Communities of Practise (CoPs) and multistakeholder platforms, to contribute towards Aim 1 of this research brief: *Create and strengthen integrated institutional frameworks and mechanisms for scaling up proven multi-benefit approaches that promote collective action and coherent policies.*

What exactly is a community of practise in this context?

The common consensus is that a *Community of Practise* (CoP) are groups of people who share a concern or a passion for something they do and learn how to do it better as they regularly interact. CoPs are not a new concept. People have been coming together to solve mutual problems for centuries: think medieval guilds and artisans' groups.

They appear to be largely informal, unstructured groups, which typically have a core of participants whose passion for the topic energizes the interested community and who provide intellectual and social leadership (Wenger & Snyder, 2000). Motivations for convening a community of practice are many, but at the most fundamental level, a group of people come together driven by a shared learning need or common challenge. CoPs may be seen by some as a social soft skills fad or short trend, but researchers have found them to have had profoundly positive effects on organisational performance in banks, car manufacturers and state agencies (Wenger & Snyder, 2000). Their primary output, knowledge, is intangible and difficult to measure.

Some experiences from the Umzimvubu Catchment Partnership (UCP) as a CoP

The Umzimvubu partnership emerged from humble beginnings in 2013 to become ''one of the most reliable success stories of collaborative catchment management in the country'' (Emily Botts, SANBI, 2023, pers. comm). It is lauded internationally as a model for how partners can work together for the overall health of a river catchment, its biodiversity and its people (Samir Randera-Rees, WWF, 2023, pers. comm). The UCP has also been included in global studies on what 'green jobs' really mean and what Nature-based solutions can look like. In 2016, the partnership received the award of "hotspot heroes" at an event in Hawaii, and its convenors (the authors) received the WWF Living Planet Award in 2019 for their contribution to helping people and environment living in harmony.

The UCP exists as a platform, not a project. It is unregistered and informal apart from a Memorandum of Agreement, which is not legally binding. It is in essence a voluntary collective of stakeholders around a commonly agreed vision.

Table 7: Outline of the UCP vision, purpose and operational geography

'Purpose / mission'	**'Vision'**	**'Place'**
UCPP exists to be a co-created platform for proactive networking, sharing, learning and mobilising resources and knowledge through collaboration. Tagline: *"Together we do more for people and environment in the Umzimvubu catchment*".	The UCPP vision is for healthy resilient ecosystem function in the uMzimvubu Catchment providing services and benefiting local and downstream people.	The land area (belonging to and used by people) from which rainfall drains into the uMzimvubu River, from source to sea, along its undammed length.

The UCP is seen by many as a community of practise (CoP), as well as a water source partnership (WSP), or a catchment management forum (CMF). UCP members like to see the partnership as all of these, but none of them in a restrictive sense. It is a multi-stakeholder platform in the true sense, representing a wide range and hierarchy of stakeholders. Snorek et al (Snorek, et al., 2022) recognised that the Umzimvubu partnership has cultivated meaningful relationships with trust and shared values based on a communal ethic for environmental and community stewardship.

Although the driving local NGOs are independently supported by donors and the private sector, they work in close collaboration with the Matatiele local and Alfred Nzo district Municipalities, as well as Traditional authorities and regional Environmental Affairs and Water and Sanitation authority representatives, to ensure alignment with IDPs and broader national legislation, policy and strategy. These NGOs implement individually with support from their own donors and grants, as well as in joint ventures and partnerships to pool resources and for implementing state programmes such as EPWP and CWP which can be administratively burdensome if done alone. Government recognises and endorses these programmes through flagging them as examples of good practice which they visit frequently with potential donors.

The partners meet quarterly to share progress and opportunities, tackle challenges, and collaborate towards their common vision through partnering on implementation of impact-focussed projects such as water supply, alien plant management, rangeland restoration, waste management and involvement of youth in value chains. UCP also facilitates increasing research in the upper catchment, through active engagement with local and international academic and research

institutions, highlighting the real research needs in the area which can benefit lives and help secure the landscape and biodiversity more effectively.

In conjunction with its quarterly gatherings, the UCP hosts field learning exchanges at active project sites such as spring protection and livestock auctions, as well as hands-on environmental events linked to Wetland and Youth day and Water week, with a growing focus on youth involvement and building meaningful green value chains to drive the sustainability agenda and move towards the SDGs.

Although the value and products or CoPs are difficult to determine and express, the core local implementing NGOs have brought more than R75 million into the Matatiele area in the last 3 years, employing more than 35 permanent staff, and up to 900 village-based contract beneficiaries at various times. The value of the landscapes and the resources they support are manifested in the livestock supported and the monetary value accruing from sales of the livestock, up to R40 million since 2013, and the increasing number of livestock farmers voluntarily signing conservation agreements. The cumulative impact in the catchment of 'doing better together' is evident when this bigger picture begins to emerge.

What has been noted by the authors and convenors, in discussions over the years, is how the passion fuelling the effort from the ground up differs between structured, sometimes stifling, top-down approach from state systems and institutions to community initiated and led institutions born of a desire to solve specific issues close to and affecting their lives. While the innovation and resourcing from national level downwards through the ranks of state hierarchy appear to diminish energy and effectiveness through highly structured processes for controlling state assets, the opposite appears to happen when organically derived groups champion a process. This has been noted in formal external evaluation of the UCP and is discussed later in this section.

Several smaller, theme-based CoPs have emerged from the collaborative nature of the UCP as a platform for learning and sharing. These have had a shorter lifespan and include a focus on issues such as alien plant control, water security, stewardship, youth mentoring, tourism, waste management and rangeland restoration. The short case studies below outline some of the essence of each CoP, which help to draw guidelines for the development and sustaining of effective multi-stakeholder platforms.

The Maloti Thaba Tsa Metsi protected area forum:
This ''collective' grew out the common desire to steward the Umzimvubu watershed more effectively, and to support better governance by the land rights holders rather than by an external state conservation entity. The institutional arrangements of the *Maloti Thaba Tsa Metsi*, as a voluntary organisation, were determined by the agreement and rules established by the members of the organisation under the guidance of the Umzimvubu Catchment Partnership. These arrangements include things like the decision-making process, membership requirements, the roles and responsibilities of members, and the mechanisms for dispute resolution. These arrangements were designed to support the goals and objectives of MTTM in their work related to livestock and range management, and livelihoods in the mountains, the Umzimvubu River tributaries and its catchment area.
The broader landscape of institutional arrangements that shape community-based institutions on communal land includes laws and regulations, cultural norms, political systems, and economic structures. These institutions can either support or hinder the development and success of

community-based institutions like the UCP-supported Maloti Thaba Tsa Metsi protected area forum (MTTM). Understanding and considering the interplay between these broader and community-based institutions is essential to promote effective and sustainable community development.

Two smaller sub-CoPs have emerged from this stewardship community of practise which support the greater stewardship vision, namely:

- A core technical team comprised of support agencies including Eastern Cape Parks, local NGOs, Municipality, CONTRALESA and relevant departments with conservation mandates, and which provides strategic guidance within national legal frameworks, as well as fundraising support and logistical support for the unfurling of the stewardship process
- The MTTM voluntary association, formed as a management authority as required by legislation for protected areas, comprising two representatives of each of the participating Traditional Authorities, and which is establishing a management committee.

The journey has not been easy and having the core technical team as a 'sub CoP' supporting the greater process has helped navigate challenging terrain and to weather some of the storms which could have derailed or wrecked the MTTM ship.

The Wattle & Alien Task Force (WATF)

Championed by local implementing NGOs, stakeholders from the Department of Environment (DFFE), SANBI, charcoal producers, Traditional and local Leadership, WWF, plus research and implementing partners spent three days in late 2021 unpacking the common problems facing alien plant management in the region. The common agreement was that they all want improved resilient livelihoods and healthy ecosystem functions, and that all have different complementary roles to play to achieve this collectively. This effort needed to extend beyond a formal funded project, and across different spheres and hierarchies of the state. Despite spending billions of Rand on alien plant control since the mid-1990s, the infested area has expanded, which indicates that solutions have not yet been found using current approaches.

After spending some time seeing NGO-run projects in the field and engaging in many hours of heated debates, the group agreed that its core objective is to collectively devise, implement and learn from better practises to manage alien plant expansion, as part of restoring the natural grassland and ecosystem functions, which form the vital ecological infrastructure of our watershed. Despite being a diverse set of role players, they have a common problem and aspirations which extend beyond their sometimes-restrictive mandates and resourcing. They agreed to tackle issues including how to foster high Norms and Standards to meet state requirements, pursuing cost effectiveness, equitable participation, technical best practise, policy influence, reality checks from field experience, long term affordability through market linkages, grabbing opportunities, exploring livelihood benefits form green business value chains, etc.

At a stage, a key market player closed, and the CoP was hugely valuable in helping navigate the fallout created by this event. Experienced facilitators from SANBI assisted with open discussions tackling difficult issues: such support mechanisms would otherwise not have been in place without the presence of this CoP.

The UCP Knowledge and Research Hub

The implementing-focused work in the upper Umzimvubu and lower catchment areas has been innovative, impactful and deeply relational building. This has garnered interest from researchers

across a spectrum of developmental, social and ecological issues, generating more than 16 research projects. Although the content of each is excellent and relevant, there has been limited co-ordination between these efforts, resulting in duplication, research fatigue and a perception that research is extractive and not aligned with catchment needs. Some tensions have emerged between the realms of academia and practise, and the UCP secretariat felt the need to bring this disparate community together to harness the opportunities it presented. These were seen to include the collation of a 'knowledge hub' and to foster catchment-driven, longitudinal research which benefits a more holistic approach to life in the catchment.

The catchment convenor for the SANBI Living Catchments Project (LCP) has nudged and cajoled a range of role players to apply their energy to what an effective knowledge hub and 'living lab' could and should look like. Interestingly, an effort was made in 2016 to establish a Research Core Group, which produced an 'Impact-oriented Research Programme' in 2017 and was championed by a technical partner resident in the catchment. That partner's capacity to participate has changed, leaving a gap in the research focus.

A key principle emerging from the recent research think-tank, hosted as part of the UCP's 38th quarterly gathering in late February 2023, was that "*if we are to generate credible, socially acceptable research that responds to the real needs of communities, we need clear rules and guidelines, and clarity on how UCP partners relate to that research*". This CoP has risen to that challenge and is generating a typology of rules.

Other emergent 'properties and products' of the UCP CoP as a multi-stakeholder platform collaborative include more than a dozen highly interactive field learning days, a printed and online 'spring protection guide and toolkit', a rangeland toolkit which is currently under revision, and a strong youth deployment approach which is being written up in a best practise approach handbook in another WRC report.

CoPs as strong, safe social spaces for fostering collaboration & co-learning

The functioning of the UCP as a voluntary alliance has fostered a lot of transparency and openness in the interactions within and between stakeholders. There is a huge role to be played by conveners in ensuring that they connect stakeholders that need to work together, disseminate information, and bring them into the conversation of ecological infrastructure and social inclusion. The organically formed communities practice were not prompted by government but rather by a diverse set of actors recognizing each other's complementary strengths and weaknesses in tackling a common problem.

The SANBI Living Catchments Project (LCP), which is largely focused around enabling enhanced water governance through improved multi-stakeholder collaboration across the built and ecological infrastructure nexus, provides further opportunities to strengthen relationships and share lessons learnt in a more structured manner, through requiring reporting on CoP progress. This catalyzes some deeper thinking around that the value of the CoP really is, and what a process would look like without it.

These locally actioned but nationally endorsed and guided platforms like the LCP and the active convening of Water Source Partnerships by WWF, have huge potential to influence state approaches to collaboration, for example the 'Working For' programmes under the DFFE's Natural Resource Management Programme, and extension services thinking. The DFFE provincial and national officials

have been active participants in the UCP's Wattle and Alien Task Force (WATF) and field learning days, providing a two-way learning opportunity.

What is the impact or value of a CoP like UCP?

A state official once bemoaned the struggle of having to form a Catchment Management Forum (CMF) which was dragging its heels and would not, despite his best efforts, come to life. He felt it was an almost artificial construct which doesn't have the spark which the UCP voluntary gatherings do and was curious about HOW the UCP CoP came together and continues to function. An external evaluation by a donor of their investments in the catchment revealed some answers to the official's curiosity, as well as to our own questions: why *does* the UCP continue to attract interest and engagement?

Partners within the UCP community of practice indicated some of the following reasons for continued involvement in the platform, which they saw as benefits:

- **The shared values and shared way of working**, which members described as respectful, participatory, transparent and culturally appropriate were important enablers of success because they **produced a consistent approach and message** and reduced conflict between partners However, some government partners felt that government was still a long way behind in term of effective stakeholder engagement
- The UCP network provides **opportunities for sharing information, networking and staying up to date with what is happening in the landscape**
- Learning opportunities associated with field trips and discussions in informal settings help to **tackle challenging issues in a safe manner**
- The CoP provides a **visible way of scaling up the work, reaching more people and more** areas, and attracting more funds into the area
- Partners feel a **strong sense of shared values and a shared way of working**.
- Pride in work that is **respectful, participatory, transparent, and culturally appropriate**
- Warm, welcoming and informal relationships help one feel supported and comfortable to ask for help if needed.

Other emergent properties and observed benefits of a community of practise included:

- Spring protection work led by a local NGO and funded by WWF led to co-learning between local implementing NGOs and community members involved in the construction and aftercare. The process involved innovation because the spring protection structures needed to be adapted for each context (geography, spring characteristics, community needs, available resources etc.) rather than simply constructed according to a blueprint. The social learning that happened through this process was captured in the UCP Spring Protection Guide produced by the partners.
- The design of the rangeland management model currently in use has been emergent. It is not owned by any one person or organisation but was developed collaboratively through experimentation and addressing gaps as they became apparent. Some of this learning is encapsulated in the Conservation Agreement Tool.
- A charcoal business model was also developed iteratively through experimentation, like the rangeland management model. Innovations included the FSC certification, the creation of a marketing social enterprise, refinement of a kiln design, the "rent-to-buy" facility.

- Many of the participants of the evaluation interviews and of these CoPs felt that there was a lot of learning which was difficult to capture and that this learning has not yet been adequately described for sharing with others (Kotshcy & Pollard, 2022) .

Figure 22: members of UCP from five different organisations spanning local and national, municipal, parastatal, civil and communal, gather to undertake a biodiversity assessment. Their common passion is plants and mountain conservation.

Emerging governance guideline considerations for Multistakeholder platforms

The authors have had the privilege of engaging with local, national, national, continental and global communities of practise in a variety of thematic areas over the last decade, including WASH (water and sanitation for hygiene), waste approaches, NGO leadership support, stewardship approaches, and forums for community-led conservation. Size does not matter. What does matter is some essential ingredients for a successful Community of Practise to emerge, survive, thrive and have its desired impact, and these include:

- Common challenges and visions
- Collaboration
- Communication
- Convening
- Co-learning

Unpacking this a little further in terms of some basic guidelines to share from the lessons in the Umzimvubu catchment, the following is relevant:

- A CoP needs an energetic convenor – without an enthusiastic champion or driver, the CoP can start up with passion, and then fade away. A key factor for sustaining the UCP as a living CoP has been active, attentive 'convening' by a dedicated secretariat who provides a networking, communication, central hub function, along with supporting logistics and information sharing.
- CoPs need a mission – a group of passionate people gathered around a common cause is the spark required. Often a crisis can spark response and amazing things happen.
- Cops often emerge best organically from the ground up – this often means they are under resourced, as they are unplanned, and this is where real support and resourcing should be focussed. Follow the passion.

- The impact or value of a CoP is hard to measure – using non-traditional measures and stories of change is a good way to see their impact, rather than standard quantitative metrics which may not show any real impact as they are an inappropriate form of measurement.
- CoPs often appear disorganised and unstructured – the French revolution's lack of systems and communication drove the English military crazy but was in fact the breakthrough which helped win the war. In the same way, CoPs should not be forced to regulate or conform with a predefined structure as it can stifle their innovation and passion. This does not propose anarchy, but rather an allowance for innovation to emerge in a welcoming space.

These platforms have the huge advantage of being voluntary (i.e., not enforced and thus not needing heavy regulation) as well as focussed on what really interests and affects the participants. Solving stuck problems by viewing the elephant in the room from all angles has become much easier with a diverse group with a common goal. A CoP can create a safe space, where unlike a formal workspace or committee, innovation can occur with limited external pressure, and where common issues can be tackled *together* with people who understand these issues, and may have different perspectives for approaching, and possibly solving it. This approach has great potential for contributing towards meeting the first aim of this project, to 'create and strengthen integrated institutional frameworks and mechanisms for scaling up proven multi-benefit approaches that promote collective action and coherent policies. CoPs can help to effectively integrate and scale meaningful community-based climate smart agricultural approaches if the real intrusted and affected parties are a core part of the practise.

Snorek et al (Snorek, et al., 2022) have summarized best practice in multi stakeholder forums from the UCP case study as being:

1. A social network structure: Connection of actors to facilitate collaborative governance and natural resources outcomes.
2. Norms of trust and reciprocity
3. A core-periphery network model: Highly connected core nodes or role-players interact with a larger sub-set with fewer linkages. This conserves network functioning over time, provides stability and cooperativeness and facilitates coordinated network responses through multiple pathways.
4. Periphery actors are kept on board through boundary acting: these actors serve as a bridge between disparate groupings, provide social learning opportunities across boundaries and support navigation of intercultural and cognitive barriers between heterogenous groups, allowing for continuity in governance.
5. Generally leadership is information and based on relational value, which are important in contested spaces characterized by multifunctionality. This avoids structural and hierarchical problems.
6. Based on ethics of care: This is rooted in relationality, collective well-being and subjective situated types of knowledge – thus solidarity and respect. In addition,
    1. There are no single right answers.
    2. Accountability through relationships is cultivated and
    3. Requires being open to emotion and some level of vulnerability.

4. M&E SYSTEMS FOR MULTI-STAKEHOLDER CLIMATE CHANGE ADAPTATION AND CLIMATE-RESILIENT SMALLHOLDER AGRICULTURE

By Karen Kotschy, July 2023

4.1. INTRODUCTION

In this project (WRC DSSII 00746), the term multi-stakeholder platform (MSP) is used to describe partnerships consisting of different groups including local and national government, Civil Society Organizations (CSOs), Non-Government Organizations (NGOs), private sector, academia, and local people and communities, all working together towards a common goal.

Partnerships to enable effective climate adaptation (climate-resilient agriculture or CRA) for smallholder farmers are conceptualized on three levels: Micro-, Meso- and Macro-levels (Figure 22).

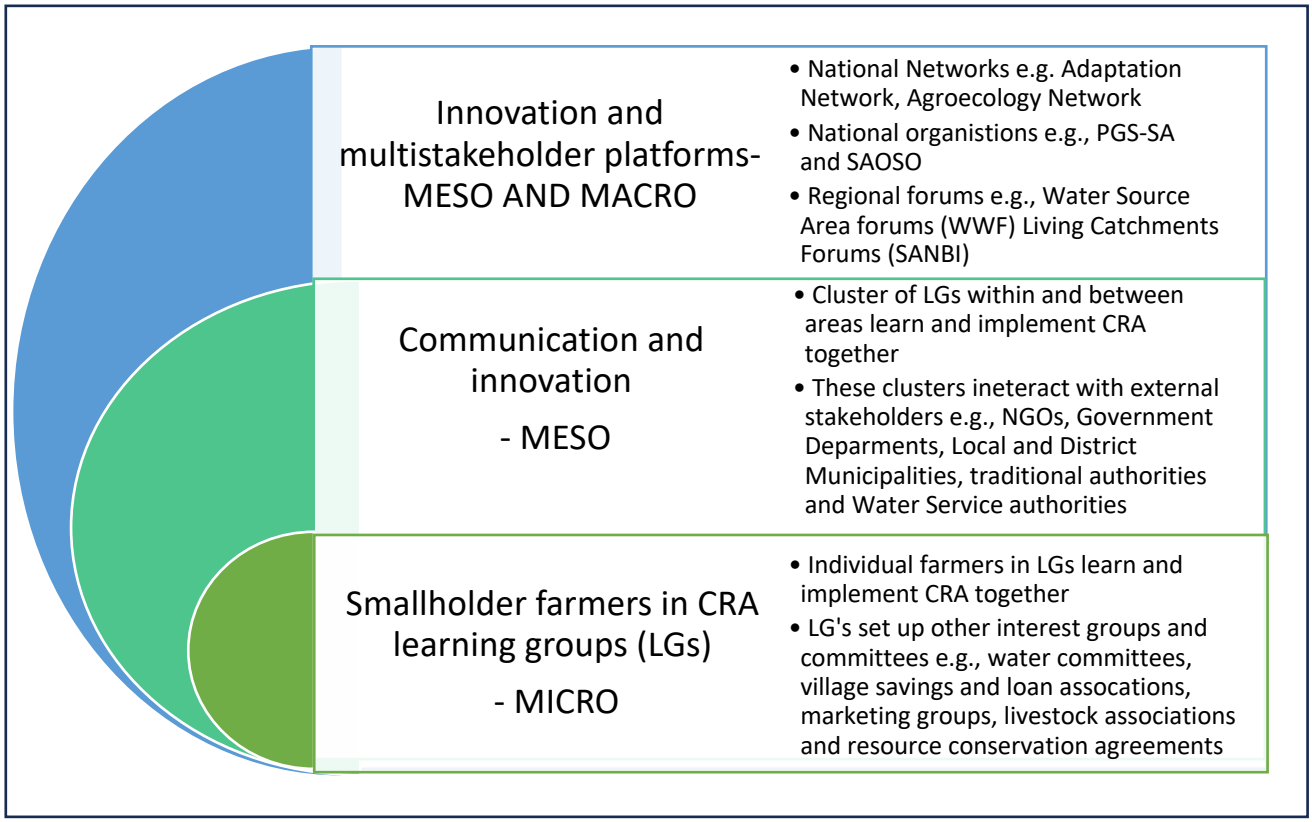

Figure 223: Micro-, meso- and macro-level multi-stakeholder platforms for climate-resilient smallholder agriculture in the project (from Deliverable 1)

This document focuses on considerations for building a monitoring and evaluation (M&E) system that is appropriate for the context (agricultural adaptation processes in multi-level stakeholder networks in complex social-ecological systems), and is coherent across micro-, meso- and macro-levels.

a. What is an M&E system?

Monitoring and evaluation (M&E) systems include, at minimum, a monitoring component through which data are collected to track project progress and record outputs and achievements, and an evaluation component through which the merit of these achievements is assessed. In the development sector, these two components typically look as follows:

- **Monitoring**: A monitoring framework is designed to collect quantitative (or less often, qualitative) indicator data based on the planned project objectives, activities, outputs and outcomes. These data often need to be reported to project funders or higher-level institutions as evidence that progress is being made.

- **Evaluation**: Evaluation processes are typically carried out by external experts, at the end of a project or initiative, and possibly also mid-way through, to determine its effectiveness, efficiency, value-for-money and sustainability. Additional data are collected (besides the monitoring data) to inform the evaluation, often from project reports and other documents, interviews and site visits.

A third component that is often mentioned as part of M&E systems, is learning.

- **Learning**: Most M&E frameworks will say that they intend to promote learning. However, the details of what type of learning is expected, by whom and when, are often not specified. Learning is most commonly stated to be important for developing "best practice" guidelines, allowing upscaling of successes, and sharing knowledge with other projects, practitioners or institutions. This implies a kind of learning that is focused on documenting and communicating successes – which is most easily done at the end of a project. Learning may (less commonly) also be considered important for facilitating ongoing adaptive management and responsivity to changing conditions, or as part of a capacity development process.

Monitoring and evaluation that places particular emphasis on learning is often referred to as **MEL** (monitoring, evaluation and learning), or **MERL** (monitoring, evaluation, reflection and learning – which specifies reflection as an important process to enable learning).

A fourth component that may be included or emphasised is planning.

- **Planning:** The planning component is usually added to indicate a specific desire to integrate monitoring, evaluation (and possibly learning) processes into planning processes, for example within an organisation, usually for the purposes of strengthening the use of M&E data or recommendations and strategic adaptive management.

The acronyms **PME** (planning, monitoring and evaluation) and **PMEL** (planning, monitoring, evaluation and learning) foreground the planning component. This is reflected in the South African national Department of Planning, Monitoring and Evaluation's name (DPME). Integration into planning processes is important because without it, M&E becomes disconnected from management and decision-making and is not acted upon or prioritised, even if effective learning is taking place among other actors in the system.

The above overview identified four components that may be included, in various ways and to varying degrees, in an M&E system. What is included, and how the different components relate to and inform each other, is the M&E system. By way of example, Figure shows AWARD's MERL system

for the RESILIM-O program, a seven-year resilience building program in the Olifants River catchment in Limpopo, Mpumalanga and Mozambique.

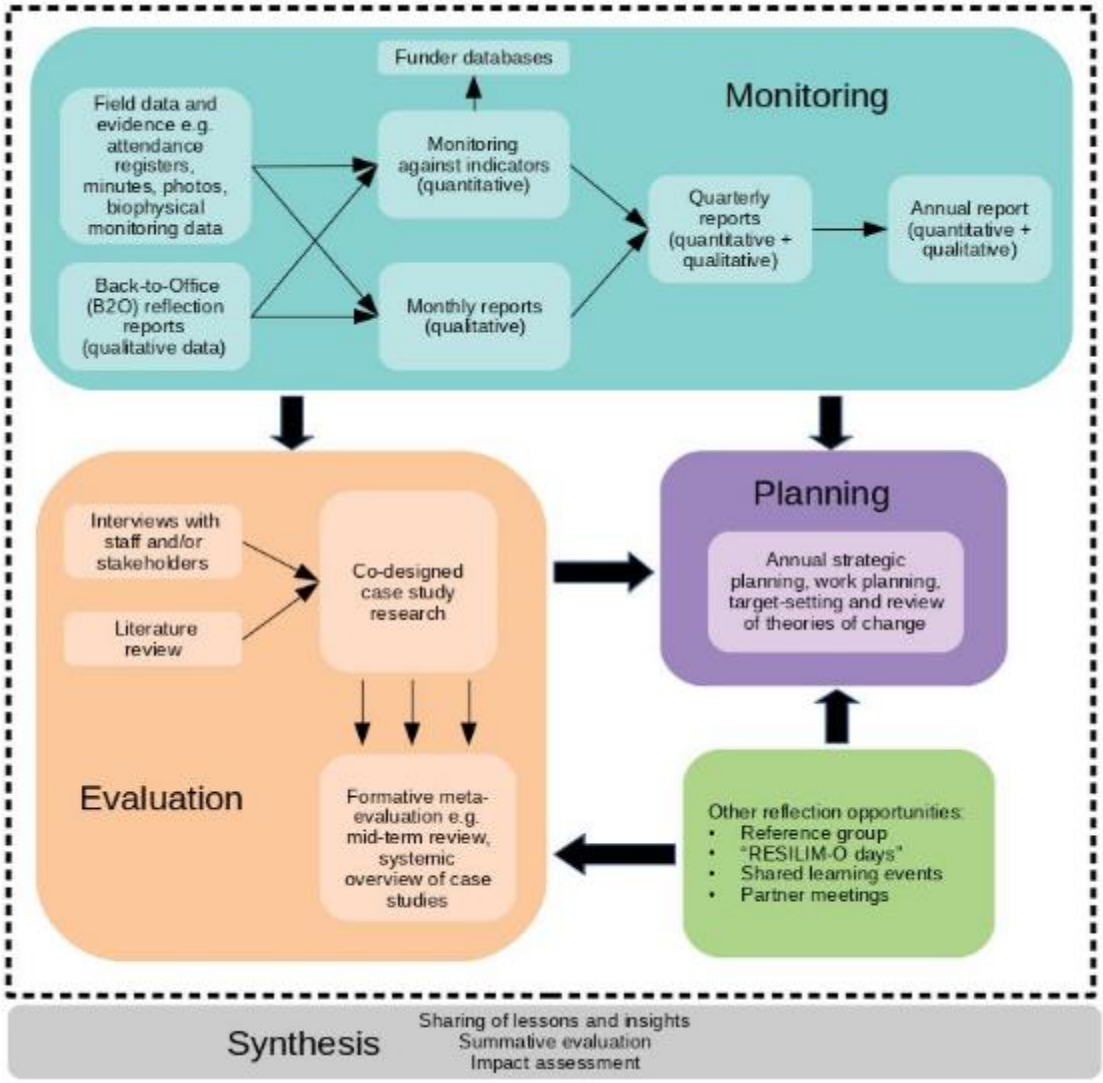

Figure 24: Components of the RESILIM-O MERL system

Learning does not appear in a particular box in Figure because it was deliberately embedded across the whole system. Both quantitative and qualitative monitoring data were collected, with the qualitative data being in the form of reflective "back-to-office" reports which were designed to stimulate reflection by the staff involved on the significance and implications of project events such as workshops, meetings, training events and site visits. This both promoted learning and provided a rich source of data for reporting and evaluation purposes. Evaluation was carried out in an ongoing way, through small case study evaluations, and larger synthetic meta-evaluations. Learning was enabled here by including project implementers/staff in the evaluation process, to allow them to make sense of the data and develop their own evaluative thinking capacities. Both monitoring and evaluation data informed the annual work planning process, where staff would reflect on what these data meant for their project theories of change, targets, and plans for the following year. Learning was also enabled through other specially-designed reflection opportunities (green box). Sharing of lessons and insights, and overall summative evaluations ("synthesis"), were carried out after the program came to an end by the core MERL team, program managers and external evaluators.

4.2 FACTORS TO TAKE INTO ACCOUNT WHEN DESIGNING AN M&E SYSTEM

When designing an M&E system, the following three general factors should be taken into account:

- The context in which the system is to be applied
- The intended purpose of the M&E system
- Practical factors related to how the system will be implemented

These will be considered below in relation to the WRC project.

b. Context

Much has been written about the need for monitoring and evaluation designs to take into account the complexity of the social-ecological contexts in which programs are implemented (e.g. Bellamy et al., 2001; Patton, 2008, 2010; Funnell & Rogers, 2011; Pringle et al., 2011; Douthwaite & Hofecker, 2017; Hertz et al. 2021; USAID, 2021). Features of complex systems are well documented (Preiser et al., 2020) and include high levels of relationality or interconnectedness, 'radical' openness (making them difficult to bound), profound contextual influences, dynamism, adaptive capacity, emergence, complex causality and non-linear pathways of change. These features have implications for the way in which progress and success can or should be monitored and evaluated. The table below summarises the implications of complex systems features (as identified by Preiser et al., 2018) for monitoring and evaluation.

Table 8: Features of complex social-ecological systems (SES) and their implications for M&E. Source: Kotschy et al. (unpublished)

Features of complex SES (Preiser et al. 2018)	Implications for monitoring and evaluation
Constituted relationally • Process-dependent interactions on multiple scales result in networks of interactive relations. • Complex systems are defined more by the interactions among their components than by the components themselves.	Multiple activities and role players will be linked to outcomes; it is often difficult to attribute change to the actions of individual stakeholders. Different stakeholders have different interests and criteria for success of an intervention, and different ways of making sense of past events. Social complexity is often not easy to see or understand from the outside, and simply listing the stakeholders is not sufficient. Since interactions are structured by processes, there is a need to evaluate process, such as processes of social learning, participation, relationship- and team-building, planning, learning, innovation, sharing of information, capacity development and collaboration.
Radically open • All systems exhibit hierarchy in that every system is part of a wider system and is made up of sub-systems. Systemic interactions generate effects that have impacts across scales and domains. • How we describe (or identify) systems is a function of our individual points of view.	System boundaries need to be chosen and assumptions clarified. Evaluators may need to go beyond their areas of expertise, or to work in transdisciplinary teams, to identify and evaluate impacts and influences beyond the chosen system boundary. Need to link across multiple scales e.g. international, national, local. There are often long time lags between actions and outcomes or impacts.

Context-dependent • The identity and functions of complex systems are defined by the context in which they exist.	Evaluators need to understand context, and often need help to do so, or they need to be embedded in the context themselves. Cause-effect mechanisms interact dynamically with the context and so need to be evaluated in a context-sensitive way.
Adaptive • Complex systems have self-organising capacities and can adjust their behaviour as a response to changes in their environments.	Ongoing learning is vital to guide the strategic direction of interventions. Monitoring, evaluation and reporting processes must stimulate as well as adequately capture and share learning. Evaluation needs to provide timeous and effective feedback to enable appropriate responses and adaptation. Over the life of a program, the focus and methods of evaluation may need to change. Initially a more open-ended and developmental approach is required, that progressively becomes more focused while retaining the system gaze. People have multiple motivations for changing their behaviour e.g. people don't only respond to climate when adapting. Maladaptation is also possible. Transformation is also possible.
Dynamic • Non-linear dynamic processes and feedback loops can dampen or amplify perturbations. Small changes can have significant, cascading effects resulting in multiple modes of system-wide reorganisation or regime shifts.	Shifting baselines and contexts. Stakeholder interests and criteria for success change over time. Power and politics are pervasive within social networks and can exert strong influences on the potential for change in a system. Patterns and effects are inherently uncertain and cannot be accurately predicted. There is a possibility of unintended consequences (positive or negative).
Complex causality • Through the interaction of the individual components, novel qualities and phenomena emerge. Hence, the whole is more than the sum of its parts, meaning that systems cannot be understood, nor their behaviour predicted, based solely on information relating to the individual parts.	It is difficult to link causes and effects, and there are multiple complicated pathways and mechanisms that interact dynamically with the context. Pathways to impact are often non-linear. Multiple outcomes and confounding factors are present. It is difficult to measure non-events or damage avoided. Many outcomes of interest cannot be adequately captured using simple quantitative measures.

The WRC project is being implemented in a social-ecological system where multiple actors interact in different ways to adapt smallholder farming systems to the impacts of climate change. In addition to the complexity of interwoven social, natural and economic systems operating at different scales, climate change is particularly challenging because it is not an immediate event, but is associated with uncertainty at various levels. It also involves "complicated science" and no clear "enemy" – yet has significant potential costs and requires people to rethink how they live (Kotschy et al., 2019). In this context, an M&E system needs to help people to figure out how to make sense of this threat that our brains are not equipped to deal with, to figure out who should be doing what, where, when, and how to enable effective adaptation, and also, why they should care about it when they have so

many other important things to do. M&E systems designed for use by project stakeholders therefore need to take into account the considerations in the table above.

c. Purpose

The context in which the M&E system is to be applied to some extent determines the purpose of the system. For example, in complex contexts, it is important that the M&E system enables ongoing learning and strategic adaptive management, and that it is able to detect emergent and unexpected outcomes as well as those that were planned at the beginning of the project. Likewise, M&E for climate change adaptation needs to be oriented towards learning, because adaptation is essentially about an uncharted process of change, and effective change requires us to learn to do things differently, or indeed, often to learn to do different things. Learning in fact underpins adaptation; thus, designing for adaptation requires designing for learning (STAP, 2017).

M&E systems typically have multiple purposes. For example, the three primary purposes of the RESILIM-O MERL system were accountability, learning and sharing (Figure 23).

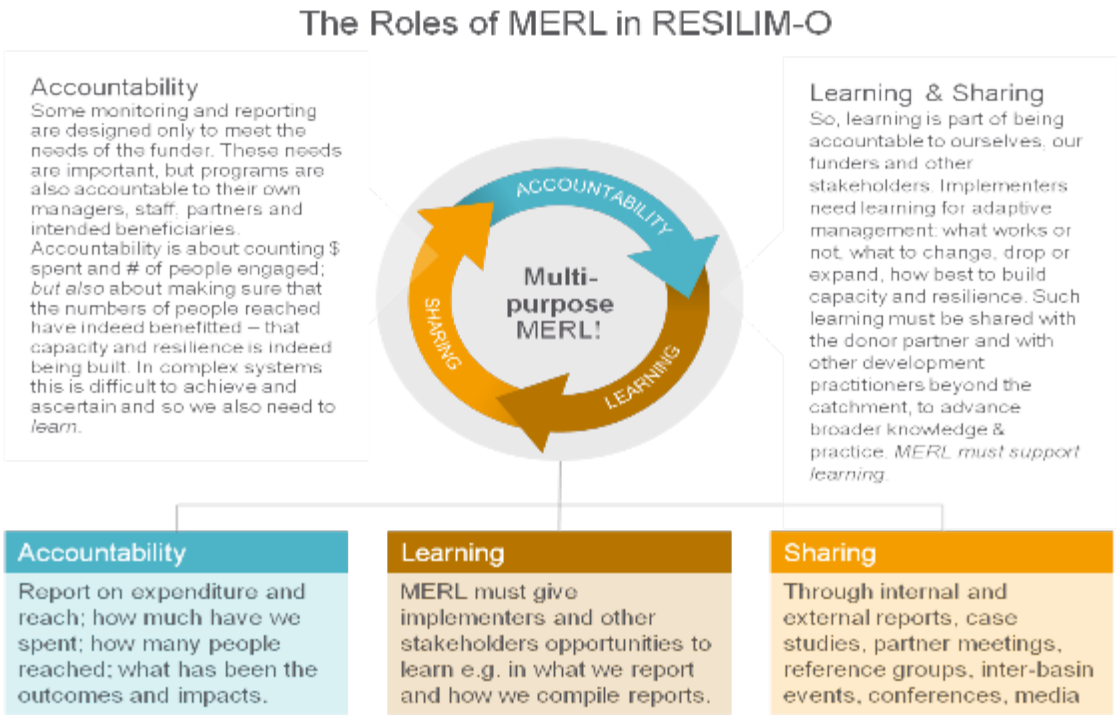

Figure 23: Multiple purposes of the MERL system in the RESILIM-O program

In the RESILIM-O program, the MERL system was iteratively designed in an emergent way. Time and resources were devoted to allowing experimentation with MERL during the first two years of the program. Ongoing reflection, writing and discussions with other practitioners by the MERL team over a period of 7-8 years helped to identify what the key elements of the approach were, and how these related to experience elsewhere. Much of that learning is captured in this document and the associated references.

An important question is who defines the purpose of the M&E system and who is involved in its design?

In learning-oriented MERL systems, it is important to consider who will participate in the MERL system and how they will do so, because participation enables learning. In the Tsitsa Project, the

MERL system was explicitly designed to be participatory as far as possible, involving residents in indicator and theory of change development, collection of social and biophysical data and reflection events. Other stakeholders such as the DFFE, NGO and university partners were also involved in data collection and reflection processes (Tsitsa Project et al., 2021). This participatory focus led to the M&E system for the Tsitsa Project being referred to as **PMERL: participatory monitoring, evaluation, reflection and learning**.

The following was learned from the Tsitsa Project experience (Tsitsa Project et al., 2021):

- Participatory, learning-focused MERL can be a powerful tool for building collaboration, a common vision and a strong basis for ongoing strategic adaptive management.
- An approach that includes and capacitates local residents brings multiple benefits including motivation, agency, capacity to participate in collective action, and changes in power relations and accountability structures. Participation makes M&E more inclusive and can thereby contribute to equity and transformation. It can also increase the "downward" accountability of stakeholders towards residents.
- However, participation requires capacity building, proper planning, paying attention and creating the conditions to enable proper participation. This approach is therefore more time-consuming and costly than "expert-driven" M&E, and requires more and different resources. For example, monitoring practices and tools must be developed to support a participatory approach, materials may need to be developed in multiple languages, and capacity building and culturally appropriate facilitation skills are required.

A useful exercise when planning who should be involved and how is to complete a table similar to the following, as suggested in a handbook produced by Cape Action for People and the Environment (2008):

Steps in the M&E process	**Who should participate?**	**When will this happen?**
1. Develop the M&E plan		
2. Gather the information		
3. Analyse the information		
4. Act on the analysis Learning Decision-making Accountability		

Different possible levels of inclusion of stakeholders within MERL processes are shown in the Figure below. (Kotschy et al., in preparation).

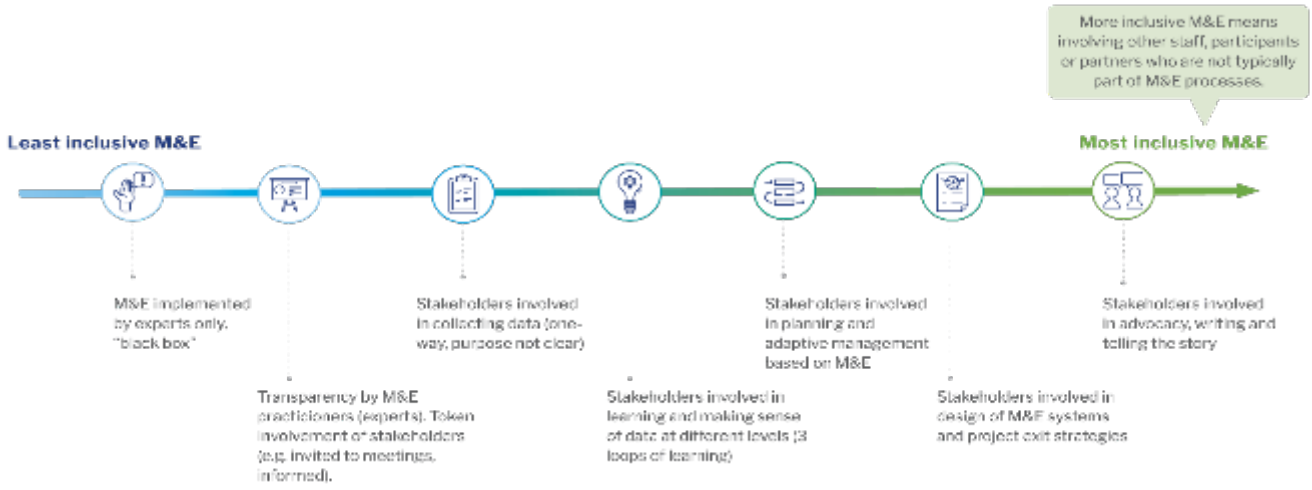

Figure 24: Levels of stakeholder inclusion within M&E. Source: Kotschy et al., 2023 (in preparation)

d. Practicality

In order to be useful and to achieve its intended purpose, an M&E system needs to be practical to implement with the time and resources available.

While learning is particularly important in complex social-ecological systems, a number of reasons have been identified in the literature for why M&E often does not optimally support learning in practice (see **Appendix 1 in this section**). The table below summarises how AWARD addressed these practical issues in the RESILIM-O program to create a MERL system that actually did enable learning in multiple ways.

Table 9: Overview of how AWARD's MERL system for the RESILIM-O program embedded learning into M&E practice. Source: Rosenberg et al. (unpublished)

M&E practices that inhibit learning	How these issues were addressed by AWARD in RESILIM-O
Program logic models don't take complexity into account and therefore do not prioritise learning. Logical frameworks or theories of change are used only at the beginning of the program to lay out how things are expected to unfold; not revisited or questioned.	Iterative development of a program theory of change in the exploratory phase of the project (first 2 years), with explicit efforts to take complexity into account and to prioritise learning. Regular (annual) reflection on sub-project theories of change, based on monitoring data, experience and case studies, with modification if necessary.
The accountability agenda crowds out learning. Reporting does not meet the needs of program implementers and is seen as a burden.	Negotiation between AWARD and USAID created space and allowed sufficient resources for M&E and learning activities throughout the program. AWARD's leadership prioritised learning and built it into as many parts of the program as possible.

	B2O reports used as a concise way of capturing relevant, evaluative information, which promoted collaborative reflection processes that were useful and enjoyable for staff. Monthly reports drew together the reflections from the B2O reports. These were compiled collaboratively on a day set aside each month for this purpose, using a template that promoted reflection on successes and challenges. Reporting to the funder (done by the MERL team) combined quantitative and qualitative data.
Separation of monitoring and evaluation. Monitoring and evaluation performed by designated M&E staff and/or external experts with little involvement by others in the organisation. Evaluation done by external experts and often only after the program has ended.	Integration of monitoring and evaluation, through a Developmental Evaluation approach and semi-internal, semi-external MERL staff. All staff were involved in reporting as an activity that both provided monitoring data and promoted reflection. Reflection on outcomes and collaborative setting of targets by teams during annual work planning also helped to integrate monitoring and evaluation.
Quantitative indicators over-emphasised, which promotes single loop learning only (how to set targets better, how to make sure you meet targets, how to work within the given system). Narrative data either not collected, or not in a form that is easily used for evaluation (e.g. meeting minutes or presentations that are not reflective or clearly linked to the aims of the project). It is therefore often difficult to see how different aspects of the work fit together, go back and answer future questions that may arise, or capture unintended outcomes or failures.	Both quantitative and qualitative data were collected, qualitative data and written reflections were valued and promoted. Double and triple loop learning was promoted through a range of regular reflection activities (B2O reports, monthly reports, monthly RESILIM-O days, "month in pictures" meetings, quarterly reflection on quantitative data, shared learning events, and attendance at conferences and other events (followed by reflection through B2O reports).
M&E seen as a purely technical function	M&E seen as an organisational development and strategic adaptive management function. It involved a combination of technical, management and strategic advisory staff, who advocated for M&E use within and beyond the organisation.
Learning treated as equivalent to knowledge transfer.	After some initial experimentation (and conflict), AWARD managed to balance the need to communicate successes with the need to document learning (and failures) within its reporting. The Developmental Evaluation approach ensured that learning took place throughout the program and was not restricted to sharing of "lessons learnt" at the end.
M&E not functionally integrated with planning and decision-making processes. Evaluation of whether M&E processes are achieving their intended purpose is seldom done.	MERL was thoroughly integrated into annual work planning processes (collaborative revision of and reflection on theories of change, objectives and targets) and strategic decision-making. Evaluation was done informally during regular MERL team meetings and more formally through reflection events (e.g. RESILIM-O days, Reference Group meetings), "meta-evaluations" and conference presentations and papers.

The RESILIM-O program had three important enabling factors: it was a seven-year program – relatively long in project terms, had flexible grant funding not based on predefined deliverables, and had sufficient funding to invest in MERL personnel. Spending on MERL was approximately 10% of the total budget and the following personnel were employed:

- One full-time MERL officer (Honours level)
- One part-time MERL manager (PhD level, 10-15 days per month)
- One part-time MERL adviser (PhD level, 1 day per month)

In the Tsitsa Project (a five-year project which also had reasonably flexible funding), the PMERL function was performed by the following people:

- Around 15 citizen monitors (matric level or lower)
- Four monitor managers (Masters to Postdoctoral level) and one NGO which performed the administration and management of the monitors (Lima Rural Development Foundation, which employed a community facilitator and a project manager)
- One part-time PMERL coordinator (PhD level, 10 days per month)
- One full-time knowledge and learning support officer (Masters level)
- One full-time capacity development coordinator (PhD level)
- One part-time knowledge and learning coordinator (PhD level, 5 days per month)
- One knowledge and learning/PMERL adviser (PhD level, 1-2 days per month)

Where the time and resources available are more constrained, the ambitions in terms of learning and participation will need to be downscaled. An important point is that effective MERL or PMERL does require people, whether part-time or full-time, who are paid to implement and iteratively improve the design of the system. *One of the biggest mistakes in practically implementing MERL or PMERL is designing an over-ambitious system and then assuming that it can be implemented as an extra (unfunded) function by staff whose time is already fully allocated.*

Another important consideration is the skills, attitudes and values required by MERL personnel. Rosenberg and Kotschy (2021) identified the need for **technical, relational and transformational competences** for successful implementation of MERL systems in complex social-ecological systems (see Appendix 1 in this section).

e. Specific considerations for multi-stakeholder platforms for climate-resilient agriculture

This section focuses on specific considerations for M&E of multi-stakeholder platforms for climate-resilient smallholder agriculture.

As shown in Figure 22, the WRC project envisages networks or communities of practice (CoPs) at three levels, which together facilitate experimentation, learning, awareness-raising and upscaling of climate adaptation support systems for smallholder farmers in South Africa. It is important that the M&E approach and the indicators used are coherent across these three levels.

4.3 Monitoring and evaluation of networks and communities of practice

The work of networks and communities of practice (CoPs) often goes unrecorded, unmeasured and unnoticed. However, several evaluation methods are available to make this work visible.

Social network analysis

Network analysis software (such as Gephi and many others) can be used to represent networks or communities of practice graphically and to calculate various statistics which can be used to describe the network and quantify changes over time. For example, in the Sabie River Water Stewardship project, the catchment partnership-building work was evaluated by comparing the stakeholder network 'before' and 'after' the project (Figure 26 and **Error! Reference source not found.**). Nodes in the diagrams (circles) represent organizations, and the edges (lines) represent the relationships

between organizations, weighted according to the strength of the relationship. Nodes are sized according to 'betweenness centrality', a measure of their importance in connecting different parts of the network. Data were collected through interviews with participants but can also be done using surveys.

Analysis of the networks in the two figures below, showed that the project strengthened the relationships between stakeholders, as seen in the average number of connections per node (the 'degree' of the network) and the connectivity of the network (the average path length). Different colours on the diagrams indicate clusters of stakeholders that are more closely connected to each other than to others in the network (the 'modularity' of the network). A high modularity indicates clusters of stakeholders that are closely connected to each other but poorly connected to others outside of their cluster. At the start of the project, the agricultural, water and supporting NGO stakeholders were relatively poorly connected (in tight clusters), but after the project the tightness of the clusters was reduced, suggesting that the project facilitated better connectivity between these different groups of stakeholders. This can also be seen by visual comparison of the two networks.

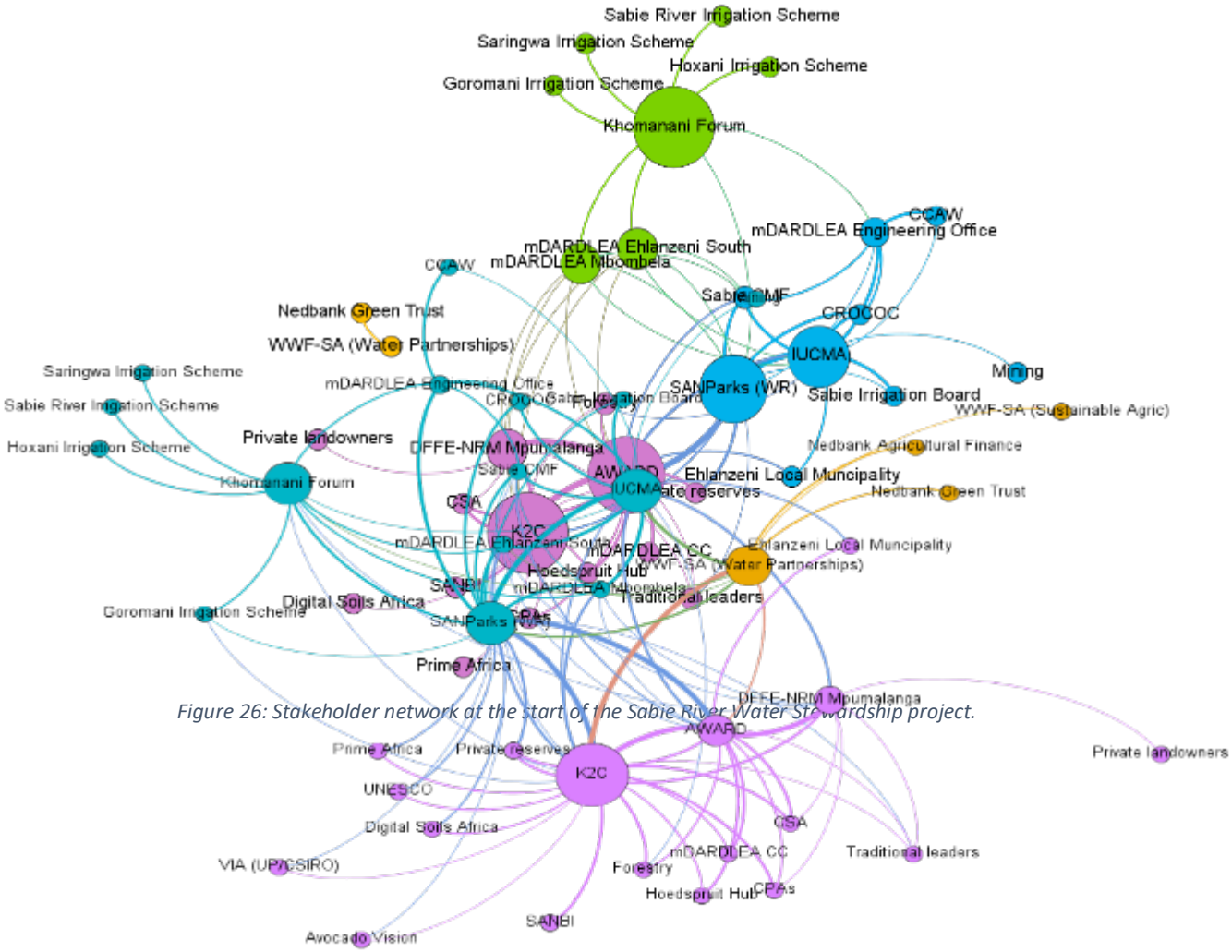

Figure 26: Stakeholder network at the start of the Sabie River Water Stewardship project.

Figure 25: Stakeholder network at the end of the Sabie River Water Stewardship project

The **Value Creation Framework (VCF)** (Wenger *et al.,* 2011; Wenger-Trayner & Wenger-Trayner, 2020) is an evaluation framework that is especially useful for assessing value created through collaboration and social learning in networks and communities of practice. It links the *process* of engagement in networks to eventual *outcomes* such as changes in practice, which often follow later.

Networks and communities of practice refer to two aspects of social structures in which learning takes place (Wenger *et al.*, 2011). The network aspect refers to the set of relationships, personal interactions, and connections among participants - a set of nodes and links with affordances for learning such as information flows, helpful linkages, joint problem solving and knowledge creation. The community of practice aspect refers to the development of a shared identity around a topic or set of challenges. It represents a collective intention – however tacit and distributed – to steward a domain of knowledge and to sustain learning about it. For most groups, however, the two aspects are combined in various ways. A community of practice usually involves a network of relationships. And many networks exist because participants are all committed to some kind of joint enterprise or domain, even if not expressed in collective terms. It is important to recognize that the value of communities of practice and networks has both short-term and long-term aspects (Wenger *et al.*, 2011). Learning that takes place in a community/network is often applied later in other situations, such as in a project team in which a member participates.

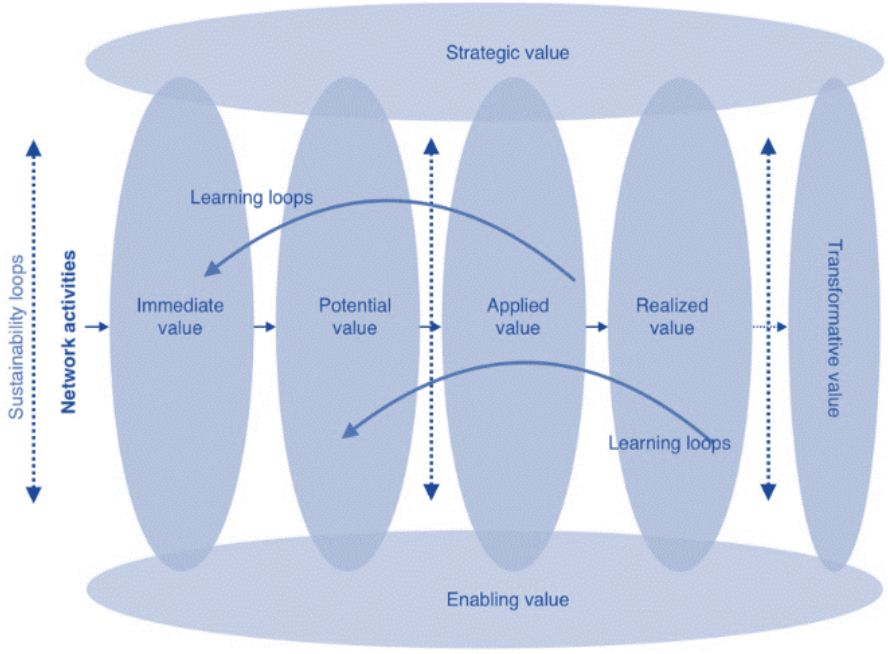

Figure 27: Value Creation Framework. Source: Wenger-Trayner (2014).

The general underlying theory of change behind the VCF is as follows: CoP members participate in activities that generate interest or excitement or deliver some tangible benefit (immediate value). This participation develops insights, skills, relationships or strengthens participants' resolve (potential value). Members apply these insights, skills and relationships to benefit their individual and collective work or do something new (applied value), leading to new, hopefully improved, practices and outcomes (realised value). Learning occurs in various ways throughout this process,

and may include reframing of issues and questioning of fundamental assumptions (reframing value – renamed as 'transformative value' in the newer version of the framework).

The context in which the above processes play out is important. Enabling and strategic value describe aspects of this context. Strategic value refers to the clarity of the strategic context and the ability of CoPs to engage in strategic conversations about the value they create. Enabling value refers to the support processes that sustain the life of CoPs, including internal leadership, external support, resourcing and technology. Ongoing conversations that align strategic and enabling value with CoP activities as they change over time are seen as a key element for sustaining learning (Wenger-Trayner, 2014).

Value creation data can be presented in narrative form, in the form of a summary table (which can include links to the original data sources), or in more graphical form as a "value creation matrix" which provides a concise overview the value creation stories told by different stakeholders (see illustrative example below)

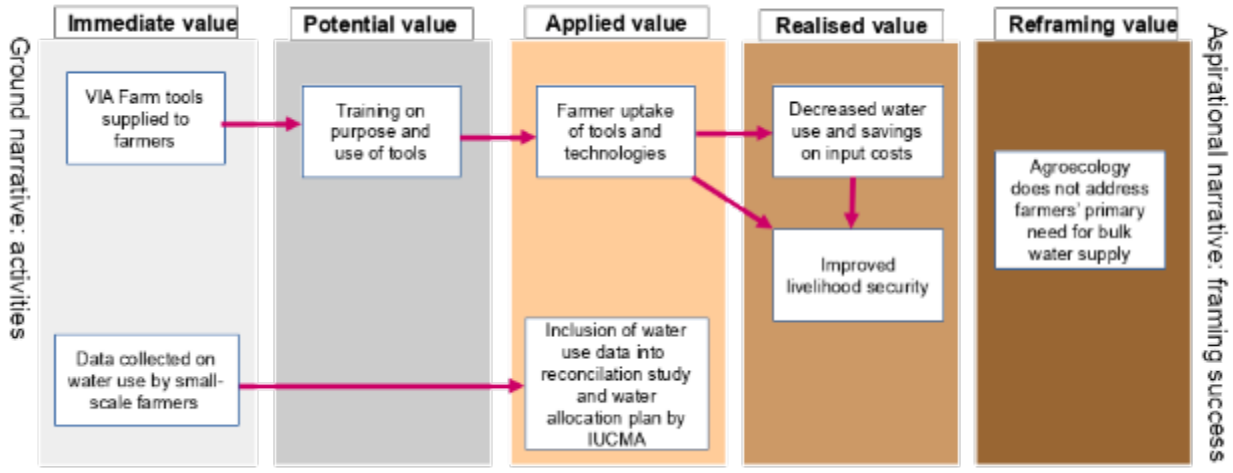

Figure 28: Illustrative example of a value creation matrix showing value creation stories. Source: Kotschy and Pollard (2021)

The Value Creation Framework has been used to evaluate networks formed during the RESILIM-O program, and water source partnerships in the Sabie and uMzimvubu catchments (Kotschy and Pollard, 2021 and 2022).

A similar approach using network evaluation and a technique called **Ripple Effects Mapping** was described by Medley-Daniel and Troisi (2019). This was used in the Fire Adapted Communities Learning Network in the United States to evaluate both the success of the network and the fire adaptation results it is enabling. [4] A "three pillar" evaluation model was used, which involved:

- Measuring connectivity using Social Network Analysis
- Gathering anonymized quantitative data on the network's health using a custom scorecard
- Describing some of the network's intermediate results and impacts with Ripple Effects Mapping (REM) and case study processes.

[4] https://fireadaptednetwork.org/fac-net-is-changing-fire-adaptation-highlights-from-our-evaluation/

Like this WRC project, the Fire Adapted Communities network relies on the concept of **multi-scalar networks at three levels:**

- Level 1: Build local networks for experimentation
- Level 2: Build networks for scaling out so that local innovations can spread, inspire, and learn from others
- Level 3: Build networks for scaling up so infrastructure and policy to support innovations can be developed

The following reflection is provided on their evaluation process

"Starting the process by measuring "collaboration" obscured our ability to see the impacts FAC Net was having on the individual practitioners and their local work (Levels 1 and 2). Instead, we determined that measuring who was influencing each other would reveal how people's work was changing as a result of being part of FAC Net, giving us insight into who was testing new ideas and experimenting, and how fire adaptation practices were "scaling out." Our vision is for network members' joint efforts to also catalyze change at the system level (Level 3)—bringing to light needed policy changes and shifting national conversations about fire management."

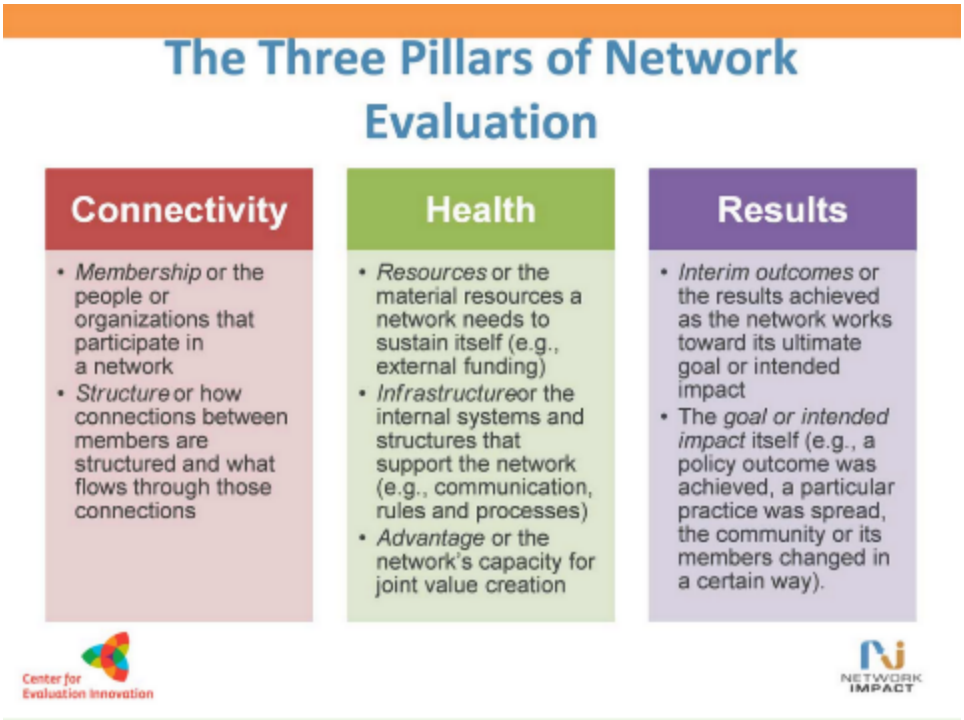

Figure 29: Three pillars of network evaluation as described as used to evaluate the Fire Adapted Communities Learning Network by the Center for Evaluation Innovation and Network Impact

When monitoring and evaluating networks or communities of practice, it may also be useful to measure/document institutionalisation, institutional development, self-organisation, social cohesion and leadership. One useful source is the framework for M&E of One Health networks which aim to integrate human, animal and environmental perspectives on health (Ruegg et al., 2018). This includes measures for social cohesion at different levels (Table 10) as well as organisation and leadership (Table 11).

Buck (2014) also presents some tools for exploring distributed leadership in sustainable land management platforms, for example, using African proverbs to explore different leadership roles and values.

The **Community Led Assessment Tool**[5] developed by Global Giving and the Global Fund for Community Foundations is a useful measure of the degree to which an initiative is community-led

Table 10: Measures of social cohesion at different levels. Source: Ruegg et al. (2018)

Table 4.2. Constituents of social cohesion from a perspective of outcomes for individuals (adapted from Bottoni, 2018; Chan *et al.*, 2006; Jenson, 1998; Littig and Griessler, 2005).

To what extent does the initiative contribute to…

Levels	Subjective perspective (attitudinal)	Objective perspective (behavioural)
Micro level – relationships among individuals (informal connections: interpersonal relations, family, primary groups)	1. Interpersonal trust 2. Social support (giving and receiving help and support)	3. Density of social relations (number and frequency of social relations, and compared to age-peers)
Meso level – relationships among individuals and groups (formal connections: neighbourhood, secondary groups, working groups)	4. Belonging: sharing values – (e.g. incorporating/respecting the norms/unwritten rules of the community in OH activities), collective identity 5. Openness: 'acceptance and openness toward diversity' (recognition/respect of differences and equality in possibilities of self-determined participation in the definition of agency and structures of a society)	6. Participation and emancipation: social and political participation. 7. Bridging (inter-group) and bonding (intra-group) ties 8. Inclusion: equality of opportunity
Macro level – relationships among individuals and society (institutions)	9. Institutional trust – (e.g. trust in parliament, legal system, police, health system, and other organs relevant to a OH issue at hand)	10. Legitimacy of institutions: Quality/ conditions of various social services – health, education; Satisfaction with government and its policies) 11. Partnerships/collaboration

(and hence follows the Locally Led Adaptation Principles). In this project, the work is already strongly locally-led at the micro-level (Figure 22), but the tool may be useful at the meso- and macro-levels to track how well the bottom-up, farmer-led approach is being integrated into regional and national forums and policies.

The different **archetypes or roles described by Chambers et al. (2022) as contributing to co-productive agility** in stakeholder networks can also be used to guide evaluation of the functioning of networks and communities of practice. This would require reflection by participants rather than quantitative indicators but may be a powerful evaluation approach to promote reflection on agency and change, and to build appreciation for different perspectives, agendas and roles.

[5] https://docs.google.com/document/d/1cQSgvy8x_sAeOeUcJHu_ZsfGkAkwFY51DhfeRf0s4SQ/edit

The above M&E tools and approaches can be used at all three CoP levels (micro, meso and macro) and indicators can be selected based on the project's theory of change for how change is expected to happen at each level. *Indicators should cover short-, medium- and long-term process and impacts at each level.*

Table 11: Leadership behaviour required to activate different systemic leverage points. Source: Ruegg et al. (2018)

Table 3.3. Ranked list of leverage points at which to intervene in complex systems, from least to most effective, according to Meadows (2008), in relation to leadership behaviour according to Yukl (2012).	
Leverage point	**Leadership behaviour**
• Constants, parameters, numbers (such as subsidies, taxes, standards) • The sizes of buffers and other stabilising stocks, relative to their flows. • The structure of material stocks and flows (such as transport networks, population age structures).	Task-oriented leadership: clarifying, planning, monitoring, problem solving
• The lengths of delays, relative to the rate of system change. • The strength of negative feedback loops, relative to the impacts they are trying to correct against. • The gain around driving positive feedback loops. • The structure of information flows (who does and does not have access to information). • The rules of the system (such as incentives, punishments, constraints).	Relation-oriented leadership: supporting, developing, recognising, empowering
• The power to add, change, evolve, or self-organise system structure. • The goals of the system	Change-oriented leadership: Advocating change, envisioning change, encouraging innovation, facilitating collective learning.
• The mindset or paradigm out of which the system (its goals, structure, rules, delays, parameters) arises. • The power to transcend paradigms.	Change-oriented, and external leadership: Networking, external monitoring, representing

4.4 Other potentially useful indicator frameworks

The **Self-evaluation and Holistic Assessment of climate Resilience of farmers and Pastoralists (SHARP+) tool** (Hernandez et al., 2022; https://www.fao.org/in-action/sharp) assesses household climate resilience based on the knowledge and priorities of farmers using an integrated approach. The assessment follows Cabell and Oelofse's 13 agro-ecosystem indicators of resilience (Cabell and Oelofse, 2012[6]) and is based on a set of questions covering social, economic, environmental and agronomic aspects of rural-based livelihoods. The assessment is operationalized in the field via an offline tablet-based questionnaire[7], through which quantitative and qualitative answers are

[6] This is in turn based on the resilience principles outlined by Biggs et al. (2012) and other scholars in the Resilience Alliance

[7] Available through KoBoToolbox and Open Foris

transformed into numerical scores reflecting the resilience levels of rural households, as well as the priority areas as considered by farmers. Monitoring changes in SHARP+ scores at different points in time reveals whether household resilience is declining or improving, as well as how and if farmers' priorities have changed over time. The comprehensive and holistic nature of the information collected through SHARP+ also supports the analysis and identification of the contributing factors to changes in resilience levels at different points in time (Hernandez et al., 2022).

The SHARP+ tool is useful for M&E of multi-scale agroecosystem resilience because it is focused at the farmer/household level but is also being widely used at higher levels. The latest version of the tool incorporates SDG indicators and has been tailored to respond to the United Nations Framework

Table 12: Examples of progress, outcome and impact indicators that can be based on the SHARP+ questions. Source: Hernandez et al. (2022)

Type of indicators	How?	Example
Progress and output indicators	The tool allows to monitor the advancement of project activities through the definition of output indicators based on the questions contained in the tool.	• Number of households using sustainable practices to manage land • Number of households using agricultural water management practices • Number of households with access to community-based groups • Number of income sources of households, including non-farm ones
Outcome indicators	Short- and mid-term effects of project interventions on beneficiaries and community stakeholders can be measured and tracked over time.	• Decreased percentage of households using synthetic pesticides • Increased access to community cereal banks • Increased percentage of households with better nutrition, reflected in a higher dietary diversity score
Impact indicators	Long-term changes resulting from project interventions can be measured through the data collected, especially when projects focus on increasing smallholders' resilience to climate and other shocks.	• Increased climate resilience of farmers • Increased food security of rural households • Improved capacity of farmers to timely respond and adapt to climate shocks • Increased ownership of productive assets, particularly among rural women

Convention on Climate Change (UNFCCC)'s Enhanced Transparency Framework reporting on climate adaptation. It has also been recommended by the United Nations Convention to Combat Desertification (UNCCD) to understand the root causes and indirect drivers of land degradation, and has been included as part of operational guidelines on M&E of nature-based interventions, climate adaptation in agriculture, and implementation of resilience thinking. The IFAD and GEF-financed Resilient Food Systems (RFS) Impact Programme is currently using SHARP+ in seven countries in sub-Saharan Africa as part of its M&E framework (Hernandez et al., 2022). The information collected

through the SHARP+ tool can support countries in their planning of context-specific adaptation investments and help to access climate finance by showcasing how integrated strategies improve climate resilience.

SHARP+ is a flexible tool that allows practitioners to fine-tune the questionnaire to fit the context in which the resilience assessment is carried out. This flexibility provides users with a wide range of options to tailor the tool to meet their particular needs.

BOX 6

What can be modified in SHARP+ to contextualize it?

- Thematic modules – by selecting which of the optional modules are needed in the assessment.
- Questions within modules – to ensure they suit the population under assessment and the objectives.
- Response options – to increase relevance to the context and the objectives of the assessment.
- Language – including native or indigenous languages.

Mahlathini's carefully and collaboratively developed resilience assessment snapshots and indicator framework appear to have many similarities with the SMART+ tool. A further in-depth analysis may be useful to assess the alignment in detail and see whether and how the SMART+ integration with higher-level indicator frameworks could be leveraged.

The COSA resilience indicators library covered in Deliverable 2 is also recommended as a useful framework which balances static and dynamic dimensions of resilience and is aligned with the Sustainable Livelihoods Framework of DFID (2000).

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Appendix 1: Why standard M&E practices fail to optimally support learning in complex systems

Extract from Rosenberg, E., Kotschy, K., Pollard, S., Burt, J. and Mudau Mushwana, V. Getting it right in practice: Complexity-sensitive monitoring and evaluation that enables learning. Unpublished manuscript submitted to the Journal of Multidisciplinary Evaluation.

Monitoring and evaluation need to both *support and capture* learning in programs implemented in complex social-ecological systems. A number of reasons have been identified in the literature for why M&E practice often does not optimally support learning. These are elucidated below.

Program logic models do not take complexity into account and therefore do not prioritise learning

Mismatches between program logic models and program design and context play a role in inhibiting learning. Rogers (2008) and Patton (2010) argued that M&E that works in simple systems, featuring regular, predictable outcomes, is inappropriate for interventions in complex systems that have multiple, non-linear pathways from underlying drivers through to outcomes. In complexity, the pathways to success need to be worked out during and through action-taking and reflection. The dynamic, largely open-ended nature of contexts, featuring complex feedback loops and emergent properties, requires real-time learning. If program logic models do not even include learning feedback loops or the possibility of emergent outcomes, it is unlikely that resources will be allocated towards facilitating and understanding these (Woodhill, 2007; Villaneuva et al., 2012).

The accountability agenda crowds out learning

Organisations are often under a heavy donor accountability agenda which overshadows, inhibits or fails to support learning. Donor monitoring and reporting requirements are often extensive and use up precious resources, particularly for small NGOs, leaving little space for evaluation or learning-focused activities (Bornstein, 2006; Taylor & Soal, 2011; Mueller-Hirth, 2012; Kachur et al., 2016). According to Wongtschowski et al. (2016), the tension between M&E for accountability and M&E for learning hinges on the fear of sanctions: performance-based systems may support accountability and transparency, but they also provide incentives to hide failures and overstate successes. Reports are likely to omit unexpected outcomes, failures and mistakes (Mudau Mushwana, 2020), whereas reflecting on such disruptions, dissonances and contradictions is vital for learning (Wals, 2007; Schulz, 2010). Donors and implementers alike must recognise failure as part of the process, and provide incentives to learn from failure (Putz et al. 2012; Wongtschowski et al., 2016).

Chirau & Blaser-Mapitsa (2020) described how a well-established performance management system and strong compliance orientation have led to a decline in evaluation and learning activities in South African municipalities. A situation in which performance-focused M&E requirements are not experienced as meaningful can lead to 'malicious compliance' (Woodhill, 2007; Phillips et al., 2014). When monitoring and reporting are seen as primarily serving the needs of the funder (upward accountability), their potential for promoting learning is lost (Mudau Mushwana, 2020).

Evaluation is separated from monitoring

Conventionally, monitoring (the routine collection of data) is the task of program implementers, while evaluation (sense-making based on the monitoring data) is undertaken by external experts, midway through and at the end of a program. This practice tends to exclude the implementers from the sense-making that could precede learning and improved practice (Woodhill, 2007). For a variety

of reasons, practitioners do not optimally benefit from reading someone else's evaluation report, and even when they do read reports, if these are only produced at program closure, they are not helpful for adaptive management and improving implementation practices.

Quantitative indicators are over-emphasised

Another standard design feature is to report almost exclusively on quantitative indicators. Quantitative indicators enable the aggregation of outcome data on national, regional and global scales. However, when M&E is *exclusively* about progress against quantitative indicators, the likelihood of learning is greatly reduced. Programs that are the most transformational are often the least easily measured with quantitative indicators (Natsios, 2010).

M&E is seen as a purely technical function

M&E is often seen as a technical function related to monitoring systems, indicators, and data storage and sharing. Wongtschowski et al. (2016:8-9) argue, for the case of agricultural extension systems, that such a technical approach fails to harness the power of M&E for building and supporting meaningful partnerships, promoting learning and building capacity. Furthermore, M&E work, particularly in complex contexts where flexibility, adaptation and innovation are important, requires leadership and advocacy and not merely "management" (Rosenberg & Kotschy, 2020; Patton, 2021).

Learning is treated as equivalent to knowledge transfer

Learning is often equated to transfers of knowledge during training or through communications products (Woodhill, 2007). The learning purpose within M&E is too often focused primarily on "capturing lessons" rather than on the *process* of learning. Capturing lessons is often left until the end of a project and seen as a once-off communications or knowledge transfer task, with the product being a brochure or guideline or a once-off "learning event". Lessons learnt are furthermore often of poor quality, being inadequately justified, not related to existing knowledge or too general or specific to be useful; and it is too often assumed that simply documenting them will be sufficient to ensure their uptake and use (Woodhill, 2007). This view of learning is insufficient for tracking, documenting and interpreting innovations and developments as they unfold in complex, dynamic situations (Patton, 2021).

M&E is not functionally integrated with planning and decision-making processes

While many development initiatives appear to have sufficient monitoring to manage the operational side of basic implementation and financial management, it is rare to find M&E systems that help organisations to critically analyse progress towards outcomes and impacts in a participatory and learning-oriented way with beneficiaries, staff and partners (Woodhill, 2007). Strategic adaptive management requires more than quantitative indicator data; it requires ongoing connections between monitoring and evaluation functions and strategic planning processes (Pollard et al., 2011).

Unfortunately, a common assumption often made by M&E system developers is that improving M&E will lead to improved management and performance. This is most definitely not guaranteed. Since M&E is often seen as number counting and dull reporting, many managers do not engage closely with M&E systems or issues and do not consider M&E as useful for supporting their management responsibilities. This becomes a self-fulfilling prophecy, because a lack of attention to the relationship between M&E, planning and decision-making renders M&E ineffective in terms of these functions (Woodhill, 2007).

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5. WORK PLAN: AUGUST- DECEMBER 2023

The following broad activities are to be undertaken during this period:

- Continuation of implementation for the CRA learning groups across three provinces
- Ongoing involvement in CoPs: AN-capacity building and learning, PGS-SA, Northern Drakensberg collaborative
- Finalization of master's student concept note and registration at UKZN.
- Development of food systems case studies
- Development of climate resilience monitoring framework and indicator sets.

Table 13: Work plan --August -December 2023

Work plan August-December 2023								
Deliverable no		**Activities**	**Aug-23**	**Sep-23**	**Oct-23**	**Nov-23**	**Dec-23**	**Submission**
5. Food systems case studies	MDF: Erna Kruger, Temakholo Mathebula, Mazwi Dlamini, Betty Maimela, Nqe Dlamini	COPs: Continue with village level CRA learning groups in KZN, EC and Limpopo engaged – develop case study framework and conduct interviews						2023/12/08
		Undertake annual review sessions for field cropping.						
		Undertake further interventions in multipurpose poultry and conduct interviews.						
		Finalise small business development and livelihoods surveys						
	MDF: Erna Kruger INR: Brigid Letty	COPs: Multistakeholder forums: uThukela water source partnership						
	MDF: Erna Kruger, Temakholo mathebula, Betty Maimela	Develop monitoring framework and indicators – pilot M&E process in selected learning groups						
	Karen Kotschy							
	MDF: Erna Kruger, Michael Malinga	Networks working groups: Adaptation Network - capacity development sessions for STI in Hammanskraal and learning, PGSSA- Certification and farmer inputs, CA forum.						

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