Participatory course to activate ecological infrastructure for water security learning networks

FINAL REPORT
COURSE MATERIALS AND SOCIAL LEARNING TOOLS

Report to the

Water Research Commission

by

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xabisa
indalo for water

EXECUTIVE SUMMARY

The "Participatory course to activate Ecological Infrastructure for Water Security (EI4WS) Learning Networks project", which is referred to here as Xabisa Indalo for Water[1] aimed to proactively design and develop a participatory course for supporting EI4WS Change Projects in order to strengthen social learning and knowledge mediation around EI4WS financing, policy, planning and development. This project was implemented in three phases, which also reflect the chapters of this report: 1) a contextual profiling, training needs analysis, and knowledge asset analysis phase to inform development of course materials and tools for mediation of EI4WS practices in the course (Chapter 2); 2) course curriculum deliberations and course piloting (Chapter 3); and 3) drawing on Value Creation M&E (Monitoring and Evaluation) outcomes of phase 1 and 2 (Chapter 4), to inform a consolidated Training of Trainers course that can be scaled into other catchments (Chapter 5).

The Xabisa Indalo for Water course was designed to support Change Projects and strengthen learning networks in the Berg-Breede and uMngeni catchments, which are demonstration catchments for the EI4WS project. Chapters 2 and 3 both report on the way in which the course was piloted and co-developed in these two catchments, starting with a situated training needs analysis which deliberated needs for EI4WS training in the two catchments, and then responded to what was identified as key needs in each of the two catchments. Through this process we were able to identify that EI4WS practice in the two catchments involved three types of EI4WS activity: planning and governance activity, investment and partnership building activity to leverage resources for EI4WS, and monitoring and management activity. We therefore agreed, through a consultative process with the WRC and Working Group 3 partners in the EI4WS programme and partners involved in the Social Learning and Knowledge Management Strategy as practice process to focus the course around these three types of EI4WS activity as this would allow us to centre the course around key practices or types of activity. This then informed the curriculum framework for the course which adopted a change-oriented learning approach, and which also sought to deepen understanding of especially the concept of 'investing' in ecological infrastructure for water security, which required deepening understanding of ecological economics, and differentiating this from

[1] This is the name and the conceptual branding developed for the Course, collectively decided on by stakeholders, as a means of mediating the complex and at times alienating discourse of 'ecological infrastructure for water security'. The term Xabisa, is 'valuing' in isiXhosa, Indalo is 'Nature', thus the meaning is 'Valuing Nature for Water', which is a more accessible way of discussing EI4WS.

environmental economics and mainstream economics. This proved to be an important, subtle process that required iterative engagement with participants in the programme as they were also seeking to develop EI4WS practices. In the uMngeni case, the focus was on monitoring and management activity, but this was part of a broader EI4WS practice development, namely the development of a blended funding approach to this practice, and involved co-development of a feasibility study for a Water Fund with the WRC and TNC. In the Berg-Breede case, this involved working more with policy and practice actors from multiple government departments and social institutions (e.g. biosphere reserves) to consider the meaning(s) of 'investment' in EI4WS, and related policy aspects. Developing course materials and case studies that facilitated reflexive engagement with self-chosen EI4WS Change Projects, was a central part of this work, and included engaged course design using digital tools such as Miro-board, WhatsApp and situated learning tools such as fieldwork and citizen science. This is reported in detail in Chapter 3.

The project also adopted a M&E approach that was aligned with the SLKMM strategy which allows for observation and evaluation of social learning processes through use of the Value Creation Framework (VCF) which is being used in the broader EI4WS Social Learning Knowledge Management and Mediation programme; so that the data in the course project could also feed into the wider SLKMM M&E process. We also included a focus on activity system analysis as this offers a way of evaluating transformation of activity with the most explicit case being the development of the blended finance model in the uMngeni catchment. We also introduced M&E tools that could assist participants to assess the M&E findings from their Change Projects for scaling potential of different kinds, e.g. horizontal scaling, vertical scaling and/or depth scaling. Further detail is offered in Chapter 4.

Overall, much was done in the project, despite a late start due to contractual delays and various impacts resulting from the COVID-19 pandemic, which especially affected our ability to engage with people in the catchments earlier on than was eventually possible. This led to a shorter period of time being available for the final course pilot, which affected the implementation of Change Projects. Some key learnings from the courses as gained from participant reflections in the two catchments, as well as reflective work undertaken by the course facilitation and piloting team, inform recommendations for taking the course forward that include:

- Advancing and continuing to use the framework of 'types of EI4WS' activity used in the course,

- Using the situated approach to TNA and knowledge assets review as established in this project, but invest more in management and development of knowledge resources, including case studies to advance social learning and access to such information and tools,
- Continuing to develop the course with specific attention to Change Projects, time given to the course, decision on selection of course participants for particular purposes in the catchments, conceptual support for a new concept like EI4WS, and ongoing clarification of the concept in practice, as well as continued development of social learning tools, especially to support access to the concept.
- Continue to develop the MEL framework and tools piloted in the course as they offer a useful combination of tools to evaluate the advancement of EI4WS activity, as well as social learning processes and opportunities for scaling EI4WS activity. These tools should be used in participatory ways on the course so that participants themselves are undertaking the MEL work to inform their own practice, as pilot tested in the course.

Overall, we recommend that the WRC and SANBI allocate further time to develop the course to the next level, including in a possible online course format. The budget and time for what was expected in this round of the process was ambitious, and with challenges associated with a late start up, as well as COVID-19, we were not able to fully advance all aspects of this course and its potential. This is also because the concept around which the course is being built is new and emergent and requires substantive engagement in the field for it to be meaningfully mediated into practice. Having said this, much was achieved, and valuable lessons were learned, and actual practice-based gains were also achieved in the two catchments. (see Chapter 5 for further detail).

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ACRONYMS & ABBREVIATIONS

AEN	Amanzi Ethu Nobuntu
CLCB	Centre for Local Capacity Building
DBSA	Development Bank of Southern Africa
DSI	Department of Science and Innovation
DUCT	Duzi uMngeni Conservation Trust
EI	Ecological Infrastructure
EI4WS	Ecological Infrastructure for Water Security
ELRC	Environmental Learning Research Centre
GEF	Global Environmental Facility
M&E	Monitoring and Evaluation
MERL	Monitoring, Evaluation, Reporting and Learning
NBI	National Business Initiative
NRF	National Research Foundation
NRM	Natural Resources Management
PES	Presidential Employment Stimulus Programme
P4G	Partnerships for Green Growth and the Global Goals
SANBI	South African National Biodiversity Institute
SLKMM	Social Learning, Knowledge Management and Mediation Strategy
UEIP	uMngeni Ecological Infrastructure Partnership
VCF	Value Creation Framework
WRC	Water Research Commission

CHAPTER 1

INTRODUCTION AND ORIENTATION

1.1 Introduction to the Project

The "Participatory course to activate Ecological Infrastructure for Water Security (EI4WS) Learning Networks project", which is referred here as Xabisa Indalo for Water[2] aimed to proactively design and develop a participatory course for supporting EI4WS Change Projects in order to strengthen social learning and knowledge mediation around EI4WS financing, policy, planning and development. The project was implemented in three phases: 1) a contextual profiling, training needs analysis, and knowledge asset analysis phase to inform development of course materials and tools for mediation of EI4WS practices in the course; 2) course curriculum deliberations and course piloting; and 3) drawing on Value Creation M&E (Monitoring and Evaluation) outcomes of phase 1 and 2, to consolidate a Training of Trainers course that can be scaled into other catchments.

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The Xabisa Indalo for Water course was designed to support Change Projects and strengthen learning networks in the Berg-Breede and uMngeni catchments, which are demonstration catchments for the EI4WS project. The Xabisa Indalo for Water course project is situated within component 3 for the EI4WS project (Figure 1.1), and the course development team worked collaboratively with key personnel from all 3 components of the EI4WS project where this was possible to further explore knowledge assets and resources within the broader EI4WS projects, and across partner institutions to inform the course development processes:

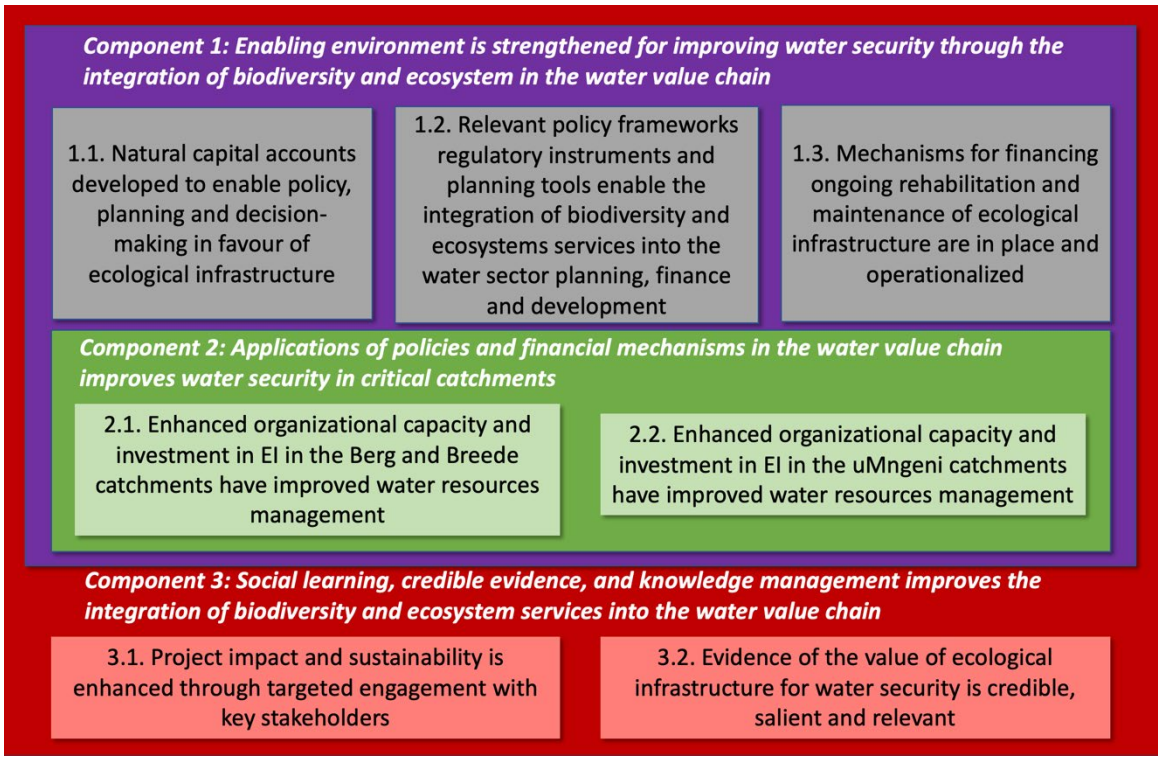

Figure 1.1 The wider GEF6 EI4WS Project Components. This diagram illustrates the work of Component 3 in which the Xabisa Indalo for water course is a key tool for mediating social learning and creating an enabling environment for value creation across the whole EI4WS project

1.2 Rationale and Framing of the Report Structure

As indicated by SANBI in the project document entitled 'Unlocking Biodiversity Benefits through Development Finance in Critical Catchments' submitted to the DBSA and GEF 6 (which governs the overall programme into which this course fits),

There is a growing recognition of the role of ecological infrastructure in supplementing, sustaining and, in some cases, substituting for built infrastructure solutions for water resource management. Water security is improved through ecological infrastructure that provides, for instance, services that improve assurance of supply over time, reduce costs associated with

clean water, ameliorate hazards that pose risks to people, livelihoods or built infrastructure (pg. 15).

In terms of national development policy, the SANBI indicates that investments in National Strategic Infrastructure Programme 18 of the National Infrastructure Plan can be significantly complemented, enhanced and sustained with further investments in the ecological infrastructure in the surrounding natural environment, in addition to investments in built infrastructure in the water value chain. Ecological infrastructure is also crucial for securing human health and livelihoods in areas where communities do not have direct access to built infrastructure for water security and provisioning. Giving attention to ecological infrastructure in the water value chain is crucial for a sustainable supply of fresh, healthy water to equitably meet the needs of South Africa's social, economic and environmental water needs for current and future generations.

The Xabisa Indalo for Water course is focussed on these objectives at a broad level, but more specifically on mobilising the knowledge capital that exists in research, practice and development platforms on how to enhance participation and co-learning to expand impacts associated with Ecological Infrastructure for Water Security (EI4WS) financing, planning and development in South Africa.

The first phase of the Xabisa Indalo for Water Course process involving a contextual profiling, training needs analysis, and knowledge asset analysis phase to inform the development of the Xabisa Indalo for Water course materials and tools for mediation of EI4WS practices in the course, indicated that there are a substantive number of existing approaches and tools for working towards improved EI4WS that can be mobilised in priority catchment contexts for others to learn more about these and to apply them well; AND that these approach and tools need to be expanded and extended through new knowledge and practice generation, and co-engaged learning (what we call expansive social learning in this proposal). **Chapter 2** of this report captures these insights more comprehensively.

In Phase 2 of the Xabisa Indalo for Water Course Development process, a course curriculum framework was designed involving four modules. A first draft of the course materials were developed via an extensive consultative approach which focuses on 4 modules:

- Module 1: Introduction and Orientation to Xabisa Indalo for Water [valuing nature for water]

- Module 2: Advancing EI4WS Activity – along three streams of activity namely Policy Activity, Investment Activity and Monitoring Activity
- Module 3: Advancing EI4WS Activity Together – social learning, value creation and stakeholder engagement
- Module 4: Monitoring, Evaluation and Scaling for Impact

The course was implemented in two sites, focussing on advancing the type of EI4WS Activity that participants are mainly engaged in (i.e. Monitoring, Policy and/or Investment Activity) (Module 2 activity) via a participatory EI4WS Change Project. Via the Change Project all course participants are encouraged to plan, develop and implement, and then monitor and report on the advancement of their EI4WS activity. The course is supported by a Foundation Text that introduces and supports core aspects of the Economics of EI4WS. It is also supported by a number of case studies that were used to enhance Module 2. The case studies provide examples of different types of EI4WS activity as brought into focus in the course.

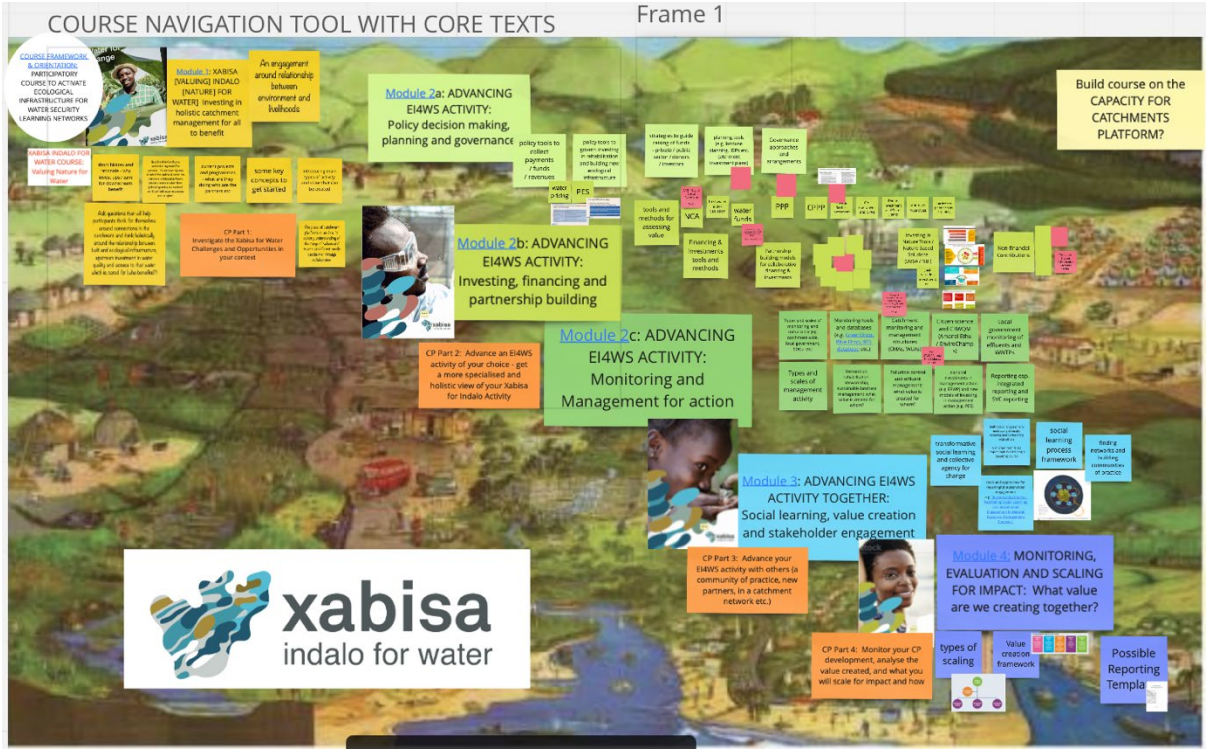

Figure 1.2 Xabisa Indalo for Water course curriculum framework

The Xabisa Indalo for Water Course development was co-developed, and pilot tested in the uMngeni and Berg-Breede demonstration catchments (Year 2 and 3 respectively), with potential to expand to other catchments in future. In Year 2, the focus was on **Monitoring Activity**, which was best tested in the context of the Amanzi Ethu Nobuntu programme in the

uMngeni Catchment as this was a key focus of the UIEP's social learning work at this time, and a second course pilot was run in the Berg-Breede in Year 3 focussing more on **Policy and Investment Activity**. This allowed core aspects of the course to be pilot tested in two different contexts, at different stages of the course development, and with diverse audiences, and partnerships. **Chapter 3** of this report captures the main insights gained from the pilot testing and ongoing co-design of the courses in these two contexts. Attached to the report are the course materials as finalised by the time of this reporting period. Course materials can be found, and downloaded from the Miro-board which was used as a course repository for the course materials.

In Phase 3, work was done to develop a MEL framework and tools for the course with MEL work undertaken to inform a Training of Trainers course going forward, and further expansion and uptake of the course in the sector. **Chapter 4** of this report shares the thinking that went into the design of these tools, and shares some of the key findings from the MEL, with further detail contained in the different course reports. It therefore outlines some of the main findings from the MEL activities and reflections, and outlines implications for further developing and/or using the course going forward.

While the project team managed to conclude the extensive work associated with scoping and course design, and piloting of two courses in the time available, it should be noted that the project was potentially too ambitious for the time and budget allocated to it, especially since the project was initially heavily affected by 1) late start up due to bureaucratic problems associated with contracting, and 2) the COVID-19 pandemic which curtailed meetings, initial fieldwork scoping and thus 3) affected the start-up design and running of the courses as initially planned. The project was also affected by sector partners often being heavily affected by overwhelming workloads (i.e. the sector partners appear to be operating under a range of stressors, including financial, time, and post-COVID-19 recovery issues, along with other contextual factors such as the impact of loadshedding on work schedules, etc.). A second draft of the course materials has been developed but these still require final DTP, and it was not possible to put the course online as originally intended due to time pressures, and also limitations to the budget. Thus, Phase 3 of the programme may need further consolidation and engagement going forward, after this reporting period.

It should also be noted that, as indicated in the SLKMM Strategy, EI4WS is a 'new concept' that is quite technical, and is not well developed and/or understood in the sector as yet, and it required a lot of unpacking and mediation to make this concept more accessible to practitioners. In some cases, such as the Amanzi Ethu Nobuntu context, the concept of

blended financing was still being pilot tested as the course was unfolding around the monitoring activity, thus we were learning about the practical dynamics of the concept as it was being worked with in practice. We also found that there was a need to put much more work into bridging between NRM and Economics discourses than was originally anticipated. **Chapter 4** reflects further on these learnings and contextual dynamics affecting the course piloting phase.

Overall the course was designed to contribute to the objectives of the EI4WS Project Social Learning and Knowledge Mediation and Management (SLKMM) strategy (Lotz-Sisitka et al., 2020), and in this way, was also seen to be a key contributor to Component 3 of the EI4WS project, which has an emphasis on facilitating social learning as a methodological approach for strengthening co-generation and knowledge sharing, to support the emergence of transformative agency (capacity) for actors and networked communities of practice to address challenges and tensions relating to component 1 & 2 of the broader EI4WS programme that focus on the integration of ecological infrastructure into financing, planning and governance of water security (SANBI / DBSA, 2016).

The course has been reported on in the EI4WS Project SLKMM Strategy, and a key activity of the SLKMM team (Prof Lotz-Sisitka and Dr Jess Cockburn) was to also support the design and development of the EI4WS Course so that it would align well and contribute to the SLKMM strategy and its implementation, as this strategy was conceptualised as a 'Strategy-as-Practice' tool for enhancing EI4WS through social learning. **Chapter 5** concludes by indicating how the course piloting and development helped to advance the principles and processes of the SLKMM Strategy, and what still needs to be done going forward.

1.3. Project Aims And Objectives

1. Develop a participatory course to activate EI4WS learning networks in the Berg-Breede and uMngeni River Catchments
2. Pilot the participatory course to activate EI4WS learning networks in the Berg-Breede and uMngeni River Catchments
3. Provide continued support for established EI4WS learning networks and scaling up of the participatory course in the Berg-Breede, uMngeni and other catchments.

1.4. Expected Outcomes and Intended Impact

The Xabisa Indalo for Water course was developed through a participatory process which allowed for co-creation of knowledge by different stakeholders involved and interested in EI4WS practices. Through its collective development and piloting, the Xabisa Indalo course was expected to provide immediate impact through enhanced capacity, evidence and changed practices for EI4WS.

Based on the monitoring and evaluation of the course pilot process, the intention was to develop refined materials for a Training of Trainers course that can further support scaling via a course-activated learning network model in the EI4WS demonstration catchments and beyond. Therefore, the Xabisa Indalo for water course sought to support:

- Co-learning resulting in between 15-30 EI4WS Change Projects (evidence-based outcomes) around financing, planning and development of EI4WS practices (monitoring, investment, policy activity) in the demonstration catchments.
- Strengthen learning networks to catalyse the co-learning, and knowledge production and sharing of existing and new knowledge assets and experiences within and across the EI4WS project components and stakeholders in the demonstration catchments.
- Knowledge mediation tools and materials that can be used as learning tools for co-inquiry processes to explore and expand EI4WS financing, planning and development within and across catchment networks, communities of practice, and the policy level sphere.
- Expanded capacity for implanting EI4WS practices in existing networks/platforms/ communities of practice in the demonstration catchments and beyond, as the course is being conceptualised as an additional layer of support to the existing EI4WS work in these catchments.
- Development of a value creation monitoring and evaluation tool that provides evidence of, and demonstrates different types of value created through the participatory course.
- A Training of Trainers course pilot tested, with accreditation tools, materials for bimodal learning platform (including e-learning), tools and strategies for further scaling the changing of EI4WS practice.

A summary of achievement against these planned outcomes and intended impacts is discussed in Chapter 5.

CHAPTER 2:

KNOWLEDGE RESOURCES & ASSETS SCOPING AND TRAINING NEEDS ASSESSMENT TO INFORM DESIGN OF THE COURSE

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2.1 Introducing the Knowledge Resources and Assets Scoping

The EI4WS SLKMM Strategy indicates that the EI4WS concept is fairly new in the South African landscape and there is a need to develop concept formation learning processes to navigate emerging EI4WS related concepts and practices. As seen in this Chapter, this involved the analysis of existing knowledge resources such the outputs being produced by the three EI4WS programme component, field-based engagements in the two demonstration catchments for deepening an understanding of knowledge needs and co-defining matters of concern (i.e. identifying challenges, gaps, areas of potential support and development) in order to develop contextualised knowledge-based resources for a transformative and participatory learning in the context of EI4WS.

Significant to the participatory course project, and its structuring is the call requirement that “Component 3 will draw from the knowledge generated through the other components, as well as experience external to the project, in order to support and enable the effectiveness of project interventions through social learning”. At the start of the process, we identified that some knowledge resources on natural capital accounting and other finance mechanisms were

being generated in the other components. There was therefore already a body of knowledge to draw on in designing the course. However, we also identified that there is very little shared understanding amongst actors, networks and communities of practice in the catchments on how these processes are developing (evolving), what the full implications of Investing in EI4WS meant amongst different partners, and what associated learning resources and tools are required to realise the financing, policy, planning and development of EI4WS in practice. We also realised that this was a vast, complex and rapidly developing area of knowledge in the NRM sector. The challenge that we faced was 1) how to make what was available more visible, and b) how to mediate this so that it was meaningful to participants in the catchments, in 3) ways that would assist them to further advance investment in EI4WS practices. We also needed to work out how to organise these practices so that it would be easy for a diversity of participants in the catchments to join into the conversation and participate in investment for EI4WS activities.

The SANBI/DBSA (2016) project document indicates that the prevailing mechanisms for investment in ecological infrastructure are: 1) Development finance such as commercial loan finance options, public sector grant finance (e.g. Water Services Infrastructure Grant and Regional Bulk Infrastructure Grants administered by the DWS) and water bonds (still in development as a mechanism); and 2) Public finance such as user tariffs, and EPWP programmes in the Environmental and Culture Sector. While these indicate that there is some level of valuing of ecological infrastructure in the policy and financing environment, there are also significant implementation lags, and there is the additional problem that water sector infrastructure engineers and planners, designers and funders are not building the true costs of water services into their planning and infrastructure costings, nor are they recognising the dependencies of grey (built) infrastructure on green (ecological) infrastructure, and significant development failures occur as a result (e.g. siltation of large dams). Additionally, a key area of investment which occurs in the social realm (e.g. through people investing time into monitoring activities) is not necessarily fully ‘valued’ as investment in EI4WS.

There is evidence on the need for incorporating Ecological Infrastructure (EI) into the broader water resource management planning across inter-sectoral agencies. And while significant funding is allocated in the development sphere to EI such as in the EPWP programmes and Land Care programmes, these funds are not allocated towards maximising water security outcomes or ecosystem integrity. In previous research we found that expansive social learning has potential to strengthen these outcomes via co-engaged and participatory processes (Chikunda, Thifhulufhelwi, & Graf, 2019).

As indicated above, we were alert to the fact that there is a need to address a range of complexities in the EI4WS financing, planning and development spheres across institutions at catchment levels, but also across catchments into the broader planning and development spheres, and into the public sphere more generally. For example, tools are being developed via Component 1, such as Natural Capital Accounting (NCA) to inform improved planning and decision making, but there is still much to be done to realise its potential for management action in accounting systematically for stocks and flows of natural resources. There is also a need to understand the difference between NCA which accounts for stocks and flows of natural resources, and natural capital accountability at project or activity level which accounts for management actions and costs for restoring and maintaining natural capital.

The work in Component 1 is aimed at addressing this, but there is need for catchment level engagement and social learning to internalise these emerging concepts and processes, which the participatory course sought to facilitate in collaboration with inputs from EI4WS Component 1 and 2 actors, Component 3 partners (who were championing social learning dimensions of EI4WS), and stakeholders in the demonstration catchments (Berge-Breede & uMngeni), both of which are critical: economically, socially and ecologically in South Africa.

A key focus of the initial course planning in Phase 1 of the project was therefore to probe existing knowledge and knowledge assets to build the foundational content and facilitation modalities of the course in the demonstration catchments. We also aimed to strengthen this process by drawing on learning insights on EI4WS initiatives from other catchments (Olifants & uMzimvubu) where relevant.

Importantly, at the start of Phase 1 we realised that there is a need to scope the full range of knowledge assets in the demonstration catchments as part of investigating the EI4WS context and practices on the ground. This formed part of exploring the need state for transformative social learning processes of a participatory course, and informed the focus of the training needs analysis, and the identification of relevant stakeholders and communities of practice to involve in the course. We realised that there was also a need to identify absences in knowledge assets. The intention was to do this with researchers in Component 1 and 2, and the participatory course project team. Overall, we found it difficult to fully draw on Component 1 and 2 teams as they tended to be extremely busy. The best approach we could follow was to attend some of the EI4WS meetings, and we also requested the WRC SL team, and Working Group 3 stakeholders to share materials and emerging tools from the sector with us, to include in the knowledge resources collection (see below). This generated a large amount of knowledge resources which was overwhelming, and we realised that it was not a good

approach to try to mediate each and every one of these (see below). Rather we needed to design a course that would allow participants to 'navigate their way into the knowledge base', rather than learn about each and every possible EI4WS practice. This is also because new knowledge is constantly being generated on EI4WS in South Africa, and it would make more sense to add this to the knowledge base as it emerges, and rather give course participants access to the knowledge base for their uptake and use, depending on the core focus of their activity (e.g. monitoring, investment, policy, etc.).

2.2 Introducing the Training Needs Assessment

The Training Needs Assessment (TNA) was undertaken *in tandem with* the Knowledge Resources and Assets Scoping. It formed a key focus of Phase 1 of the project (see Figure 2.1 below), and it was comprised of two interrelated parts through which we aimed to identify priority training needs and capacity development gaps across EI4WS practices at the implementation activity level (i.e. EI practices in uMngeni and Berg-Breede). The TNA was conducted in two parts, which allowed for an initial / interim TNA, reflection on this drawing on the knowledge resources and assets scoping work, and then a final TNA which took the knowledge resources and assets scoping work into account in relation to the initial TNA and insights from the two demonstration catchments:

- TNA Part 1 was an interim TNA which focused on engagements with stakeholders in the two demonstration catchments. The purpose was to explore the EI activity interventions on the ground (i.e. what EI are stakeholders working on, interested to work on/ has potential for expansion, what are the challenges, who is involved or need to need involved, communities of practices and network). This process was supported by the EI4WS Component 3 team and involved fieldwork engagements in the two catchments by the Xabisa Indalo for Water team members. It also involved developing case studies which could be used in the course, as this was a way of scoping and articulating local knowledge assets and gaps as will be shown below.
- Part 2 was presented as a 'final TNA' which further explored training gaps and enabling tools at planning, financial investment, and policy activity level. This involved the review of knowledge resource products from component 1 and 2, as well as meetings and engagements with key personnel in the above-mentioned components; in other words we sought to find out from Component 1 and 2 stakeholders what their views of TNA were. The final TNA also helped to identify course participants who will further develop interventions (change) projects to address identified training gaps within the broader EI4WS activity of planning and decision-making, financial mechanisms, policy framework, and social learning mediation in the demonstration catchments.

Importantly, further TNA work can still be undertaken going forward, based on lessons learned from this iterative approach to TNA which involved a) knowledge assets and field scoping, b) catchment level TNA, c) sector level TNA, and d) iterative relations between the catchment level TNA and sector level TNA processes, as e) these relate to available knowledge resources, assets and gaps. This could be seen as an innovation in TNA methodology, as most TNAs are treated more technically as an assessment that is done prior to a training process. In this case, the TNA was designed to be informed by the status of the field, *as well as* the needs of participants, *and* available knowledge resources and assets / gaps, offering a more holistic and iteratively designed form of TNA.

In terms of process, both the Part 1 TNA and Part 2 TNA were constituted as key components of Phase 1 of the *Xabisa Indalo for Water project*, and they aimed to:

- Strengthen the catchment-based stakeholders' engagement in identifying training gaps (Figure 2.1, social capital). This will build on the stakeholders mapping process initiated under component 3 (see initial stakeholders maps in Figure 2.5 & 2.7).
- Review existing knowledge assets to identify social learning mediation needs and gaps at planning and decision-making, financial investment, and policy activity, to inform course design and implementation (knowledge capital), e.g. how to mediate and package the NCA work in a way that addresses stakeholders needs for EI implementation in the catchments?
- Identify course participants and their knowledge needs in order to inform development of change projects the demonstration catchments (social to activity capital)

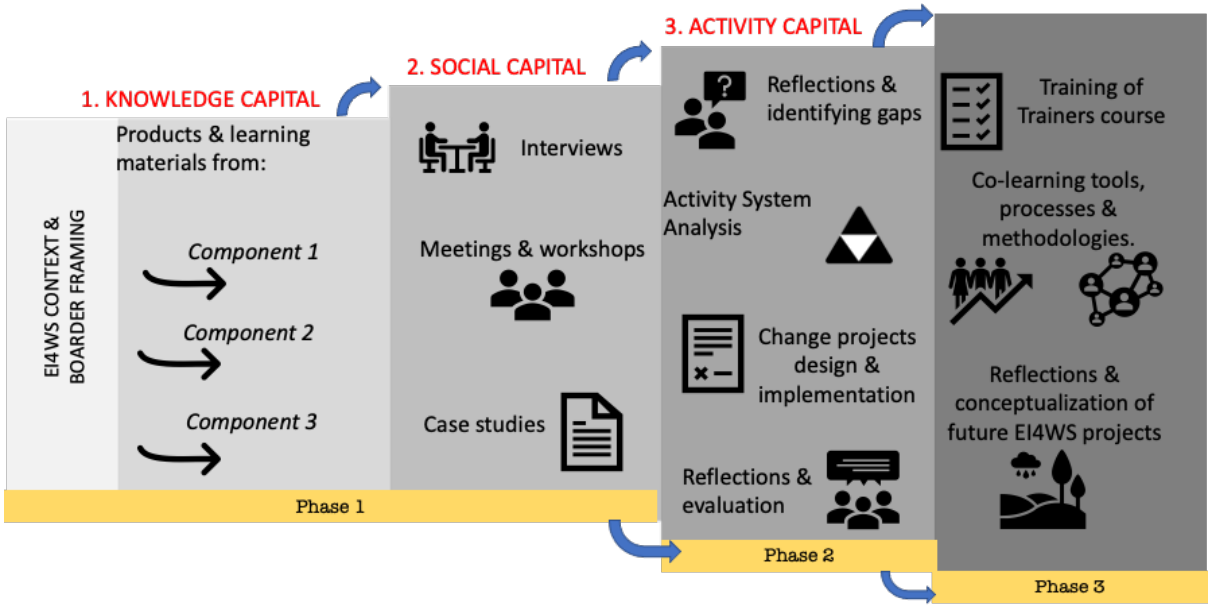


Figure 2.1: Three phases of the project to develop the participatory Xabisa Indalo for Water Course

2.3 Introducing the stakeholder mapping and analysis

Phase 1 of Xabisa Indalo for water project started in April 2021, with the focus being on orientation to the EI4WS project and collating existing knowledge resources already produced by the three components of the project (knowledge capital), stakeholders mapping and meetings (social capital).

This was followed by initial stakeholder mapping of both uMngeni and Berg/Breede catchments (see Figure 2.4, 2.5, 2.6 & 2.7 below). The stakeholder mapping process was further deepened using Activity System analysis (Figure 2.3) to understand participants and their agency in relation to key types of EI4WS activity. This was done via hosting of meetings/ interview with EI4WS components leads, catchment coordinators, and other key partner stakeholders who are involved in EI4WS project, in order to collectively identify the course priorities. This was done in the two catchments, and via online interactions, as shown further below. Throughout the process, the team were also alert to considering the six SLKMM processes identified in the SLKMM Strategy (Figure 2.2), and this also informed some of the stakeholder mapping and activity analysis work. We were particularly alert to tensions, existing learning networks, and types of SL activity, as well as knowledge resources and mediation processes, as well as gaps in understanding / concept of EI4WS that needed additional engagements.

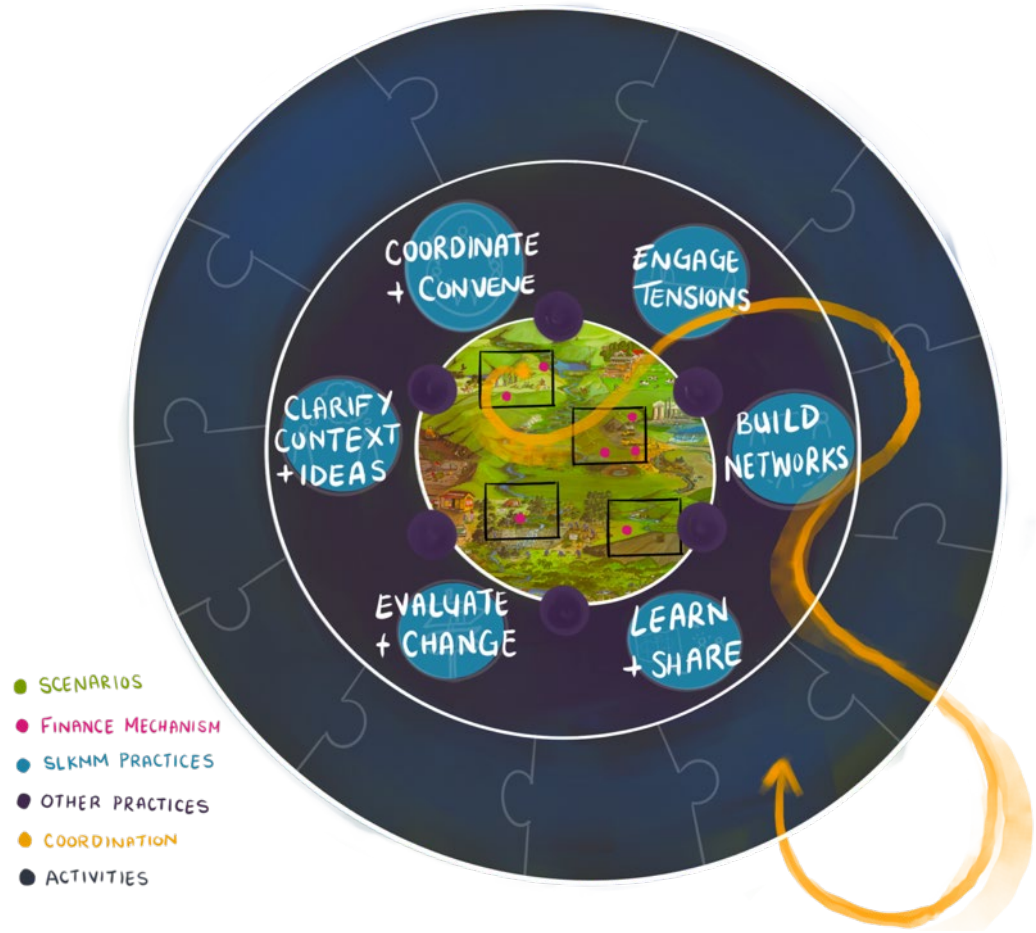


Figure 2.2: The six core SLKMM practices in the work of the wider EI4WS project, source: (Lotz-Sisitka et al., 2020)

Introducing the activity system analysis tool

Drawing on the above, we designed a set of tools to guide interpretation of the contextual profiling, TNA and stakeholder analysis, drawing on some of the guidance in the SKLMM but also introducing new tools, most notably the activity system analysis tool (see Figure 2.3 below) which helped us to structure the three core focus areas for the course and its participation. By Activity System, we mean a system of shared, i.e. collective human activity that has a history and a shared **object** motive (i.e. people are willing work together towards advancing a key activity such as investing in restoration; or developing a new policy to advance EI4WS, or fund community-based water quality monitoring activity). Such an activity system normally involves a main group of **subjects** who are championing the development of the EI4WS activity (e.g. monitoring activity), they are aiming towards some **outcomes** (often not yet known, but anticipated), they work with others (**a community of stakeholders)** and use **tools and instruments** (including ideas / concepts as well as other types of tools and instruments), and the subjects tend to divide tasks and take on different roles, i.e. **division of**

labour, and their activities are normally either enabled or constrained by **rules** (e.g. policy or cultural norms). When activity systems either as like-minded subjects or different activity systems join together to confront and work through tensions and contradictions, the possibilities and potential for expansive social learning are significantly advanced (cf. Engeström, 2015/16), and the activity can transform, i.e. one can advance and transform EI4WS activity. This tool, is therefore helpful for framing a course such as the EI4WS course, and was also helpful for us to identify how to find the key activities in the EI4WS landscape.

Figure 2.3 below provides an illustration of activity system analysis using diagnostic questions to explore the object in relation to its contradictions (i.e. these include tensions, challenges, learning needs, absences, etc.), stakeholder analysis, identification of networks or communities of practices, enabling and constraining tools in the context of EI4WS. A more detailed background on Activity system analysis was provided in the project proposal and inception report. In summary, the Activity System Analysis provided the Xabisa Indalo for Water team with a conceptual model that gives facilitators and participants guidance on how to collectively engage with matters of concern, contradictions, challenges and tensions, as well as envisioning the transformation pathways (think critically, identify solutions or alternatives, take action). This conceptualisation of moving through tensions and contradictions towards, through collective engagement in Ei4WS activity, in order to advance alternative and expanded EI4WS activity, lies at the core of developing the Xabisa Indalo for Water course as will be elaborated on below in further detail.

Three core activity systems were identified as being significant to the advancement of EI4WS, conducted, and were brought into focus in the stakeholder analysis, and in exploring and unpacking the key concepts and training gaps.

a) **Financial tools and investment activity system/s** (e.g. NCA activity system – see Figure 2.3 below for insight into how one approaches deeper analysis of these activity systems in stakeholder mapping and analysis work that is oriented towards EI4WS activity).
b) **Policy, governance and regulatory framework activity system/s**
c) **EI4WS implementation and monitoring activity system/s**

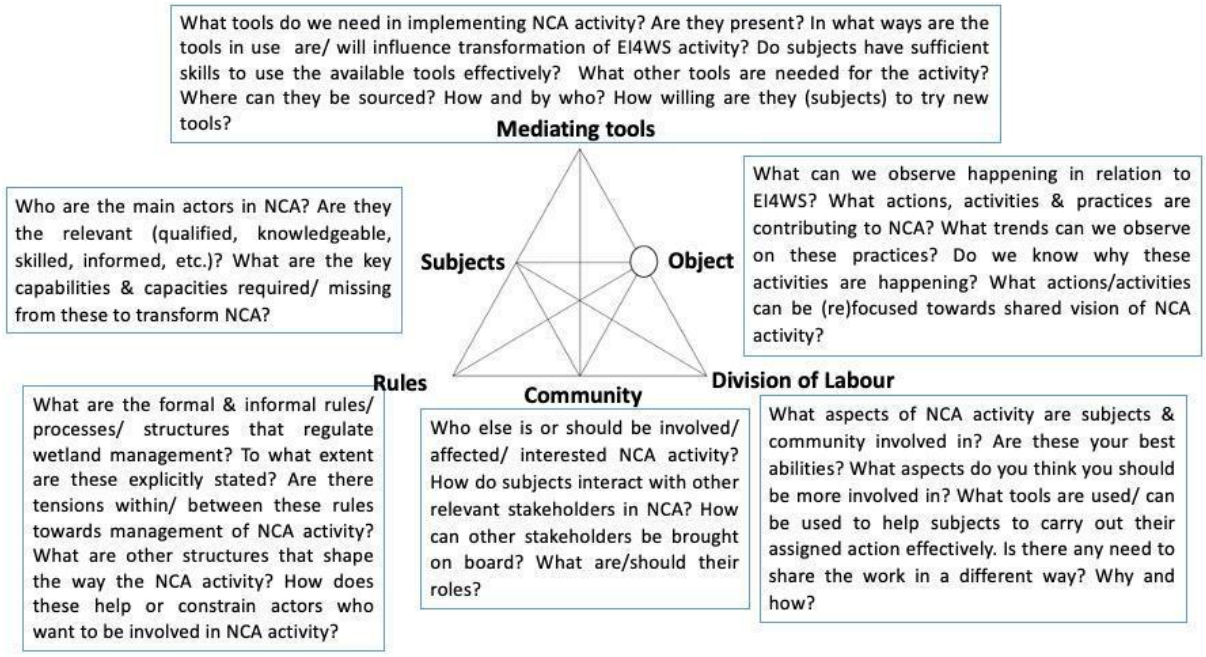


Figure 2.3: Example of using diagnostic questions for the Investment Activity System Analysis (with focus on NCA and planning tools). Adapted from Engeström, 1987.

Module 2 of the course offers a more refined analysis of these activity systems. Ultimately the Change Projects of course participants will also show how these types of EI4WS can be advanced and transformed in Catchments (see Chapter 5).

Stakeholder mapping process

An initial stakeholders mapping online meeting was held on the 16 March 2021, and this was aimed at identification of key stakeholders who are involved in any form of EI4WS practices in the demonstration catchments. A Padlet web browser was used as an online tool to facilitate the stakeholder mapping process, but this proved to be technically challenging for many participants to draw connections and linkages between and amongst different identified stakeholders. Initial stakeholder maps for both uMngeni and Berg/Breede showing just the list of identified stakeholders were the main outcomes of the meeting (Figure 2.5 & 2.7). This required further interpretation in the design of the course, hence also the use of the activity system mapping introduced above (Figure 2.3)

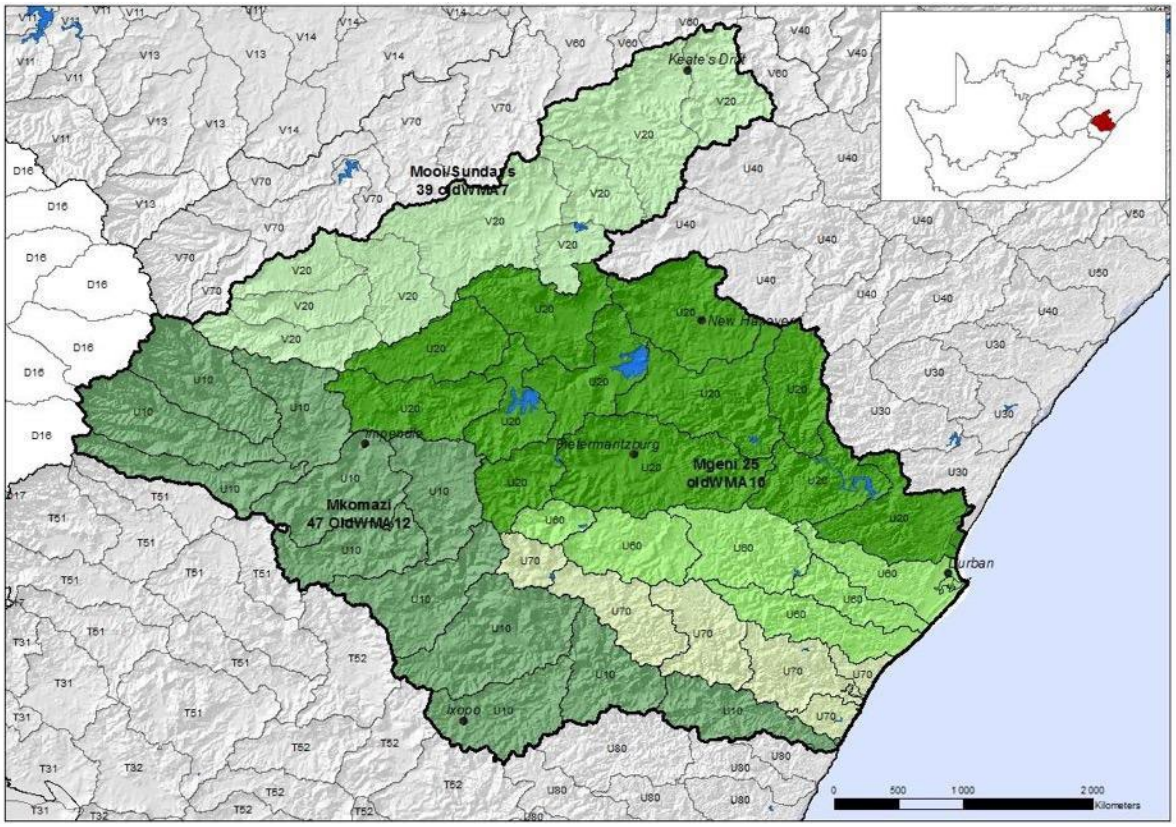


Figure 2.4: The Greater uMngeni demonstration catchment, which provides most of KwaZulu-Natal's water, including for the midlands and Durban

Figure 2.5: Initial stakeholder map for Greater uMngeni demonstration catchment

The initial stakeholder map for uMngeni catchment showed high levels of engagement from civil society organisations working together to improve implementation and monitoring activity, especially restoration, pollution management, and monitoring activity, with this being identified as lacking in sustainability and sustainable investment. There was also evidence of government involvement in the catchment, especially related to policy and governance activity related to the implementation activity (e.g. funding of restoration work), with this at times being identified as lacking in scope, efficacy and impact. A range of stakeholders were also identified who were contributing via various forms of investment and financing activity, with this being identified as lacking in reach and sustainability in terms of investment focus. This helped us to make better sense of what otherwise becomes a 'list' of stakeholders, in other words, we could connect the different stakeholders to types of EI4WS activity as identified above in 1-3.

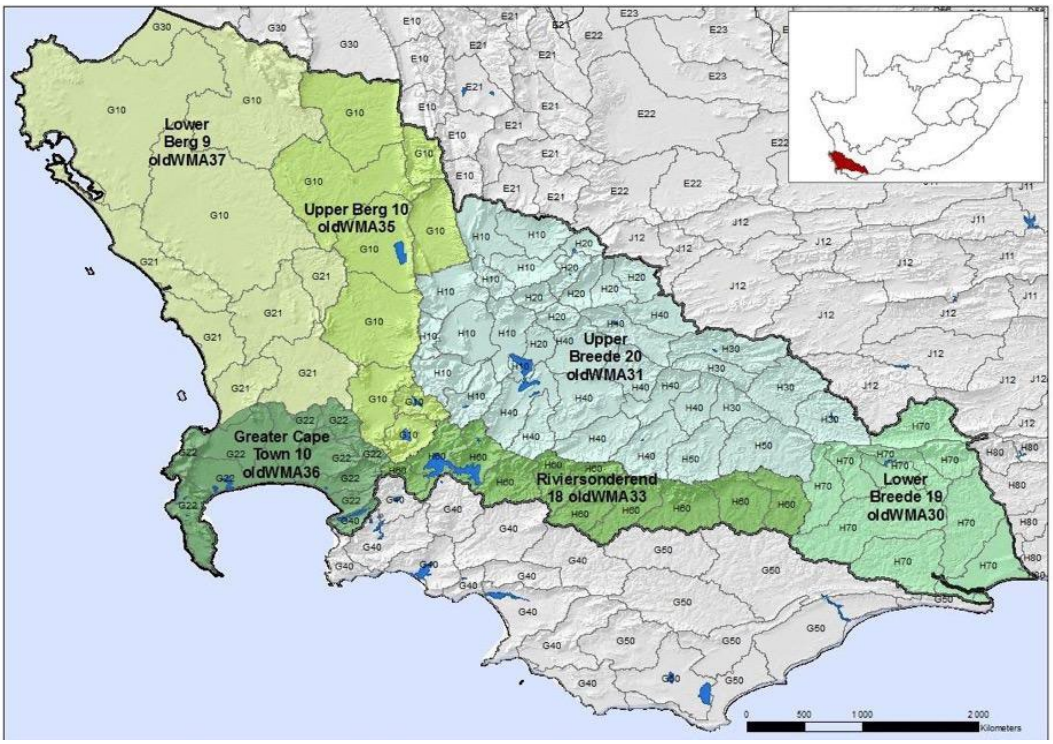


Figure 2.6: The Berg-Breede demonstration catchment, which provides water for Cape Town and its surrounding high value agricultural areas

Figure 2.7: Initial stakeholder map for Berg/Breede catchment

As in the case of the uMngeni Catchment, the Berg/Breede catchment stakeholder map showed a similar mix of stakeholder activity systems that were engaged in either: EI4WS implementation and monitoring activity; policy and governance activity and/or investment and financing activity. This helped us to confirm the three main types of activity that we identified through the initial document analysis, the work of Component 1 and 2 actors, and the actual interests and actual work that the different stakeholders were doing to advance EI4WS in the courses. This therefore helped to consolidate the focus on the three types of EI4WS activity that we ended up using as a focus in Module 2 of the course, and in the organisation of the case studies, the navigation tool, and the catalysing of participant Change Projects as will be discussed in the following sections of the report.

2.4 Knowledge resources / assets review, and engaged TNA processes shaping and informing the course design and materials

Linked to, and integrated with the TNA was the knowledge assets review, which involved a number of processes. These included:

Case study development

On the 8 April 2021, the Xabisa Indalo for Water and Component 3 WG team met to explore the design of EI4WS case studies. The intention was to develop a set of case studies that could provide a brief review on existing knowledge resources, identify gaps for training, and also support generation of value creation evidence in the demonstration catchments (Component 3.2. outcome). However, our interest was also to develop these case studies so that they could add substance and content to the Xabisa Indalo for Water Course and its materials, and so that they could also provide 'real life' examples of EI4WS activity as found in the field. This workshop was held during COVID-19 pandemic conditions, and was therefore both face-to-face and hybrid as can be seen from Figure 2.8 below.

Figure 2.8: Workshop on EI4WS course planning and case studies development design, 8 April 2021

The workshop offered useful guidance on how to approach the development of the case studies. It was decided to use a nested case study approach to guide the development of case studies to inform the knowledge review process. A nested case study approach involves articulating or identifying multiple embedded and related case studies that are contributing towards the same objective or focus / activity (Yin, 2009). At this point in the project, we sought to identify cases that were contributing to **the same type of EI4WS activity**. Figure 2.9 below shows the overarching nested cased approach, and to ensure distinctions between the two demonstration catchments, we named the Berg/Breede as "Blue case" and uMngeni the "Green case" (Figure 2.10 & 2.11).

Figure 2.9: Nested case study approach for guiding value creation evidence generation and knowledge assets review in uMngeni and Berg/Breede. Source: 8 April 2021 workshop.

The above illustration of the case studies development process was redrawn in Figure 2.9 and 2.10 below. It was noted that the nested case approach will be similar in the two demonstration catchments, although the context and content within specific cases of the different types of activity will be different. We also noted that the contrast in case studies between the two catchments will be an important aspect to support cross-learning in which course participants can learn from each other, especially in EI4WS types of activity that might be more developed in one catchment. For example, the community-based water quality monitoring (CBWQM) practice using an emerging blended financing model, which falls within the EI4WS **implementation and monitoring activity type**, is more developed in the uMngeni catchment and also well-grounded through the implementation of Amanzi-Ethu Nobuntu project through DUCT and its partners in the UIEP. We reasoned that this would make a good case study, as it would potentially provide a good opportunity for cross-learning and value creation evidence on CBWQM and blended financing model development, with course participants from the Berg-Breede.

With this 'types of EI4WS activity framing', we identified potential examples of mini activity-based cases which collectively contribute towards building the broader case types of activity study (nested). We initially identified four categories of activity-based mini cases including 1)

policy and regulatory framework activity (to which we later refined to include planning activity under a broader category of policy and governance activity), 2) diversifying investment in EI4WS activity, and 3) implementation (including monitoring) activity. These activity-based case categories also helped the EI4WS team at the WRC to synthesise the project impact and value creation evidence within the component 3 outcomes. Figure 2.10 and 2.11 below provide a list of provisional case studies that we aimed to develop / support for development and sharing in the demonstration catchments (Berg-Breede and uMngeni).

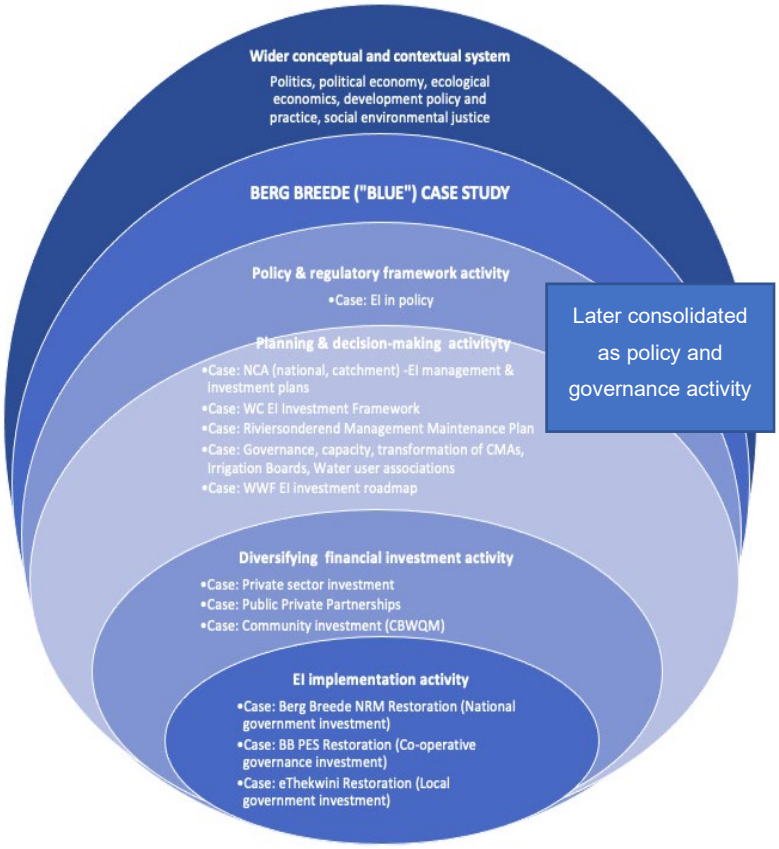


Figure 2.10: Provisional case studies identified for further development in the Berg/Breede catchment in April 2021.

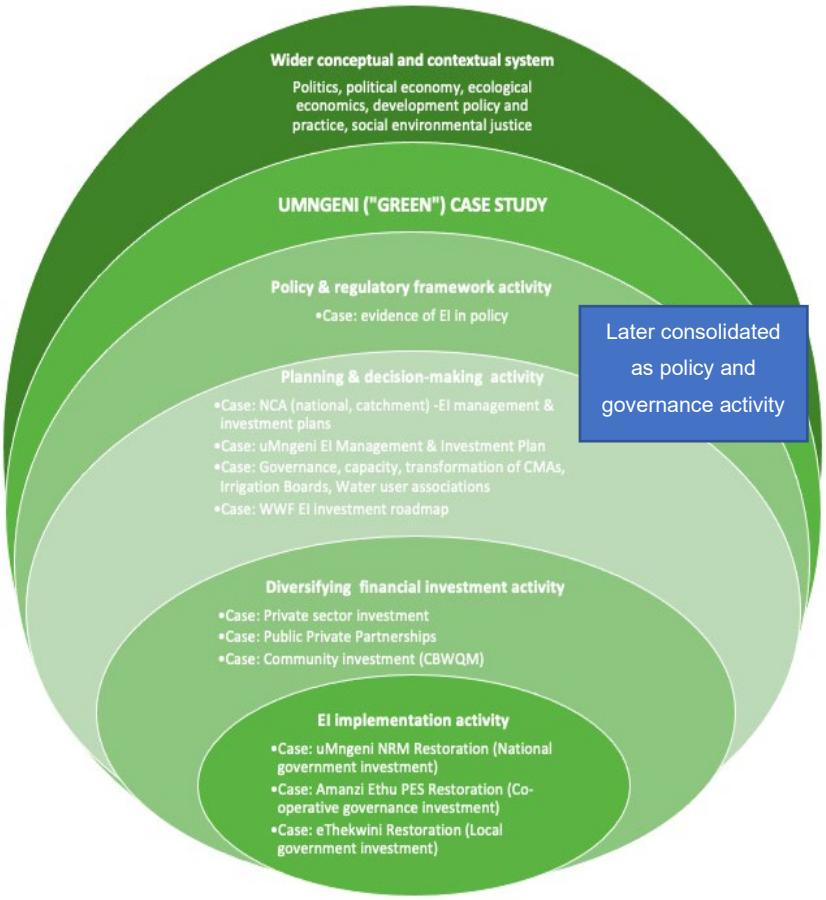


Figure 2.11: Provisional case studies identified for further development in the uMngeni catchment

Additionally, the team also identified additional cross-cutting case studies that provide wider context and learning from other catchments, which were later used in the course to extend learning across more than just the two catchments in focus.

- Shared-learning: EI learning experiences from Olifants catchment
- Shared-learning: EI learning experiences from uMzimvubu catchment

The proposal for the cases identified above as provisional cases, were shared more widely, and ultimately refined to a fewer number of cases, but with a longer-term intention to continue development of cases to support wider social learning. Ultimately the intention was also that course participants in the courses would develop mini-cases of their EI4WS activity to share more widely and thus expand a learning network around emerging cases of EI4WS activity (see Chapter 6 for reflection on this). Our reasoning at this point was that there were many different ‘mini-cases’ of the three main types of EI4WS present in the catchments, and articulating these under these three main types of activity would help to articulate and capture knowledge assets that were ‘alive’ in the catchments, helping to build strong EI4WS learning

networks within catchments, and in the process create a platform of wider participation in the EI4WS course and landscape of practice (see Chapter 5 for reflection on this).

At this point, we also developed a guiding template for the development of mini activity-based cases with a series of guiding questions (see Figure 2.12 below). We conceptualised the mini-activity cases as a minimum 4-page text which addresses the six key questions listed below, ranging from understanding the nature and context of EI activity; work done and gaps; stakeholder involvement; value created or impact; and additional resources for further reading and development of the cases. This later also informed and shaped the Change Project Guidelines in the course for participants, so that they could also contribute to the mini-cases of EI4WS activity (see Chapter 3, 4 and 5).

Figure 2.12: Guiding question template for developing activity-based min-case studies

Guiding questions for developing activity-based case studies (from Figure 2.12 above).

A. What has been done so far and why?
B. What needs to be done next and why?
● What is missing?
● Gaps?
● Next steps?
● Opportunities?
C. How could this be done?
● Methods?
D. Who is and could be involved?
● Experts
● Stakeholder
E. What results and benefits and for whom?
● Results and impacts?
● Nett benefits?
● Whole system benefits?
● Value created?
F. Additional resources, references and links?

Significant to the process of the mini-case study development is that it allowed all of the partners who were involved in the Xabisa Indalo Course development (RU, WRC, DUCT, Living Lands and others) to contribute case studies, and thus also contribute to the development of the course materials, as the case studies formed a key focus of Module 2 of the course (see Chapter 3, and see further reporting on the case studies development below).

Document analysis and key-informant interviews

Through consultation with the WRC and WGs, it was noted that a lot of contextual profiling work and stakeholder analysis can be conducted retrospectively from documents analysis from prior engagements (meetings, workshops, and project outputs/ knowledge resources) within the EI4WS project and its partners. As such, the Xabisa Indalo for Water team reviewed data on prior engagements and knowledge assets analysis to identify gaps that could only be addressed via interviews. The intention was not to undertake extensive interviews, rather to keep the interviews sharply focussed with key stakeholders. Initial planning was to conduct one key informant interview per representative of the three EI4WS types of activity and one interview per representative within each of the demonstration catchments (total of 5 key

informant interviews). In order to maximise the opportunities of the engagements, these interviews could also be conducted in the form of focus group discussions as part of other ongoing EI4WS engagements. Here we note also that we attended WG 1 and WG 2, as well as WG 3 meetings on a regular basis, and were also active partners in the Amanzi Ethu Nobuntu programme as it was unfolding in the uMngeni, and were also well connected to key activities in the Berg-Breede and in wider EI4WS forums such as the Restoration Ecology community and their activities. We therefore aimed to avoid duplication and to make the most of the insights gained from these ongoing EI4WS community interactions in informing the knowledge assets review and TNA. We were, however, careful to visit both catchments and engage ourselves in activities there to advance the TNA and knowledge assets review, and to inform case study and materials development. The interviews mostly took place in focus group and in-field settings during engagements in the catchments, which – as shown below – offered a richly textured and grounded TNA and knowledge assets review process, and shaped case study and course developments. These engagements also pointed to the importance of the mini-cases of types of EI4WS activity, as each mini-case of EI4WS activity is a richly textured, engaged space for advancing EI4WS, and needs grounded engagement in the catchments and in the complex relationality of stakeholders, partners and catchment conditions. This further confirmed the importance of the Change Project approach to the SL course design and its intended outcomes.

2.5 Catchment-based engaged TNA and Knowledge Assets Reviewing

Catchment-based engagements (Berg-Breede)

Site visit to look into active EI4WS processes

On the 17th-19 May 2021 the Xabisa Indalo for Water participatory course development team engaged in catchment-based activities in the Breede catchment. We met with several key stakeholder groups involved in a wide range of EI4WS monitoring practices across different catchments in the Western Cape. From a participatory course point of view, the main aim of these engagements was to gather contextual understanding in terms of different EI4WS practices in the Berg-Breede catchment, identify key stakeholder groups that are involved, their key challenges/ gaps, and opportunities from capacity development. These engagements were coordinated by the Berg-Breede EI4WS coordinator Dr. Sam Braid and the broader focus was on exploring collective efforts towards support development of key EI4WS practices in the catchment. One of the key interests by the different stakeholder groups was on exploring the expansion of Resource Quality Objectives (RQO) monitoring with specific focus on wetlands and related water resources. The engagements included stakeholder meetings and fieldwork activities in Duiwenhoks and Goukou wetlands which are part of the Western Cape

Working for Wetland sites and potential RQO sites as identified by the stakeholders during fieldwork and reflection meetings. The stakeholder groups consisted mainly of representatives of the Western Cape RQO Task Team which include SANBI (Freshwater Biodiversity Program), Cape Nature, Department of Water Affairs (DWS), and Breede-Gouritz Catchment Management Agency (BGCMA). The participatory course team was represented by Reuben Thifhulufhelwi (Rhodes ISER & ELRC as participatory project principal investigator), the EI4WS Component 3 leader Michelle Hiestermann, Roderick Juba (post doc fellow under EI4WS Component 3), as well as Pienaar du Plessis from Living Lands (partner organisation supporting implementation of the participatory course in the Berg-Breede catchment). We also engaged with private landowners, mainly the Grootvadersbosch Conservancy which provided key insights on how private landowners are involved in EI4WS restoration initiatives. The meeting surfaced their interests in expanding the DFFE land user incentive and EPWP model, towards a stronger public-private partnership for restoration in which landowners collectively contribute towards funding restoration activities such as IAP clearing. The conservancy is also planning to expand their efforts to EI4WS monitoring of river health and they have support from other partners including SANBI (FBP).

Figure 2.13: Stakeholders' reflections meeting: Catchment-based engagements 17-19 May 2020

Key reflections on training needs with the Monitoring Task Team

The catchment-based engagements provided an opportunity to further deepen the stakeholder mapping process which was initiated through online engagements (cf. above). The initial stakeholder mapping process had only identified different EI related stakeholders

in the Berg-Breede, and the next step was linking the stakeholders more concretely to the EI4WS activity (and activity types) on the ground to further exploring their agency (capacity and capability to take action) and their capacity development/ training needs (key challenges/ what stakeholders are struggling with). The focus at this point was to identify some of the key EI4WS activity that stakeholders are involved in, and especially to note where they expressed needs for training support, in alignment with their organisational objectives and mandates.

Monitoring of Resource Quality Objectives (RQOs) was identified as a key **EI4WS implementation activity** which included investments into monitoring of river health, wetlands, and restoration interventions. RQOs are developed under the National Water Act (Act No. 36 of 1998), and they are implemented by the Department of Water Affairs (DWS) in partnership with CMAs, and in the Berg-Breede this responsibility falls within the DWS Western Cape and BGCMA. The Western Cape DWS pointed out *a lack of monitoring capacity* as one of the main challenges to supporting the sustainable management of EI4WS, and this includes *the need for skilled professionals and adequate budgets or funding*. It also was pointed out that due to budget cuts and limited funding, both DWS and CMAs are constrained to implement RQOs and they can only manage a few RQO sites. The *resource constraint challenge* is perceived as a key issue constraining effective **policy activity**, especially management and compliance management action in public government institutions due to their large areas of operation. This was exacerbated by budget cuts as government shifts priorities (i.e. the COVID-19 pandemic resulted in massive budget cuts). Therefore, the *importance of supporting partnerships with other institutions* operating in these catchments was identified as one of the pathways towards collective action for EI4WS management, which confirmed the need for the intended focus of the course to form learning networks and strengthen shared knowledge and activity that expands EI4WS.

RQOs are operational tools that support decision-making processes for better management and allocations of water resources. Therefore, RQOs are supposed to be developed for all types of water based EI4WS, including rivers, groundwater, wetlands, estuaries and dams. It was noted that the RQOs for rivers are already developed but extensive implementation is required in which more RQOs sites need to be established and monitored regularly. Some of the key activities in managing RQO sites should include water quality and quantity monitoring, SASS assessments, and freshwater fish surveys. These are done by different stakeholders including DWS, SANBI, etc., but there are still capacity gaps in which more stakeholder needs to be involved, especially landowners. Sharing of data between different stakeholders and working together across mandates was also highlighted as one of the important challenges. It was also highlighted that there is a need to establish key baseline data and routine monitoring

for other aspects such as broader impacts on water resources such as water abstractions, river modification, IAP invasion, flooding, etc.

These different stakeholder groups agreed to explore ways of formalising the monitoring task team that will collaboratively work towards supporting the development of RQOs for wetlands, monitoring of restoration progress, and developing monitoring baseline research. The task team intended to support the sharing of responsibilities to maximise the capacity across different institutions including SANBI-FWP, DWS, Cape Nature, BGCMA, Living Lands, EI4WS, and other local stakeholders such as farmers/ landowners/ water users.

Below are some of the key points identified from the Berg-Breede stakeholders' meetings and fieldwork:

- Need for more funding into monitoring and research.
- Formalisation of a task team/ learning network that will allow for collaboration across organisation mandates.
- Working with local stakeholders based in RQOs such as landowners/ water users/ farmers, to build custodianship on supporting monitoring.
- Explore the pathways of working with private landowners for investment in EI practices such as restoration.
- Identifying additional RQO sites. Priority will be given to areas that have existing EI management processes such as working for wetland rehabilitation sites, and also sites where landowners are interested to support and be custodians in monitoring and sustainable managing their resource use.

Key reflections on the TNA with the BGCMA

The BGCMA is one of the key stakeholders for sustainable EI4WS governance, with specific focus on water resource management. They have the mandate to uphold the National Water Act through implementing sustainable water resource management practices. The BGCMA team is also responsible for authorization and licensing, freshwater RQO monitoring, and other aspects of EI management including restoration activities in Breed catchment. Two of the BGCMA's freshwater ecologists responsible for RQOs monitoring joined the meetings on the 17th and 18th May for wetlands fieldwork, and we later organised a meeting (19th May) with the broader BGCMA team (Figure 2.14 below) for further reflection.

The purpose of this meeting was to explore key challenges or matters of concern for EI4WS management and governance within the Breede as one of the BGCMA catchments. We also

sought to explore how these matters of concerns can be incorporated in the development of the EI4WS participatory course. The intention was also to identify potential course participants.

Figure 2.14: meeting the BGCMA, held on 19 May 2021, in Worcester

Key points emerging from the meeting that had relevance to the TNA, knowledge assets review and course development include:

- A prominent issue identified is the disregard for wetland importance in the applications for Water Use Licences. It is unclear whether landowners are aware of their ecological function or whether they just don't care. Either way, some form of training may be required.
    - This has been evident especially with developers and other stakeholders who are degrading wetland mainly through settlement developments and agricultural practices.
- The BGCMA operates within the Cape Winelands and Overberg District Municipalities, and this is where they have relationships and support in terms of stakeholder engagement. And, it was noted that some farmers in the area are willing to work with the BGCMA and other interested parties in sustainable catchment management interventions, while some farmers are not so keen (need for more stakeholder's engagement). It was also pointed out that not all water users including farmers have expressed interests in working with other stakeholders on learning more and understanding the sustainable options for EI management, but there are willing

farmers who for instance have responded well to information on IAP management on their private land.

- The BGCMA sees the participatory course as a potential platform for them to further strengthen relationships on the ground and to continue building partnerships with stakeholders.
- It was also suggested that when engaging with stakeholders such as farmers, a central point of discussion should be around water quality and availability, as this will resonate with farmers and increase interest and relevance.
- It was noted that it is important to remember that EI functionality and priority differs between catchments and landscapes, while development also means different things to different stakeholders. We have to make sure that the course content speaks to the definitions of concepts such as EI, development, water security, and social-political dynamics of the target catchment area.

Below is the summary of some of the potential implications for the design of the participatory course:

- Exploring opportunities for re-establishing and re-building EI4WS in practice, i.e. collaborative restoration projects and exploring offsets
- EI4WS planning and resource management across municipal boundaries
- Private public partnerships on management of EI4WS to guide development activities
- Understanding the role of EI4WS restoration and sustainable management (i.e. wetland rehabilitation) in the broader water system functionality.
- Building agency (capacity & capabilities) to take action in EI4WS management – i.e. how to get EI4WS activity interventions in planning & management tools such as IDP and SDF, and thus leverage more investment in these EI4WS activities.
- Governance and custodianship of EI4WS practices – working with landowners and water users. i.e. How can they be involved, how do they take responsibilities, who does what, tools required to take action, etc.
- Policy focus – integration of EI4WS activity across policies. i.e. How do we ensure that EI4WS is aligned and integrated within organisational mandates and supported by policies, and also address the issues of conflicting or unclear policies on EI4WS management.
- Exploring the legislative enabling and constraining factors – i.e. unearthing contradictions across legislative frameworks on EI4WS management and governance.
- Building platforms for cross engagements and co-learning-multi-stakeholders' partnerships.

- Providing best practical approaches for EI4WS management. i.e. many water users and farmers still believe building a dam is the best option for water conservation, but there are better options like restoring EI functions such as wetlands; exploring practical benefits of protecting EI such as erosion control, preventing siltation, flood damage control, soil conservation agriculture, etc. and the cost-benefit analysis on impacts of unsustainable developments and abstractions.
- Roles of citizen science in monitoring of EI management (water quality, quantity, restoration interventions, etc.) – How can users co-learn and be involved in monitoring? Training farmers? Eco-monitors? Interns? Develop citizen science monitoring CoP to enable cross-learning amongst stakeholders? Developing other non-scientific monitoring protocols as part of citizen science custodianship (fixed-point photos, narratives to account for events like flooding, IAP monitoring, abstractions, etc.).
- Impact of stormwater management on ecological infrastructure. i.e. siltation of dams and wetlands. Also linking this to developments to consider impact of stormwater (e.g. settlements and housing zoning).
- Develop MoU to support working together across institutions involved in the course process and CoP beyond the course. i.e. developing a shared reporting practice on EI4WS across the Breede from all stakeholders responsible. Development of joint long-term EI4WS management plans.
- Research and evidence building – i.e. linking best agricultural practice such as agroecology to soil conservation and its impact reducing siltation; establishment of research data on monitoring baselines.

These field-based engagements also led to the development two mini-cases for the course. Box 1 below illustrates the cases that were developed, showing how they were developed from grounded EI4WS activity found in the demonstration catchments, and offered as materials and tools in the form of learning resources (course materials) for participants to engage with when working on course development actives such as change projects. This also allowed for easy sharing of the case studies with partners other external stakeholders.

BOX 1: Case study on Ecological infrastructure and water resource monitoring: possibilities in and around the Breede River catchment, Western Cape.

Background and context

Monitoring of the state of ecological infrastructure (EI) is a critical component of its long-term management and in informing needs for adaptation or intervention. It is also one of the more neglected aspects of management as it requires long-term investment of resources, a steady conveyor belt of technical specialists, a policy environment conducive to its implementation, and a dedicated group of partners and stakeholders.

Being a water-stressed country, the importance of monitoring water-related EI in South Africa has possibly been undersold over the last few decades, and as the results many critical ecosystems are facing on-going degradations including invasive alien plants (IAPs), impacts of unsustainable land-use development practices such as agriculture, and poor enforcement of management regulations. The impact of these as been exacerbated by severe droughts, most notably in the Western Cape during 2018-2019 and in the Eastern Cape (currently). While the lack of monitoring is not directly responsible for these challenges, it exposes a gap in our capacity to learn from them and adapt to future challenges, or to avoid them entirely.

This case study explores ***monitoring into management action*** as a key activity towards sustainable management of Ecological Infrastructure (EI). The initial conceptualization of this case study was based on multi-stakeholders' engagements, with partners involved in different monitoring practices in the Berg-Breede catchment, as part of *Xabisa Indalo for Water* project.

Figure 1 (right): Degradation that threatens the hydrological functioning of this wetland and hence its ability to provide ecosystem services such as water filtration, increased infiltration, and flood protection.

What has been done so far, gaps, and opportunities?

In the case of the Berg-Breede River catchment and the Western Cape in general, EI monitoring has been ongoing, and it is implemented through various stakeholder groups, including amongst others the Department of Water and Sanitation (DWS), South African National Biodiversity Institute (SANBI) freshwater biodiversity programme, Breede Gouritz Catchment Management Agency (BGCMA), CapeNature, and other stakeholders such as private landowners, NGOs, municipalities, etc. These stakeholders are involved in different EI monitoring practices, with specific objectives, and some are guided by high-level mandates (i.e. CMAs and government departments). But collectively these stakeholder groups contribute towards EI monitoring for better management and action. We have therefore identified key EI monitoring practices that are currently being implemented and those that can potentially be developed in the Berg-Breede catchment, as described below.

- Water quality and quantity monitoring

Implementation of Resource Quality Objectives (RQOs) was identified as the key practice for water quality and quality. RQOs are developed under the National Water Act (Act No. 36 of 1998), and they are implemented by the Department of Water Affairs (DWS) in partnership with CMAs, and in the Berg-Breede this responsibility falls within the DWS Western Cape and BGCMA.

"Our biggest challenge in implementing RQOs and supporting the protection of ecological infrastructure is lack of capacity and budget" - DWS

Western cape DWS pointed out lack of capacity as one of the main challenges to implementation of RQO as a monitoring tool for supporting sustainable management of EI, and this includes needs for more skilled professionals and budgets. It was pointed out that due to budget cuts, both DWS and BCMA are constrained to implement RQOs and they can only manage few RQO sites. The resource constrain challenges is perceived a long-term issue into the future across government liked institutions. As such, the importance of support and partnerships with other institutions operating in these catchments has been identified as one of the pathways to towards collective action for EI monitoring into management.

"The RQOs help us to make decisions on better management and allocations of water use and it is important to build partnerships to work together like this group right here, as no single organization have the capacity to manage EI across these catchments on their own" - BGCMA

The RQOs are supposed to be developed for all types from water resources from rivers, groundwater, wetlands, estuaries and dam. It was noted that the RQOs for rivers are already developed but the extensive implementation is required in which more RQOs sites should established and monitored regularly. Some of the key monitoring activities in RQO sites will include activities such as water quality and quantity monitoring, SASS assessments, freshwater fish surveys. These can be implemented through partnerships with other stakeholders such as SANBI, CapeNature, landowners, etc.

One of the envisaged pathways by stakeholders was the need for an established learning network and community of practices, to enable different stakeholder groups to work collaborate and integrate their EI monitoring activities. There is already an informal monitoring task team which support cross-collaborations and coordination of monitoring activities by different stakeholders.

Figure 2: Stakeholders discussions on wetland monitoring and formalizing monitoring task team

The group of stakeholders agreed to explore way of formalizing the monitoring task team that will collaboratively work towards supporting the development of RQOs for wetlands, monitoring of restoration progress, establishing baselines. The task team will support sharing of responsibilities to maximize the capacity across different institutions including SANBI-FWP, DWS, Cape Nature, BGCMA, Living Lands, EI4WS, and other local stakeholders including farmers/ landowners/ water users. Data sharing between different stakeholders and working together cross mandates was highlighted as one of the important issues, and the need to establish key baseline data and routine monitoring for other EI monitoring aspects such as broader impacts on water resources agricultural practices, wetland degradations, river modification, IAP invasion, water resource pollution, etc.

"We need to invest in monitoring because it is for guiding practices for resource development and management, including restoration progress. The main challenge at the moment is we don't have sufficient baseline monitoring data, which makes it difficult to make inform decisions. We are currently supposing different types of research working with students to generate the necessary baseline data but also to develop the sustainable management practices around wetlands. And this work can further strengthen implementation of RQOs at catchment level" – SANBI-FWP

Stakeholders agreed to explore ways of formalizing the monitoring task team that will collaboratively work towards supporting implementation of RQOs especially in wetlands which is the biggest gap, monitoring of restoration progress, and developing monitoring baseline research. The task team will support for sharing of responsibilities to maximize the capacity across different institutions including SANBI-FWP, DWS, Cape Nature, BGCMA, Living Lands, EI4WS, and other local stakeholders including farmers/ landowners/ water users.

- Operational water resource management monitoring practices

These practices mainly fall within the intersection of ecological and built infrastructure, and these include bulk water supply, water abstractions, waste water and treatment works, and other related regulatory practices such as water use licensing. Monitoring into management action is a key activity towards achieving sustainable EI management, and therefore it is important to ensure integration, collaborations, and partnerships between EI and build infrastructure. For example, in order to issue a water user license, authorization agencies such as DWS and CMAs must understand the state of resource (i.e. natural capital accounting, demand, supply, threats, etc.), and to acquire this type of data requires a strong EI monitoring practices.

Water resource authorization and users including municipalities, water user associations, landowners and communities need to be involved in different aspects of monitoring. For example, farmers can contribute in monitoring their water use, and impact of their practices (i.e. monitoring sedimentation from agricultural practices). Farmers and water users should have access to broader EI monitoring in their catchment (i.e. state of rivers, wetlands, dams, threats,) and they should be part of monitoring community of practices which will collectively explore sustainability pathways to dress management needs towards restoring and sustainably managing their ecological infrastructure.

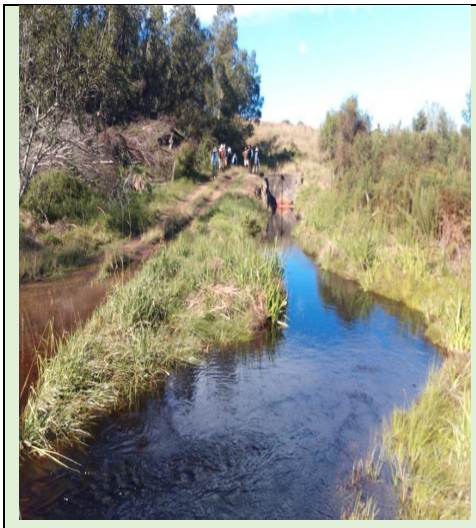


Figure 3: An example of canal dug for water abstraction from the wetland, and sometimes these canals are used to drain wetlands by farmers

In other catchments such as the Olifants, a FlowTracker for real-time flow monitoring in rivers and dams was developed as a learning tool to simulate support monitoring agency in civil society (AWARD, 2017). A similar process that integrated different data for monitoring practices including rivers, dams, and wetlands is required. And these types of tools can also provide opportunities for engaging citizen science monitoring in which users can upload monitoring data on conditions of EI including water abstractions, wetland degradations, IAP invasions. Users can also be supported to develop their best practice monitoring tool kits to track their own activities and impacts on the ecological infrastructure such as monitoring sedimentation from agricultural practices.

- Biodiversity and ecosystem services monitoring

These include EI monitoring practices relating to tracking both the 1) degradation of ecosystems services (i.e. invasive alien plants, erosion, sedimentation) and impacts of human activities on biodiversity (i.e. impact of land-use change, water resource extractions), and also monitoring 2) change in restoration and conservation efforts (i.e. IAP clearing, wetland rehabilitation, agro-ecology). Various activities on biodiversity and ecosystem monitoring are already been implemented by different stakeholders including projects such as IAP control and wetland rehabilitation. However, these activities are not integrated and coordinated to provide an integrated picture at catchment scale and the data is not accessible by all stakeholder to inform their management actions. For example, a citizen monitoring approach should be integrated in projects such as wetland rehabilitation and IAP control in order to ensure involvement of local citizens as custodians in monitoring of changes in ecosystem drivers their catchment areas. The collaborative monitoring approach through use of citizen science tools will ensure active involvement of local custodians, and this is one of the identified capacity needs especially in private landownership areas.

Our monitoring capacity for freshwater resources is really stretched. We definitely cannot monitor all river systems by ourselves […] we need to work collaboratively with other stakeholders that already involved in other monitoring practice. We are working with a lot of students in our Freshwater biodiversity programme in order to create monitoring baseline data and it will be good to involved landowners in monitoring as they are the direct custodians of these water resources benefits […]. If we have good monitoring system tools in place, landowners can be able to capture important data such as flood events, water extractions, wetland drainage, IAP invasions, etc., as these are important baseline data that inform management, in addition to formal monitoring practices such as RQOs. In short, we need to involve students, farmers, community youth and all stakeholder that are involved different management aspects of these catchments and river systems (SANBI - FBP).

A more integrated monitoring approach on biodiversity and ecosystem services will also provide a systemic overview on understanding and linking the applicability of natural capital accounts which are currently developed under component 1 of the EI4WS for both Berg-Breede and uMngeni catchments. Natural Capital Accounting (NCA) is a process for measuring natural resources in order to provide reliable measurement of stocks and flows (also see EI4WS NCA case study). The accounts help inform policy, planning and decision-making, but a regular monitoring is required to provide trends in flow of resources and associated ecosystem services, as well as threats and challenges for management actions.

Therefore, EI monitoring into management action has the potential to not only a be tool to inform management actions but also a learning tool that allows different stakeholders learning collectively about the status of resources in relation to demand for ecosystem services, and this process also provide opportunities for management interventions to restore and protect EI, as well as promoting sustainable actions to maximize socio-economic beneficiation.

The majority of the current restoration interventions such as IAP control and wetland rehabilitation are largely funded by government under the DFFE natural resource management programmes, and these interventions are implemented through both local government structures and also by catchment citizens including landowners, community organizations, and NGOs, through what is referred to as a land user incentive (LUI) model. The LUI model is aimed at supporting the custodianship by local catchment residents to implementing restoration programs but there is currently no model that is directly aimed at support agency and capacity development for EI monitoring into management action. Here, we argue for expansion of models such as LUI into a more holistic

EI implementation and monitoring into action, whereby local citizens can be critically engaged and supported in developing their capabilities to understand, explore, and intervene in conserving and restoring EI.

Figure 4: An example of wetland rehabilitation gabion structure constructed by Working for wetland. These structures require regular monitoring to measure their impact on restoring the wetland functions.

● Opportunity for citizen science monitoring practices

Citizen science monitoring tools such as the widely used miniSASS provides ideal opportunities to broaden EI monitoring practices by bringing-in local citizens and integrating their resource management knowledge and experiences into management action. A big challenge regarding wetland monitoring is that many wetlands, unlike rivers, are located on private property. These are often sites that are not readily accessed by public institutions like the ones mentioned above. There is an opportunity to develop a citizen science programme that involves landowners and their partners in monitoring parameters such as wetland extent, water quality and quantity, vegetation structure and composition, and faunal assemblages. This approach would have several key benefits, including:

- Allowing for timely contributions to existing datasets and greatly increase the extent of our current monitoring efforts.
- Increasing private landowners' interest in EI, its management, and understanding the impact of surrounding activities on its functioning.
- Sparking interest from civil society and mentoring future technicians and specialists

Ways forward

The challenges and opportunities discussed here suggest a need for the convening of a Community of Practice (CoP) around monitoring of water-related EI along the Berg-Breede catchment that could drive the coordination of monitoring activities, data sharing and storage, and reporting. The CoP would also concern itself with coordinating data gathered through the citizen science programme and incorporating it into the larger dataset. Importantly, the CoP should serve as a decision-making platform for the coordination of monitoring sites, the incorporation of new monitoring sites, and the parameters monitored. In the interest of informing the establishment of such CoPs elsewhere, the CoP should also document all of these processes of decision-making, stakeholder engagement, and any changes in monitoring value matched with changes in resource use efficiency.

Figure 5: A community of practice made up of a diverse group of stakeholders could facilitate social learning and provide a great platform for coordination of monitoring activities

From this case study, we can see opportunities for emergence of partnerships and synergies across different stakeholder groups towards a community of practice (CoP) on the shared object of **Ecological Infrastructure monitoring into management action.** The CoP will provide a co-learning platform to support collective action for both effectiveness of different monitoring practices into action and the efficient use of resources and capacities which are already constrained.

Tools and resources

- RQO monitoring guidelines:

https://www.inr.org.za/wp-content/uploads/2019/09/A-PROCEDURE-TO-DEVELOP-AND-MONITOR-WETLAND-RESOURCE-QUALITY-OBJECTIVES.pdf

- WET-health wetland health monitoring tool:

https://www.academia.edu/32824652/WET-health_A_technique_for_rapidly_assessing_wetland_health

Activity systems analysis to inform course curriculum development

Based on the above iterative approach to TNA and Knowledge Asset reviewing, we were able to draw out a more refined activity system analysis for exploring opportunities for collective action in relation to the EI4WS priority activities identified through the field visit. This was based on the above engagements with stakeholders on the Breede, and through this we identified different monitoring stakeholder groups, which also informed the potential groups who could become participants in the courses (see Chapter 4).

- Fresh water monitoring (wetlands & river health) – SANBI-FBP, Cape Nature,
- Implementation, compliance and monitoring of Resource Quality Objectives (streams, rivers, dams) – BGCMA
- Water resource management & policy development – DWS
- Water resource use practices – Water-user associations, landowners & custodians

The activity system analysis approach in Figure 2.15 below consolidates the TNA approach that deepened initial stakeholder identification and their individual needs to a collective TNA for the catchment area around a key shared object of activity, namely partnerships for EI4WS implementation activity (monitoring into management action), which was identified by stakeholders as a key priority for them. The intention was to find a way of focussing in on key points (cf. red arrows) where collective action for effectiveness of different monitoring practices into action can be developed through co-learning in a context where it was clear that efficient use of resources and capacities are already constrained, and there was need to focus on critical areas for shared learning and change.

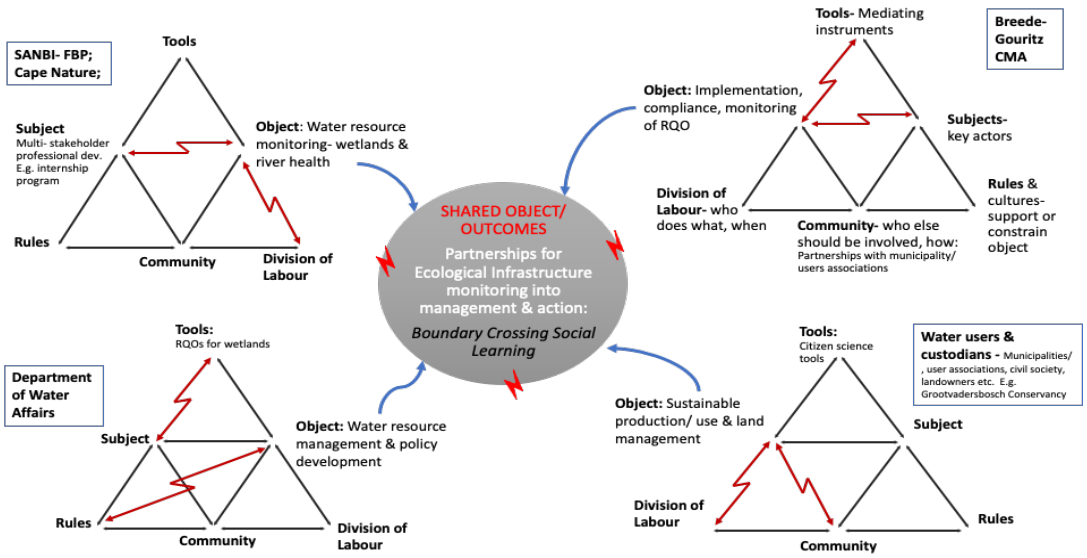


Figure 2.15: Activity system analysis on developing community of practice for monitoring practices.

NB: The red cross arrows in Figure 2.15 indicate the challenges, tensions, contradictions, and potential development opportunities as expressed by stakeholders from the activity systems. Expansive learning research indicates that such tensions and contradictions in and between activity systems are important sources of collaborative social learning, and should be embraced as such (see Chapter 3 for further discussion on this).

Figure 2.15 above shows that for this group of stakeholders in the Breede, building collective action for EI4WS implementation activity, especially monitoring into management and action is the object of their shared EI4WS work. An object is a key concept in the expansive social learning tradition as it defines the focus of the transformative learning process. In this case, we are exploring monitoring for management action as a potentially shared object of EI4WS implementation activity that can be jointly constructed by different actors (activity systems). As can be seen from the diagram, the emphasis is between two or more activity systems and what Engeström (2001) called boundary crossing objects, which essentially means that people have a will to work together on solving a shared issue that they all have partial knowledge of, and/or capacity to resolve. As such, the expansive learning process is carried through by a set of durable activities, actions and practices towards transforming the object (in this case partnerships for monitoring into management action for their shared EI4WS implementation activity).

To inform the curriculum of the course, we therefore identified a set of EI4WS implementation via monitoring practices that are currently in action and those that can potentially be developed in the Breede catchment. These monitoring practices include:

- Water quality and quantity (i.e. RQOs)
- Operational water resource management (i.e. allocations to water users; waste water treatment works)
- Citizen science and River-health monitoring (i.e. mini-SASS)
- Land-use management (i.e. soil conservation practice for minimising sedimentation)
- Biodiversity and ecosystem services (i.e. restoration IAP clearing; wetland rehabilitation)
- Investment in these practices from a diversity of sources via shared resourcing.

The need for, and lack of adequate and sustainable investment in EI4WS monitoring and management activity (i.e. implementation activity) was also reflected in other projects such as the community-based water quality monitoring project in uMngeni catchment (see below). In the uMngeni case, we also identified an emerging blended finance model / approach that was

trying to respond to this problem, which also involved development of a feasibility study for a Water Fund (i.e. institution development for EI4WS), discussed further below.

Catchment-based engagements (uMngeni)

The similar catchment-based engagement and potential fieldwork activities were also planned for the uMngeni catchment in June and July 2021. However, this was postponed due to the COVID-19 pandemic. However, the Xabisa Indalo for Water team were already heavily involved in the DUCT Amanzi-Ethu Nobuntu programme and its development from a parallel WRC project that was also linked into the EI4WS programme. As DUCT was also a partner in the Xabisa Indalo for Water Security course/s along with the UIEP, we decided to focus in on this as a site-based catchment engagement in order to inform the co-development of the course with partners involved in the Xabisa Indalo for Water course development processes.

Document review

Through our partnerships with DUCT, one of the partners in the Xabisa Indalo for water project, we were able to rapidly provide insights on EI4WS monitoring practices in the uMngeni. These reflections were mainly drawn from the community-based water quality monitoring project team report which was just being concluded at more or less the same time that the Xabisa Indalo for Water course process was starting: '*Research into Alignment, Scaling and Resourcing of Citizen Based Water Quality Monitoring to Realising the DWS Integrated Water Quality Management Strategy*' (WRC Project No. K5/2854; Lotz-Sisitka et al., 2022). Through this extensive project, which included an initial review of the emergence of the Amanzi Ethu Nobuntu programme and the first stages of co-developing a blended finance model for monitoring and implementation practices, the CBWQM team were able to identify insights on the key challenges and training opportunities for EI4WS monitoring practices, and how these can be addressed through the Xabisa Indalo for water course. The full report on CBWQM project is available (see Lotz-Sisitka et al, 2022). In considering the TNA and Knowledge Assets review work, we pulled out some of the key recommendations to inform the course development process, and these include:

- MULTI-STAKEHOLDER APPROACH AND INTERIM CO-ORDINATING STRUCTURE: Need to adopt and support a multi-stakeholder approach to CBWQM scaling, but support an interim structure to support initial mobilisation of the scaling strategy (e.g. Amanzi Ethu learning network, which referred to the network of partners supporting the AEN). The multi-stakeholder approach should be organised around the key activity groups that have roles within and across the CBWQM value chain and its supporting systems. The Amanzi ethu model shows there is a need to move beyond stakeholder-based activity systems (as outlined below) to clusters of stakeholders who share a key role or task in the CBWQM value chain in the expansive learning design for scaling CBWQM.

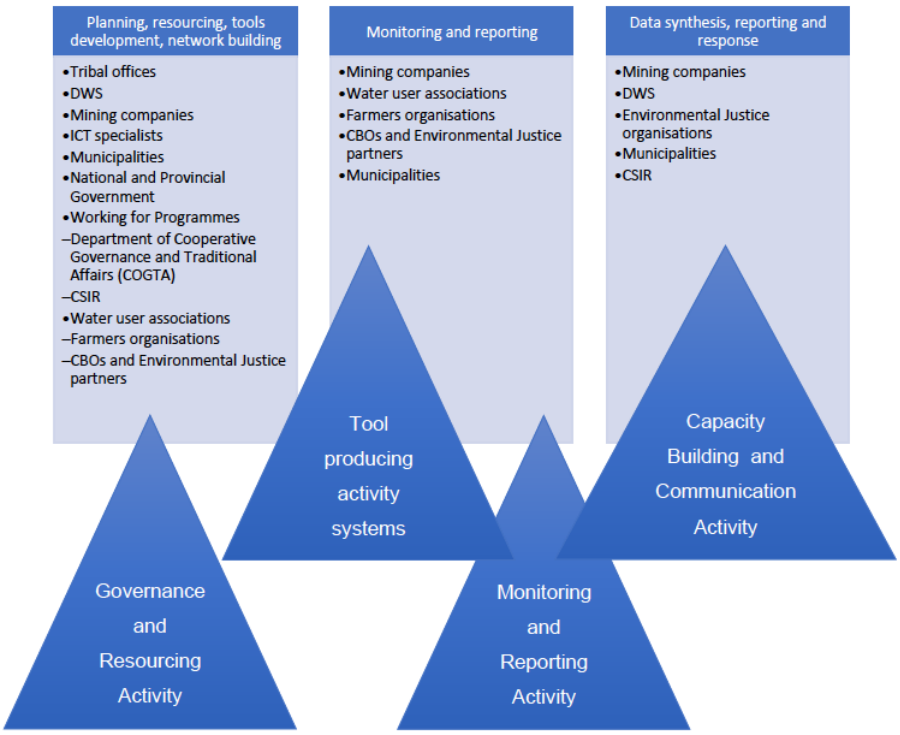


Figure 2.16: multi-stakeholder activity systems (source, Lotz-Sisitka et al, 2022. CBWQM project)

- CAPACITY DEVELOPMENT: Identify existing and emerging courses and course development systems that can strengthen capacity building for CBWQM in partnership with local governments and multi-actor groups. Work with training institutions, the WRC EI4WS programme (Xabisa Indalo for Water Courses), the SETA system, as well as the Groen Sebenza / Working for institutional framework to develop and support an intensive capacity building process or course over a period of 3-5 years for depth scaling, use of CBWQM tools, and development of the CBWQM community of practice at national level. Include more communities, rivers, and local governments than are currently involved in the practice.
- POLITICAL ECONOMY AND POLICY SUPPORT: Scaling pathways for policy advancement and implementation at organisational level in ways that also create jobs and learning pathways for youth.
- SUPPORT KNOWLEDGE COMMONS: Scaling pathways to CBWQM tools development and use, as well as improving and expanding the use of existing CBWQM tools to advance water quality monitoring practices in local government settings.

Building on this we worked with DUCT to draw in the Xabisa Indalo for Water course development team to support course development that could continue the work of advancing the scaling pathways for advancing capacity development through Xabisa Indalo for water

course. We therefore started by identifying exploring pathways for expansion of the initial work that took place under the first phase of the Amanzi Ethu Nobuntu programme, as it was moving into a second phase. The Xabisa Indalo for Water process was therefore closely engaged with the **Phase 2 of the Amanzi Ethu Nobuntu programme**, specifically supporting the training of the team leading and supporting the EnviroChamps who were undertaking the monitoring and implementation action (see Chapter 3).

The Xabisa Indalo for Water team, working with the WRC, TNC and DUCT also supported research into the feasibility of establishment of a Water Fund, as this was identified as being critical to establishing the institutional structure for holding together the **Amanzi Ethu Nobuntu institutional mechanism necessary for making a blended finance model work in the catchment.**

Our decision was therefore, given the strong emphasis on monitoring and implementation activity emerging from the TNA, and the need for mobilising investments into EI4WS in ways that also enable creation of meaningful work for young people in South Africa, and the innovations taking place in relation to establishing a blended finance model for EI4WS in the AEN and UIEP contexts, that we would explore how a course intervention such as that planned by the Xabisa Indalo for Water Course could be utilised as an emerging course development system that can strengthen capacity building for EI4WS monitoring into management action (**the third type of activity identified above**). While the focus was on **monitoring and implementation activity,** this was being made possible through **a new type of investment activity,** and also required engagement with **policy activity** to make this more sustainable. Thus the Xabisa Indalo for Water team were able to learn from, and contribute to the advancement of all types of activity in this context.

Survey with partners and initial dialogues with AEN team setting up the training

At the start of Phase 2 of the AEN, the Rhodes Team working on the Xabisa Indalo for Water agreed to work with the AEN to design and develop training for the River Rovers (graduate fieldwork trainers) and the Data Detectives (graduate team supporting use of monitoring data). A first step was to reflect with the AEN Implementation Team on a survey that they commissioned to get feedback and inputs from stakeholders from Phase 1 AEN processes, to inform and improved the training in Phase 2 (See Table 2.1 below).

Table 2.1. Feedback on amanzi ethu questionnaire for informing design of the onboarding training programme

PARTNERING ORGANISATIONS: In your view, what are the most important things that need attention for a participating organisation to become an active partner the Amanzi Ethu PES 2 programme?
Administrative costs for HR and administrative services
Working in the civil society field or environmental justice network, where a key focus of their work is helping communities get better access to clean water and maintaining our rivers. Have been working in the catchment area in either education or environmental programmes.
M1: and ONGOING … Clear communication, and understanding of roles and responsibilities
Be an active and existing employer of people...with UIF/COIDA, and supervisors/managers in some sort of hierarchy of reporting and organising of work. (i.e. not a "one man band")
M1: Partnership should find its place within the strategic direction of the organisation. A coordinator that ensures the initiatives are achieved
Understanding M1: what collaboration is. This involves value exchange – bringing your company's/groups key offering into the partnership, and not being a passive receiver of funds. Module 1: The broader catchment context, what is happening, the roles of different stakeholders. Where the UEIP fits in. What is Amanzi ethu nobuntu – now and the future. Scaling, and how to scale successfully – highlights from the WRC upscaling research M1: Understanding that learning together – as partners, with Enviro Champs, etc. – is a foundational principle of what we are doing. A focus on human optimisation, with environmental care seen as the result of people changing. In other words, unless people change from the inside out, we just have another version of EPWP, and no sustainable impact on the ground. The big vision/picture towards Mzansi Enviro Champs. Focus on innovation, and learning for the future.
M1: Proper pre-planning and communication on objectives, expectations and processes before the start date. This includes contracting, reporting and financial management processes.
Clear understanding of expectations and inclusion of all voices in research and gathering of data and innovative contributions – WORKING TOGETHER AS A CONNECTED TEAM
Partner selection – Organisational focus/objectives to be aligned with AEN focus (includes geographical location). Existing projects to form base (sufficient co-funding). Sufficient Management, Admin and finance capacity. Internal champion/sponsor of appropriate decision making capacity. Topics for orientation – A2B selection process – learning theory – AEN End Result

PARTNERING ORGANISATIONS: In your view, what are the most important contents, processes, tools, etc. that partner organisations will have to master in order to successfully host a team of Enviro Champs?
Definitely more training for the envirochamps and PPE
Have to be able to do create and implement active learning environmental programs. Be able to train EcoChamps on all aspects of the MiniSass process, artisanal processes related to water (system and how it works, e.g. plumbing, municipal system, etc.). Strong understanding of the catchment area. Commitment to creating change agents for the greater environmental and social good.
A clear understanding of how the citizen science tools are used and what the data is for

Being able, and willing to monitor their teams via the Fieldsurvey portal: using it actively as their management tool...taking it onboard – MODULE ON FIELD SURVEY and BACK END FIELD SURVEY PORTAL for PARTNERS AND OTHER STAKEHOLDERS
Identifying tasks and develop a workplace plan for the Champs before their arrival
How to shift humans from dependence to independence. Understanding and tools on tapping into the ability of people to transform. (I have potential course content for this from an organisation called A2B Transformation that DUCT is working with) TRANSFORMATIVE SOCIAL LEARNING AND CHANGE AGENCY Being able to utilise the USE OF TOOLS Citizen science tools effectively, and how to utilise the data to start dialogue with other key stakeholders and decision makers. [UPTAKE AND USE OF THE DATA] Utilising the field survey data collection tool to collect data, and understand it. [DATA INTERPRETATION] Social media – how to gather good pictures and utilise them [SOCIAL MEDIA TRAINING and MOBILE JOURNALISM TRAINING] Stories of change – capturing the stories of what is happening on the ground, and how lives and communities are changing [SOCIAL COMPONENT – engagement, interviewing] Introduction to mapping and GIS – not the details, but rather the power of spatial data representation. [SPATIAL COMPONENT]
Proper practical training and troubleshooting of applications [TECHNICAL ASPECTS OF USING THE APP AND DEALING WITH APP PROBLEMS]. Ensuring standards of onboarding, training and reporting are standardised across all partners. Efficient and timeous payroll and benefit delivery.
SPECIFIC PROJECT MANAGEMENT FORUM / MEETINGS FOR PARTNERS, CONSISTENCY COMMUNICATION and SHARED LEARNING … A toolkit that is complete with admin requirements and templates at inception, standardisation where it is critical (reporting to DSI, SARS COIDA, etc.) and flexibility / customisation for more local requirements (example of a contract between participant and onboarding organisation). Including a template for reporting on work completed so that KPA's are clear from the outset. Exposure to other partners close by for peer to peer – we need to work together across our groups and feel part of a bigger Mzansi within eThekwini
Technical – Biomonitoring, App, Citizen Science Tools, Mini SASS – (clear guidelines on method, frequency, set sampling points), baseline, targets, focus areas. [CS TOOLS TRAINING] – Video recordings for the website Finance & Admin – Budget allowances and structure and parameters, expenditure reporting format, PFMA requirements and supporting documentation and Invoicing, timesheets and payroll, assets registers. HR – community engagement (traditional structures in selection process if new employees), EC profile (age, skills, geographical location, employment status, aptitude, etc. – employee documents required – Certified ID, Banking details), EPWP database requirements, A2B selection and Incubation methodology, – ORIENTATION PROCESS FOR PARTNERS, GRADUATES AND RIVER ROVERS Team Structure (Supervisor _possibly older, experienced, existing or previous employee – Team level Graduate for APP coordination and analysis – operational EC's), Clear workplans – employee turnover/attrition and replacement. Marketing – Marketing protocol and collaboration for DSI and Programme level. – PART OF THE REPORTING AND UPSCALING WORK

M&E – Stories of Change, Change Projects, targets achieved, community engagement, lessons learned, Knowledge sharing methods , tools & commons. Resources – Data (options/ method of data distribution) and Smartphones
RESEARCH AND DATA TEAMS: In your view, what are the most important contents, skills support and tools that will be needed for high quality monitoring and data processing for good quality reporting in the AE PES2 programme?
Definitely graduates will capture before and after of the project areas
MiniSass investigations knowhow, equipment, upcycling initiatives to create low cost equipments, workshop skills, facilitation skills, project management,
comprehensive training of participants so that they understand what they are doing and why
Being inquisitive and enquiring and creative enough to slice and dice data, looking for trends and pictures that no one has thought of before....we need "Malcolm Gladwells" and "Simon Sineks" and "Adam Grants"
An upgrade on the mini sass apparatus that are currently used
A good understanding of all the citizen science tools utilised. What results should look like, what they mean, how to find errors. And how to then translate this into useful information that makes sense to all stakeholders. Some intro to water quality monitoring, catchment management, ecological infrastructure. Every project area that participates needs to have a report at the end of the 6 months. This report should highlight key issues, findings, and recommendations for the sub-catchment area. Therefore the ability to research, find other bodies of information, and then being able to marry these with the data, and real stories coming through the project period. Data cleansing, data analysis, data synthesis.
Technical training on applications, measurements, data collection and processing and reporting.
Good knowledge and training of the back end of the Application to be used. Preferably using a laptop. Access to a modem for downloading and capturing data
Web and App development – GIS software, tools, technologists – fixed point photography (before and after) – Content specific specialists (advise on methodology and best practice – from learning theory to herbicide application....), social scientists to capture stories of change. Report writers.
RIVER ROVERS: In your view, what are the most important tools, contents, and skills that River Rovers need in order to successfully support the Enviro Champs in the field of practice?
To be able to capture all projects before and after impacts
mentoring skills, knowledge of the terrain and equipment, reporting skills
A drive to ensure, day by day, that the database is complete and correct...singularly focused on steering/coaching/training/helping the teams on the ground towards perfection in the database.
Upgrade the mini technology devices for the benefit of the project

Detailed practical use of citizen science tools in the field.
A good understanding of all the citizen science tools utilised. What results should look like, what they mean, how to find errors. And how to then translate this into useful information that makes sense to all stakeholders.
Some intro to water quality monitoring, catchment management, ecological infrastructure.
Stories of change – how to interact with people, ask the right questions, and write up stories.
Networking with organisations [NETWORKING]
How to take photographs. How to do short video clips. [MEDIA / MO-JO SKILLS]
Learning for the future. They are hands on with Enviro Champs. They need to understand what we are selling here as a model.
Standardised documents for data collection, processing and reporting. Mobility across catchment.
The River Rovers were great. The teams on the ground valued the visits – these could be more regular and request Durban River Rovers that are more area based.

ANY OTHER IMPORTANT ORIENTATION NEEDS THAT ARE NOT LISTED ABOVE ... Please provide details
Project Management training for the Supervisors and other organisation managers
Passion and commitment for rivers and water resources and energy and enthusiasm for the project
Communication and role clarity are the trip-up risks. We need clarity and agreement on what a project officer, Rover, Graduate (and maybe better terms!) do, what their role is, and what they must and must not get involved in, and we need that before we start.
further accredited trainings for the Champs to also have their skills acknowledged academically
Social media – standardised, timeous and coordinated.
The majority of our teams participants were accessed through the WESSA Youth volunteering network in Durban, most of whom are graduates or students of environmental studies. Certain members of our teams brought specific interests and expertise as contributions, e.g. a passion for birding, climate change activism and community engagement. The project requirements of local participants who know the river well were met in some instances but in reality local participants knew little and struggled with the higher end skill sets of bio-monitoring and use of the App. Smart phones meant few could use the App successfully.. We need to find some way of working across these gaps.

PARTNERING ORGANISATIONS: SUGGESTIONS OF MATERIALS AND TOOLS FOR PARTNER ORGANISATION ONBOARDING (things that have worked well or that are needed)
The disbursement funds and the HR systems under DUCT
support vehicles and crew
An easy to use training platform
They need to give their project officer access to an office, PC and phone
Uniforms, training
A tool to monitor and evaluate their projects as they go. Both quantitative and qualitative.

A recruitment screening tool. We would like partners to hire their own graduates and teams, but to have a tool that assists them in choosing the right people. We ideally want some of screening method to test both current skills, but more importantly, willingness to learn.
Data collection tool (this is developed) for work done on the ground.
Citizen science
Learning pathways for enviro champs – access to modules, or opportunities, etc. for the enviro champs to engage with over the 6-8 months. CS ++ TRAINING – 'WORK FOR THE COMMON GOOD AND LEARN FOR THE FUTURE … '
Onsite and infield skills and content training [OFFERED BY RIVER ROVERS]
Ordering PPE more locally – supplier that we can access at different locations. Budget for tools was higher than what we required – would prefer travel allowances or higher wage stipend

RESEARCH AND DATA TEAMS: SUGGESTIONS OF MATERIALS AND TOOLS FOR RESEARCH AND DATA TEAMS (tools and approaches that have worked well or that are needed)
Definitely the miniSASS and the Timesheets on the Fields Survey app
laminated miniSASS worksheets, whiteboard markers, GPS system, mappers, charging stations,
Trainings, technology updates
Standardised data sheets
Laptop and smart phone or tablet with a modem and data – we used our own but dedicated for the team administrator / supervisor would free up our own tools. Binoculars for our birders :) A budget for books would be great – we purchased a book with Zulu bird names that become well used and spread to other networks. Binoculars for our birders :) A budget for books would be great – we purchased a book with Zulu bird names that become well used and spread to other networks.

RIVER ROVERS: SUGGESTIONS OF MATERIALS AND TOOLS (that have worked well or are needed)
N/A
PPE's for river work
Access to a single office, where they belong and can form a team: borrowing and rotating offices mixed with working from home serves only to break the team.
PPE, training and technology
Standardised data sheets
More visits and a more locally based team of River Rovers

This feedback from stakeholder was incredibly useful in informing the co-design of the AEN training programme with the DUCT team and partners. It showed the need for a mix of: technical training (to use tools), social training (to engage communities), and training on use and sharing of data emerging from the monitoring (to engage stakeholders in using the data from monitoring). Additionally, there was training needed that would enhance social agency

for change, and partnership and collaboration, as well as project management (for partner organisations). This was therefore very helpful in providing further information for the TNA.

Case study development

The work on conducting the TNA and Knowledge Assets Review work, we also developed two case studies, one on the AEN as an EI4WS practice using a blended finance model, and one on the feasibility study to establish a Water Fund. Both case studies were also used in the course as course materials (see Box 2 below).

BOX 2 CASE STUDY: Enviro Champs & Amanzi Ethu Nobuntu in uMngeni: Xabisa Indalo for Water Monitoring & Management Action Activity

Activity: Environmental monitoring by Enviro Champs – Mpophomeni

The Mpophomeni Enviro-Champs movement was born out of a partnership between uMgungundlovu District Municipality (UMDM) and the Duzi Umgeni Conservation Trust (DUCT) and the uMgungundlovu District Municipality in 2010. The main aim of the project is to reduce pollution, especially to stop sewage flowing, in the uMngeni catchment and especially Midmar Dam, and through this protect EI4WS. Many previously unemployed people have been employed to be the eyes and ears of the environment and to do work for the common good on this project from Nov 2010 to March 2020. At times the project has been funded to employ 20 people and at other times 40 people have been employed. In 2021, the Presidential Employment Programme invested funding in training of 200 young people to do this work.

Figure a: Some of the problematic sewers in Mpophomeni

How the programme works?

The Enviro Champs have a weekly programme that includes a day for training. Training includes:

- Environmental issues such as ecology and climate change
- Administrative skills (e.g. report writing and reporting)
- Technical skills such as the use of citizen science tools and replacing a tap washer
- Personal development such as financial management

The rest of the week is dedicated to a programme that is specific to the group. Each Enviro Champ knows what is expected of them every day of the week. In some cases, they also work on Saturdays.

Some of the key monitoring activities by Enviro-Champ (NB: all field staff are Enviro-Champs but they do not all perform the same tasks) are:

- Sewer Monitoring and using Field survey/GEO ODK

Enviro champs identify sewers on a map and where necessary clear access and check on the sewer. If there is a problem (e.g. spilling over, the municipality is alerted). The results would be uploaded to an app (e.g. GEO ODK or Field survey).

- Biomonitoring and testing of Howick Waste Water Treatment Works outflow

Depending on the project requirements, Enviro Champs monitor water quality at specified points using citizen science too, mainly miniSASS and clarity tube. Sampling of the Waste Water Treatment works outflow was undertaken three times a day with a clarity tube.

- Measuring and reporting fresh water leaks

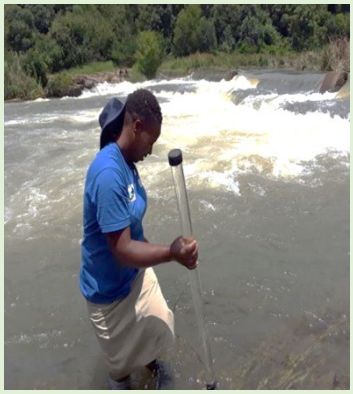
While walking about and during door-door visits, the Enviro champs would also check for water leaks. These provide a learning opportunity on water conservation as well as basic repairs. Plumbers would be contacted for more complex repairs.

- Measure, audit and clean-up illegal dump sites

Also, during walkabouts, the Enviro Champs would be on the lookout for illegal dump sites. They would assess the size, its "age" and be involved in cleaning them up. This to limit litter ending in the water bodies.

- River walks and citizen science tools

To further raise awareness on issues impacting the rivers, Enviro Champs would organise and run river walks for a range of groups. During these walks, citizen science tools would be used to assess aspects of water quality.



All the monitoring information gathered is reported to the relevant authority. Water quality information is reported to GroundTruth, Water, Wetlands, Biodiversity and Environmental Engineering. Sewer and plumbing issues are reported to the municipality who often does repairs.

Figure b: N Bhengu, an Enviro Champ using a clarity tube

Challenges associated with the programme

More stable funding would not only boost the morale of all Enviro champs, it would also result in sustained impacts – the disruptions and breaks in funding are not useful in developing a well-run and effective programme.

Career pathing – Individuals who show potential need to be identified and offered opportunities to grow in this field. While some Enviro champs have no qualifications (including matric) the programme provides a lot of learning that equips them with both knowledge and skills to enable them to be employable. A small number of Enviro Champs has degrees (+ post grad) qualifications. Due to unemployment, they end up doing the same work as those without any qualifications. It would be ideal if this small group could have opportunities to long term employment aligned to their areas of study. Long term employment – would boost morale and improve livelihoods of the Enviro Champs

Up-scaling – Sharing this work more widely so that other communities in South Africa can benefit. Having more community members and groups with this type of knowledge and skills will be beneficial for taking better care of our environment, especially water.

Possible improvements to the programme

Strengthening communication with policy makers/politicians/local authorities and COGTA. This is likely to result in an improvement in cooperation and ultimately services. Improving this would benefit both the authorities and the communities.

A more responsive/reactive call centre so that reported incidents would be recorded and addressed faster and more efficiently.

While some Enviro-Champs have been employed full time by outside companies, e.g. Ayanda Lepheana and others included in other projects, e.g. Amanzi Ethu Nobuntu programme, most remain unemployed. Enviro champs can be employed to train new groups (they have been employed to help on high school outings doing miniSASS)

This small investment in a small group and their exposure to broader environmental aspects/issues/problems has led to benefits to the individuals, the environment. It has resulted in cleaner communities with and a greater understanding of the interlinking of environmental

problems and people's health. It has also resulted in reduced pollution and a better relationship with community leaders and the municipality.

How could this be done?

- Methods?

For government to recognize that these types of programmes are enormously beneficial to communities and save the government money in the long run.
Training – proper, directed training specifically designed to upskill people in this type of work.
Finding co-funding for programmes such as Amanzi Ethu means raising less than usual funds but getting to retain the group.
Enviro-Champs taking part in entrepreneurial programmes would lead to getting additional qualifications, learning to manage their own ventures and would strengthen their competence.
Supporting local initiatives identified and supported by the Enviro Champs.

Who is and could be involved?

- Experts
  - Government
  - Private sector
  - Academia
  - Enviro-Champs
  - Environmental NGO's
- Other stakeholders
  - National Government
  - Local Government
  - Communities
  - Recycling companies
  - IAP clearing organisations
  - Environmental NGOs/conservancies

What results and benefits and for whom?

- Results and impacts?

  The environment benefits and therefore the wider community's benefit

- Nett benefits?

  Health benefits for communities
  Future sustainability of infrastructure (sewage infrastructure, freshwater infrastructure, roads, rivers)
  Cleaner communities and rivers

- Whole system benefits?

  The complete social system, ecological infrastructure and community health will benefit
  Social – community upliftment
  Leadership & community awareness

- Value created?

  Ecological Infrastructure has benefitted
  Investment in employment
  Investment in the environment
  Investment is future sustainability
  Exposure to broader environmental aspects/issues/problems
  A greater understanding of the interlinking of environmental problems and people's health

Additional resources, references and links?

Working with Enviro-Champs we are finding that the following Ten Principles provide the essence of our case study.

- **Awareness Raising and Campaigns can only provide short term gains:** Awareness raising and once off campaigns such as talks, clean-ups and alien removal days seldom lead to sustained, long-term commitment. Such processes tend to be outside-in, centre-to-periphery or top-down. This means they don't meaningfully involve or co-engage with community members. Longer-term sustainability issues tend to be neglected and are seldom sustained. Benefits therefore tend to be short-lived.
- **A Powerful Commitment to the Common-good or uBuntu:** Across all our deliberations we can conclude that community members genuinely do want to do the right thing for the environment. The odds are stacked against environmental sustainability, however. Many people, when given the opportunity and an enabling context, will go to great lengths to care for and work towards sustainable practices and habitats.
- **Working with the Best:** Community-based projects should work to the strengths of community members. It is better to work with a few enthusiastic and committed people than to spread the net wide and try to engage with all and sundry. A good practice is to choose the best and work with them! By carefully selecting Enviro-Champs at the beginning of a project a competent and committed team of Enviro-Champs will be appointed. This process should apply a wide range of metrics and should take time before a project starts.
- **Indigenous Knowledge Practices and Mobilising Prior Knowledge is important:** The Enviro-Champs experiences also demonstrated how important it is to explore and fore-ground indigenous knowledge practices and how relevant and meaningful these are within a community setting. By framing the indigenous knowledge practices within a context of action learning (Taylor, et.al., 2018) powerful pathways towards sustainability became possible.
- **Learning is Key:** Learning is a key component of effective community-based environmental care. By setting aside one day a week as a training day the Enviro-Champs of Mpophomeni are able to continually learn, build relationships and develop a positive conviction for the environment and indeed for the common-good or uBuntu.
- **Avoiding Unreasonable Expectations:** We are also finding that where groups of people consciously work without expectations they are seldom disappointed or discouraged, no matter what happens. The various groups are sometimes promised funding, for example. Expectations may rise, and then everyone becomes disappointed and discouraged if the funding doesn't materialise or takes too long. Once resources, such as funding, are realised, it is then appropriate to apply a structure and management by objectives approach.
- **Long-term Continuity:** Having long-term continuity amongst the groups of Enviro-Champs is a further powerful force for change. Membership continuity has been remarkably consistent in the case of the Enviro-Champs of Mpophomeni, for example. Having members who are 'in it for the long-haul' provides a sense of confidence, purpose and stability to the group as a whole. Having some members who are able to take on a leadership or shepherding role strengthens the continuity and consistency.
- **Civil Society Partnerships with Government:** Working with local government is a further important principle. Where Enviro-Champs have a conviction that they can, and in fact like working with local-government, many positive outcomes are possible.
- **Communication is Key:** Contrary to popular beliefs environmental psychology studies often show how well people work and behave in a time of crisis, provided communication is clear and informed. Panic, fear and apathy only set in when people feel they aren't being informed about what is going on. Successful Enviro-Champs case studies all emphasise how important constant communication amongst group members and with leadership (project and community) is. In this regard social media such as What's App groups have proved most effective.
- **Coping in the New-Normal World of COVID 19:** The constraints and opportunities of working in the new-normal post-COVID 19 era is a fact of life. Here we are finding that a positive outlook, strong communication processes and strengthened communities of practice offer a powerful future direction (Taylor, et.al., in press).

BOX 3: CASE STUDY OF INVESTMENT ACTIVITY: WATER FUNDS FOR SUPPORTING BLENDED FINANCING

The apparent disconnect between water users and water source areas has been touted as a significant threat to achieving and maintaining high levels water security in the water-scarce South Africa. This was addressed through initiatives such as UNICEF and WWF's 'water doesn't come from a tap' campaign, which aimed to highlight the importance of catchment areas and riparian zones as strategic areas to be managed responsibly. Through initiatives such as the Extended Public Works Programme (EPWP) and Working for Water, the South African government has invested heavily in catchment management, with a strong focus on job creation and socio-economic well-being. By removing Invasive Alien Plants (IAPs) and rehabilitating affected areas, such programs contribute to the capacity of the catchment areas and riparian zones to function optimally in providing ecosystem services such as clean water, flood protection, and even reducing soil erosion. It has been shown that alien tree clearing and ecosystem rehabilitation is one of the most cost-effective means to secure more water. However, the rate of clearing and effectiveness of such programs are not enough to reach its objectives of ecologically intact catchments and riparian zones.

Figure 1: Picture of invasion around the Theewaterskloof dam during the 2015-2017 drought in Cape Town and the effect of the drought on water levels (right) (Source: Greater Cape Town Water Fund business case)

By highlighting the crucial connection between water users and catchment areas, we are now able to rethink some of the costs associated with catchment management and adapt our financial models to reflect this reality. Blended finance models for implementation are nothing new but are now receiving more attention as viable and even desirable alternatives to current financing mechanisms in management of water-related ecological infrastructure. An example of this is the Water Fund model, pioneered by The Nature Conservancy (TNC) in countries like the USA, Argentina, Kenya, and even South Africa. The Greater Cape Town Water Fund was launched in 2018 as a response to the ongoing drought in the region and the widespread challenges associated with IAP spread, its water use, and the impact on the overall water supply. In general, the goal of water funds is to "unite public, private and civil society stakeholders around a common goal of contributing to water security through nature-based solutions and sustainable watershed management". Water funds directly connect downstream industrial water users to upstream management activities and offer the opportunity for collective funding of such interventions.

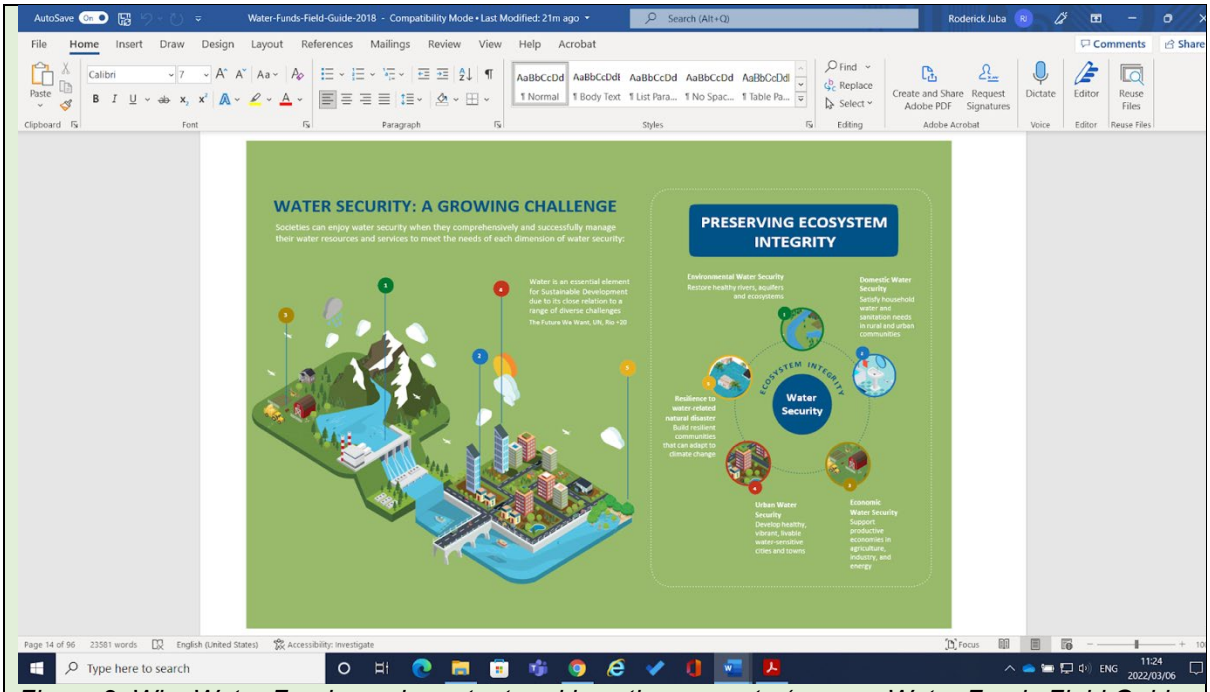


Figure 2: Why Water Funds are important and how they operate (source: Water Funds Field Guide, 2018)

Importantly, water funds are not meant to replace the efforts of government in catchment management but to offer a partnering/collaborative platform for such work that is decentralised and responds to challenges experienced at a catchment scale.

<u>The water fund life cycle involves 5 phases:</u>

Feasibility. To determine the water security challenges experienced in a catchment, and the potential of a water fund to help and contribute positively to alleviate these challenges. This phase also informs whether further finance should be invested in the further establishing of a water fund.

Design. This is where the water fund is moulded to suit the needs of the landscape and its stakeholders, to affect water security through science-based interventions and widespread engagement. This is also where a strategic plan is developed that outlines the actions needed to achieve the water security objectives, including guidelines in the election of leadership,

Creation. After feasibility and design phases are complete, the water fund is formally launched, where the launch platform is used to engage potential members and investors. This is also the phase and platform where the water fund becomes its own legal entity.

Operation. This phase is undertaken to establish stability by developing and implementing a comprehensive work plan, which guides systematic execution of activities, measurement and evaluation, and communication of progress towards the goals of the water fund. These activities should be continuously improved through adaptive management, refinements, and innovation. The deliverables expected in this phase include an Annual Operating Plan, Periodic Progress Reports and Updated Strategic Plan Evolving to Maturity Plan.

Maturity

This phase is a determination that assures the long-term viability of the water fund to create significant and lasting impact that positively contributes to water security. The deliverables of this phase include a Significant Percentage of Longer Term Financing Commitment, Routine Report Documenting Water Fund's Ongoing Impacts, Influence Demonstration and Positive Public Perception Demonstration.

There are currently 12 Active water funds around the world (figure) with several more under development.

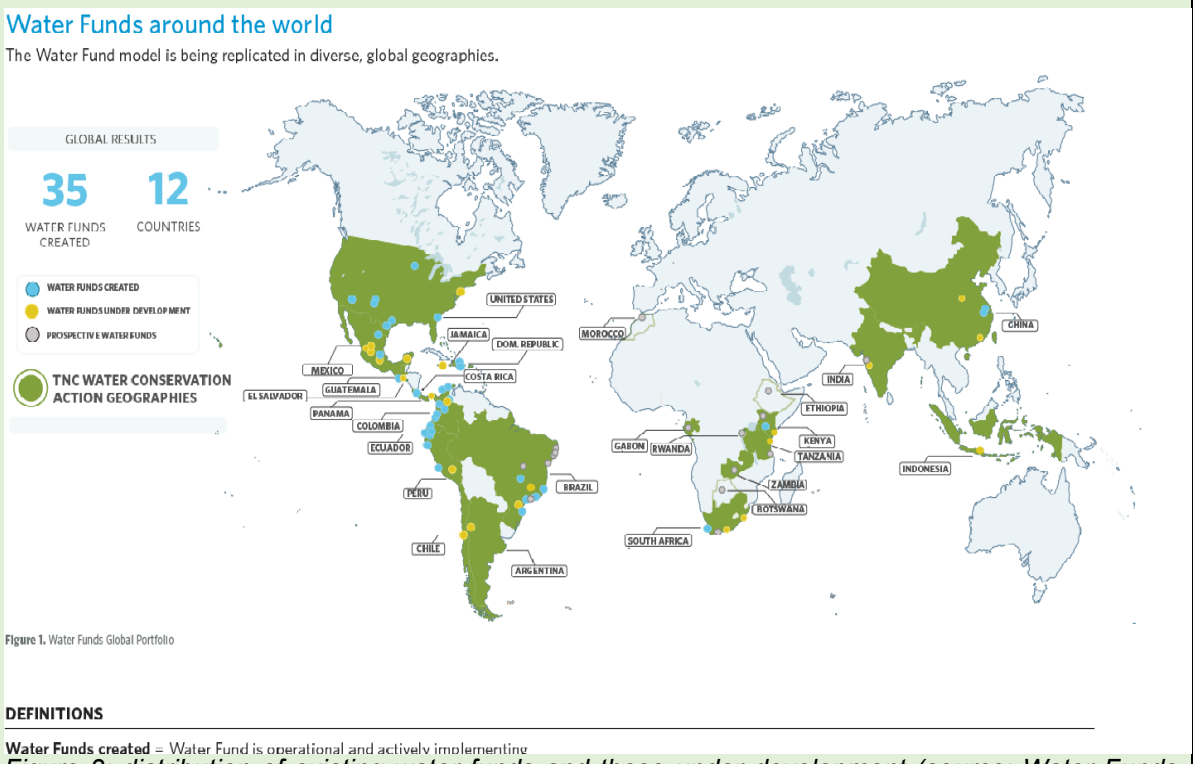


Figure 3: distribution of existing water funds and those under development (source: Water Funds Field Guide, 2018)

Through the GEF-funded Ecological Infrastructure for water Security Project (EI4WS), various mechanisms are being explored towards financing catchment management in a sustainable manner. Water funds represent one of the more desirable mechanisms due to its focus on a blended finance model that can be responsive to the economic status of the landscape. A sister project to the EI4WS is the Living Catchments Project, which seeks to "create more resilient, more resourced, and more relational communities with the ultimate goal to create an enabling environment for integrating built and ecological infrastructure to support water security, economic development and livelihood improvement". This again relies on building strong mechanisms for investment into maintaining healthy catchment ecosystems.

While a water fund is its own legal entity, a secretariat is identified through which it can operate. The Greater eThekwini Water Fund is currently in its feasibility study phase, which is undertaken by the Duzi uMngeni Conservation Trust (DUCT) in partnership with Rhodes University and the Water Research Commission. This water fund will focus strongly on the Umkhomazi catchment as an important water Provider to the eThekwini municipality and its surrounding urban centres. The organisation earmarked to house this water Fund, Amanzi ethu nobuntu, currently operates as a youth employment programme that supports community-based water management and citizen science. The programme is administered by DUCT and is a direct beneficiary of the Presidential Economic Stimulus (PES) funding, which later became known as the Presidential Youth Employment Initiative (PYEI). The impact of a programme like Amanzi Ethu Nobuntu is both socio-economic and ecological. Youth from within close proximity to the river are employed though the programme, adding a sense of ownership to the management of local water resources**. A water fund would amplify these efforts in both scale and impact, and more importantly, provide long-term support for this and other similar initiatives.**

2.6 Knowledge Assets Reviewing and further elaboration of the TNA

Deepening understanding of the broader intentions of EI4WS

Part 1 of the TNA was aimed at outlining the process and possibilities for Xabisa Indalo for Water Course, by exploring training gaps, opportunities and knowledge resources and assets with stakeholders in the two demonstration catchments. The catchments both showed the importance of giving attention to EI4WS implementation and monitoring activity, but also that these forms of activity were not divorced from governance and policy activity, and investment activity. All three types of activity need to be developed in tandem, or in relation to each other as was so clear in the Amanzi Ethu Nobuntu case.

This offered useful insight into the design of the Xabisa Indalo for Water Course, most notably our decision to make Module 2 focus on all three types of activity. We also identified the importance of social learning and partnership formation processes, and decided to make this a third module of the course.

Thus, the TNA process was very helpful to identify the potential focus areas for the Xabisa Indalo course, in order to inform the course module content and curriculum development process. As can be seen above, we engaged with catchment-based stakeholders to understand:

- What EI4WS practices stakeholders are involved in?
- What stakeholders are struggling with, and what is missing (gaps in current EI practices)?
- What are the potential opportunities for strengthening EI4WS activity, with focus on three types of activity: Implementation and monitoring activity, policy and governance activity, and investment activity.

As noted above, we identified EI4WS **implementation activity: monitoring into management action** as the key focus for the course at the implementation activity level in the two demonstration catchments. We, however, needed to generate further insight into the status and gaps associated with **investment activity and policy and governance activity**, which required more engagement with WG 1 and 2, and the knowledge assets being developed at the policy and investment planning levels. This led to a more substantive review of the available knowledge assets and their production, as well as some analysis of their contents.

As highlighted above, phase 2 of the TNA was meant to further deepen our understanding of EI4WS activity by exploring gaps in policies, planning, and financial investment. Therefore, phase 2 of the TNA was focused on developing a critical review of existing knowledge resources from component 1 in order to unpack key EI4WS concepts and tools within policy and financial investment. Team reflections at this stage of our process, also surfaced the need to conduct an extensive review of the economics aspect of investments in EI4WS in relation to the policy landscape, socio-ecological, and political context. At this point, the ISER were also appointing a post-doc researcher with an economics background, who helped the ELRC team with critical review and analysis of knowledge resources from component 1 (policy frameworks, planning tools, financial investment and diversification mechanisms). Prof Mbatha from ISER also took up the task of developing a comprehensive 'foundation text' for the course that surfaced ways of engaging more deeply with the economic dynamics of investing in EI4WS (see Chapter 3).

We agreed that, in order to further develop the course curriculum for strengthening the EI4WS SLKMM practices, we need further, and a clearer and step-wise conceptualisation of:

- What does EI financing, policy and planning entail? What is already done, gaps, and opportunities.
- Understanding the valuation processes/methods used in the natural capital accounting (NCA) and analysis of benefits streams identified from the NCA process.
- Financial mechanism frameworks and payment sources and methods for the benefits received from natural assets.
- Policy decision making process on sources and methods to drive financial investments and collection of payments/funds/revenues to manage/protect/ restore ecological infrastructure.
- Policy decision making on strategies to engage private/public sector donors/investors for investing in the rehabilitation/ restoration and building of old and new ecological infrastructure.

Knowledge assets review and absences for training materials development, and navigation tool

Meetings with WG 1, 2 and 3 to gather information on resources being produced

To explore the above, a series of meeting engagements with the key lead personnel from component 1 was needed, and we sought to set up engagements with WG 1 and 2 project leads in the wider EI4WS project. We wanted to get guidance on the knowledge resources

that were being produced (or were under development), what methodologies and processes were used, and to identify if there are already identified gaps and opportunities that should be prioritised for the course? We also wanted to find out if there were already clear messages in the knowledge resources that needed to be communicated through the course. Additionally, we sought to find out who the key stakeholders were that involved in producing and/ implementing the outcomes of knowledge resources. As it was difficult to arrange these interactions with the WG1 and 2 stakeholders, we rely on the support from component 3 in setting up engagements with lead personnel and partners involved in component 1, and for sharing of the knowledge assets and resources being produced in the EI4WS programme (see below).

The *Knowledge Assets Review* expands on the more engaged Phase 1 TNA and knowledge assets review. It involved review of existing outputs and learning materials (including reports, presentation, proposals, engagements, etc.) from EI4WS components and related partner projects components 1 and 2. The focus of this review was to inform **the course navigation tool** and **content for course materials** content through orientating and expanding the three types of Xabisa Indalo for Water activity (Policy, Planning and Governance activity; Investment and Partnership activity; Monitoring into Management Action activity).

This process involved collating an extensive collection of available knowledge assets from the EI4WS components. This was strongly supported by the component 3 team, as well as the SLKMM team. A series of core team planning meetings as well as the engagements with leaders of component 1 and 2 were conducted, i.e. meeting with component 1 and 2 to explore training needs and learning materials for advancing the policy activity. We also used EI4WS quarterly and advisory forum meetings as a point of engagement. A series of planning meetings were held with the core team, as well as two key workshops with component 3 and SLKMM teams. These engagements collectively contributed to a collective review of knowledge assets to inform the course curriculum and material development. However, as there were a LOT of resources, we needed to organise them and create ‘navigation tools’ for course participants to access these and also to find their usefulness in relation to the EI4WS activity types.

Co-creation of navigation tools for the course and knowledge resources

In considering how to manage the vast scope of concepts and investment activities that were relevant to EI4WS and that were being produced in the field, we summarised these into a ‘landscape-based view’ of the diversity of policy, investment and implementation activities (see

Figure 2.17 below). This also helped us to arrange the knowledge assets review, in order to draw on it in the course. This was done on a miro board, which is an online visualisation tool that allows one to co-construct perspectives together. We were therefore able to co-design this navigation tool with members of WG3, the SLKMM team, and team members working together in the Xabisa Indalo for Water programme. Besides being useful for the framing and construction of the Xabisa Indalo for Water Course, this was also a key contribution to the SLKMM Strategy, which requires knowledge management *and mediation,* i.e. it is not helpful to just have a lot of knowledge resources, these also need to be mediated into use.

Figure 2.17. Landscaping the Xabisa Indalo for Water Course, as a navigation tool for organising the Knowledge Assets Review and Knowledge Resources (key below).

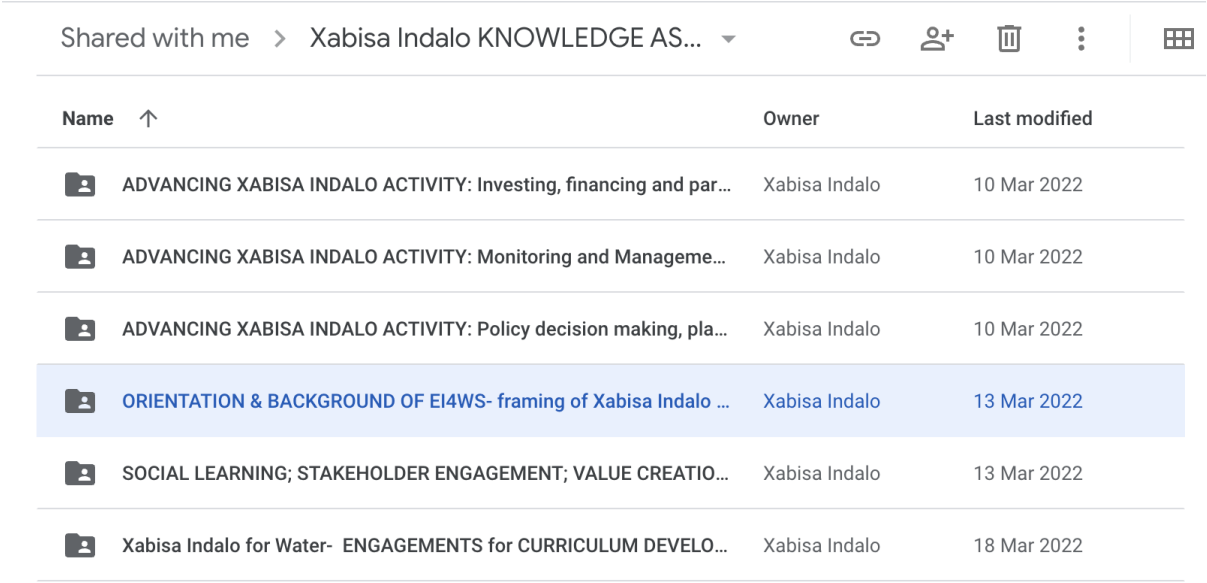
(https://miro.com/app/board/o9J_l8XwEBs=/)

- **From the TOP LEFT in figure 5**, we have provided the background and orientation to the emergence of Xabisa Indalo course (i.e. links to the three components of the Ei4WS, and the six social learning practices of the SLKMM).
- **YELLOW: Module 1 which provide and orientation to EI4WS object** (i.e. history of EI4WS object, different EI practices and activity; current EI4WS programmes; etc.)
- **GREEN: Module 2 which explore the three EI4WS or Xabisa Indalo for water activity** (i.e. Advancing policy decision making, planning & governance; Advancing investment, financing & partnership building; Advancing monitoring & management for action)
- **BLUE: Module 3** which focus on stakeholder engagement and social learning tools and process for advancing value creation across the three EI4WS (Xabisa Indalo for Water activity)
- **PURPLE: Module 4 which focus on monitoring, evaluation and scaling for impact** (i.e. exploring different types of value created from Xabisa Indalo for Water course).
- ORANGE: Change project assignments which are sub-divided into four parts (i.e. one assignment at the end of each module)
- PINK: Case studies examples that was developed to support course participants with examples and additional learning resources for exploration of the three Xabisa Indalo activity

With this in mind, the Xabisa Indalo for Water team set up a google drive with all of the knowledge assets sourced, organised according to the categories in the landscape view (visual) navigation tool:

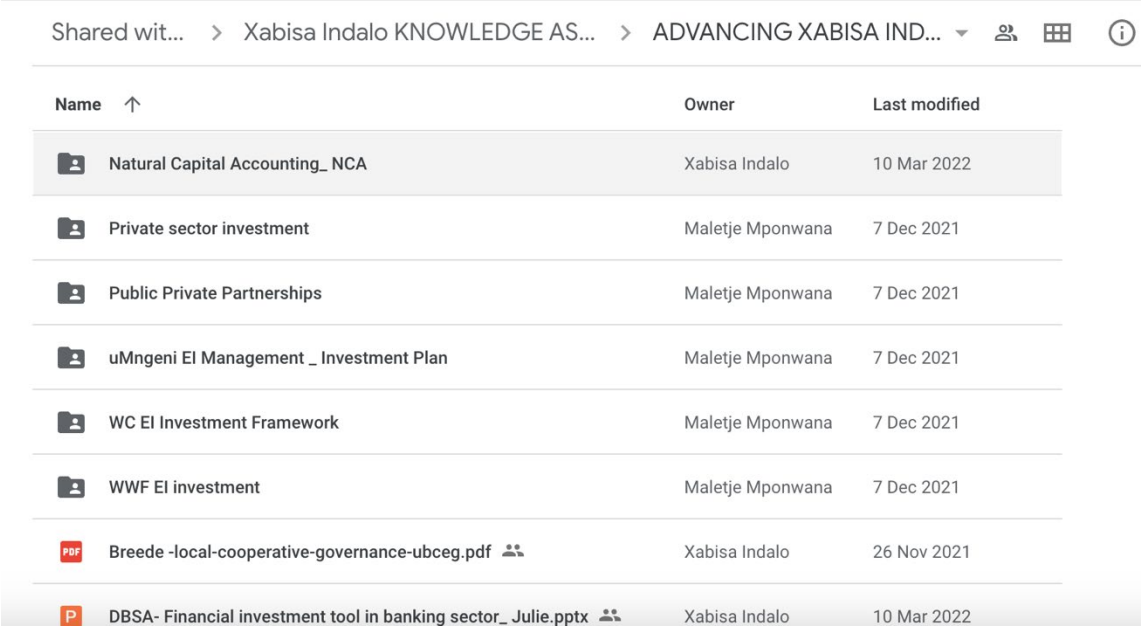
The Primary google folder is a folder entitled **"Xabisa Indalo for Water Knowledge Assets Review":** https://drive.google.com/drive/folders/15MKMC8qj9N0yfu0XWKxF4r9EfJKhq-ic

Within this folder, there are **six sub-folders, with approximately 100 items** that were collected to inform the Xabisa Indalo for Water Course development process, and to provide background materials for course participants as well as course developers.



Within each of the sub-folders, are a number of other sub-folders, as outlined below:

For the folder: Investing and Financing Activity : *This folder has 35+ items in the collection.* https://drive.google.com/drive/folders/1OppJr5YLWjO5UA8ki63ScOmYjGVgDeCn



For the folder: Implementation – Monitoring and Management Activity : This collection has 15+ items in it

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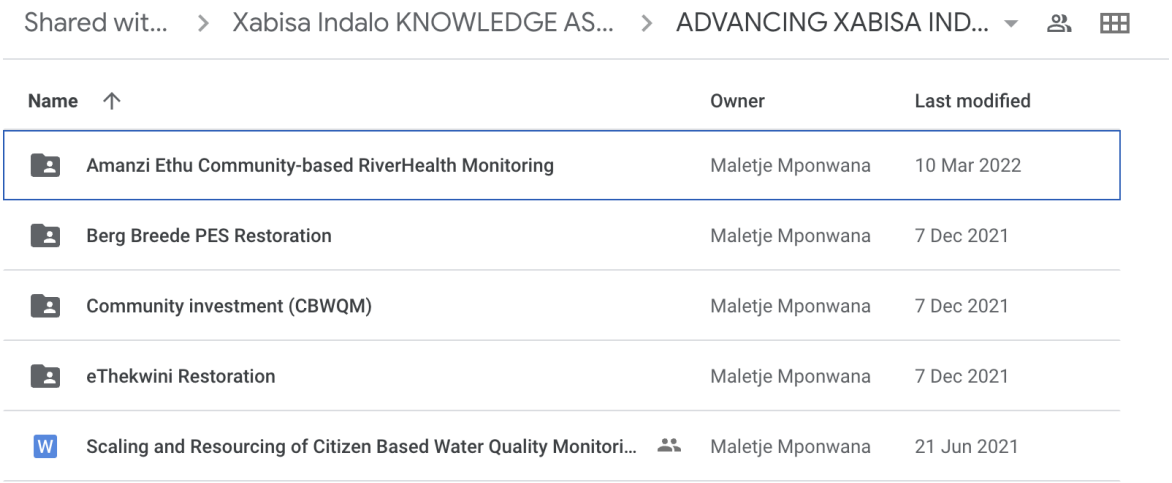

For the folder: Policy and Governance Activity : This collection has 12+ items.

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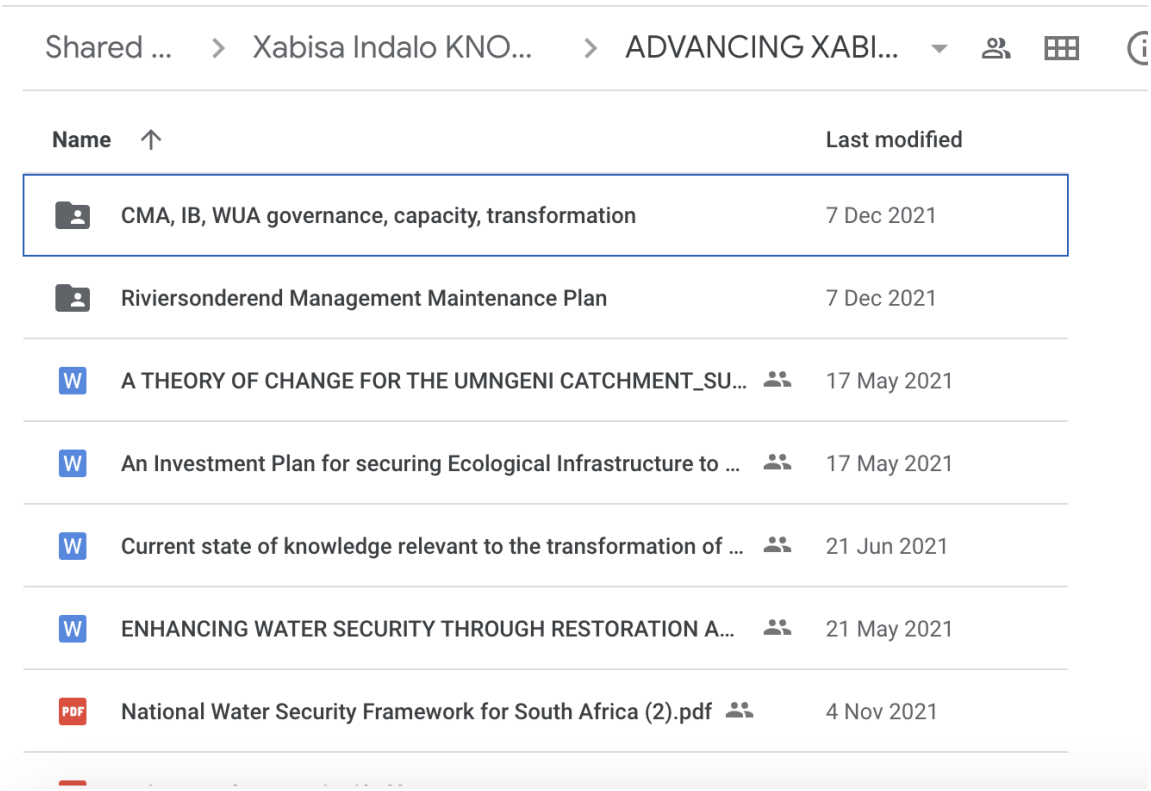

For the folder: Orientation and Background to EI4WS : this collection includes 9 items

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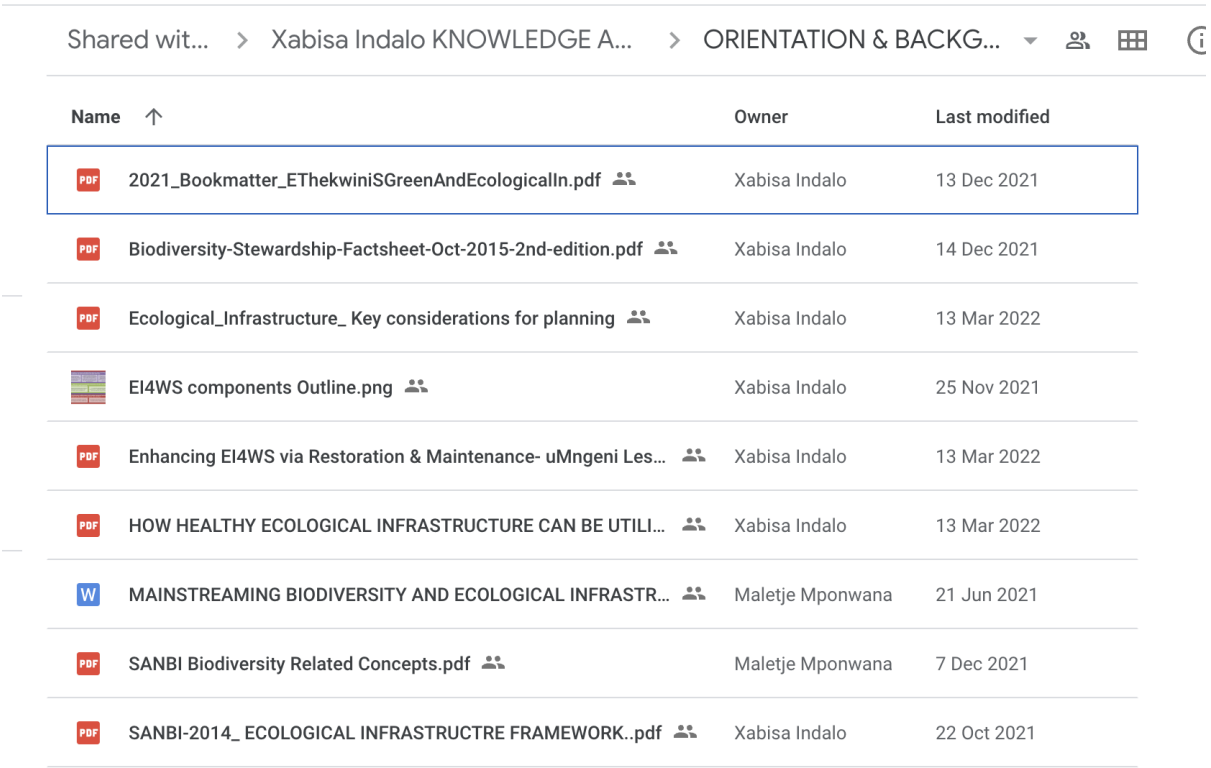

For the folder: Social Learning, Stakeholder Engagement, Value Creation : This collection has 15 items

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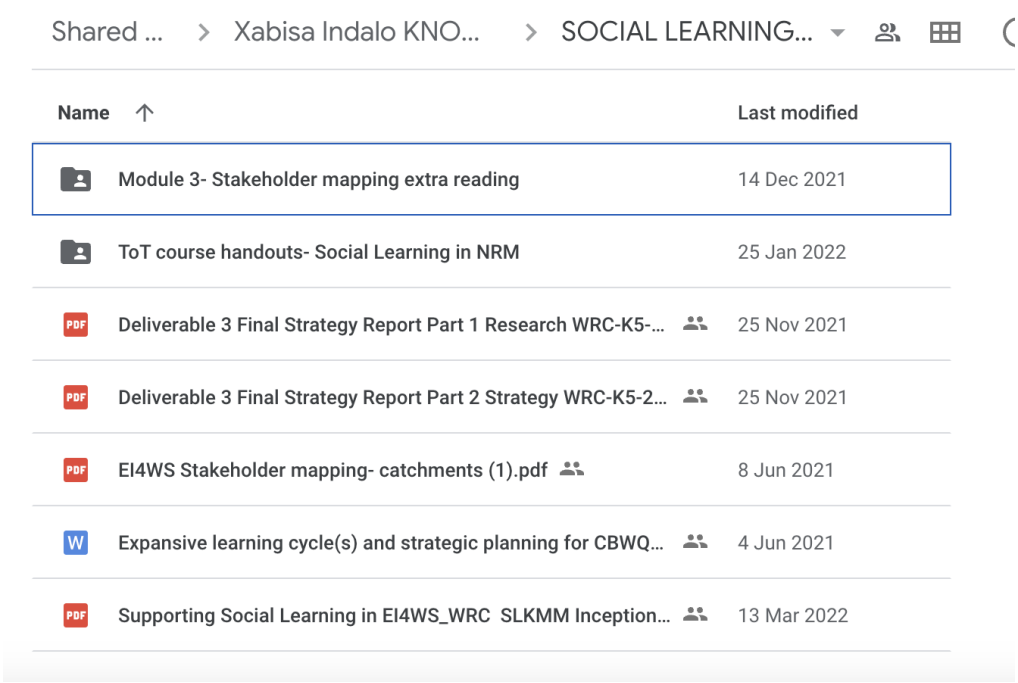
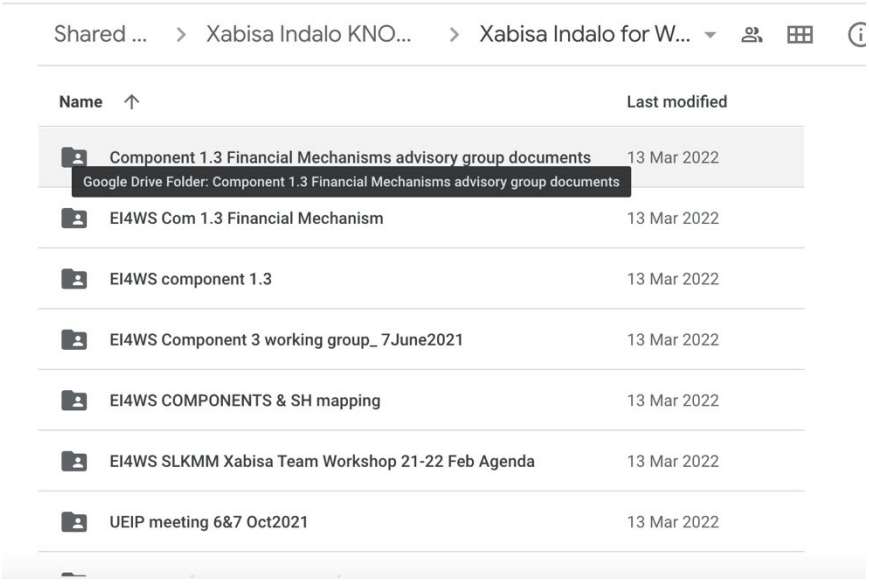


For the folder: Engagements for Curriculum Development : This collection has 22 items. https://drive.google.com/drive/folders/174lGTdLegDQDV9LFrvIaKd-I4i_UilMB



As can be seen below, the design and development of the course navigation tools, curriculum framework and course materials was a collaborative process, that drew on expertise from the WG3, the WRC team, the SLKMM team and the Xabisa for Indalo for Water team. Figure

2.18 also shows the work done to ensure that the course was well located in the EI4WS SLKMM Strategy, it being a 'Strategy-in-Practice', with the design and development of the course being a key implementation tool for the SLKMM strategy (WRC Project K5-2988).

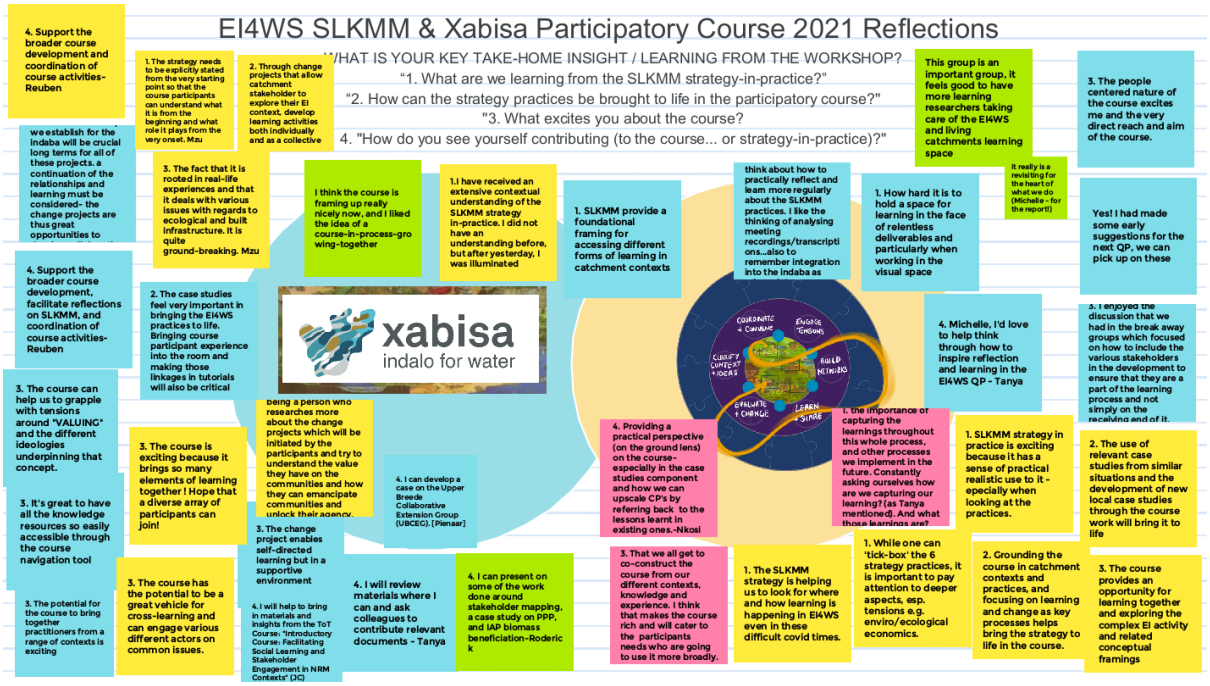


***Figure 2.18**: Reflections from a two-day workshop focused on knowledge assets review, Xabisa Indalo course materials development and review on implementation (13-14 December 2021)*

***Figure 2.19:** Xabisa Indalo for water material development workshop and reflections piloting of the implementation activity stream course (21-22 February 2022)*

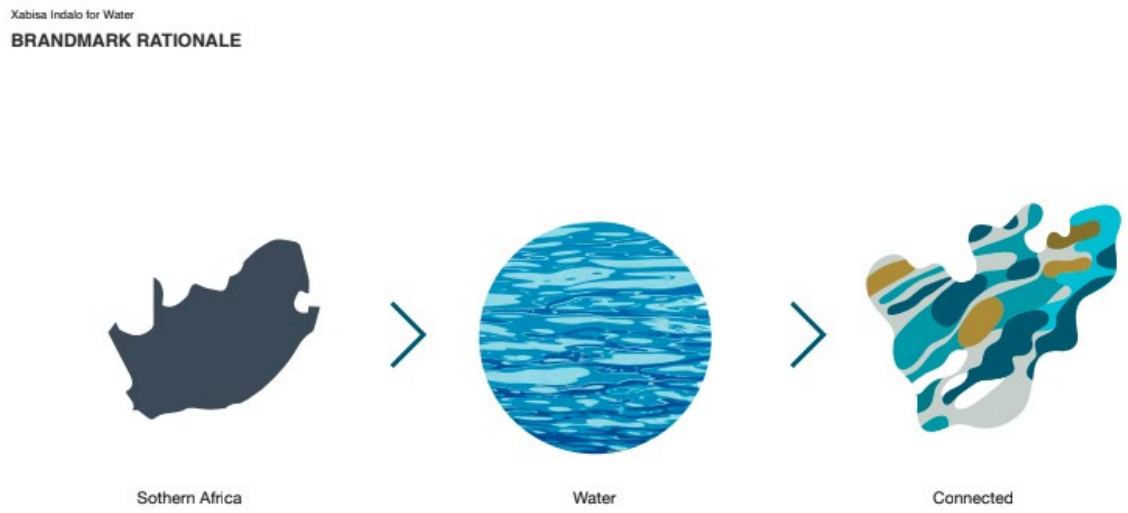
Course visualization navigation tool: Xabisa Indalo branding

The branding of the "participatory course" was also a critical component of visual navigation. A full set of branding materials were developed, including the naming of the participatory course "**Xabisa Indalo for Water**" which translates to *valuing nature for water* in the context of learning to invest in ecological infrastructure. The decision to do this was to help with mediation of the concept of EI4WS, i.e. to make the concept more accessible to a diversity of audiences. We developed a full set of Xabisa Indalo for water branding materials that were used for report and presentation covers, flyers, booklets, etc. (see the Xabisa Indalo branding guidelines in the google drive).

Below is the short description of the Xabisa Indalo for water branding which forms a critical component of the visual and concept navigation tool that have been designed for the project to facilitate ease of access to the EI4WS programme concepts and course modules.

Box 2: Xabisa Indalo for Water brand positioning

Xabisa Indalo for water: Valuing Nature for Water
Broader meaning: Learn to invest in ecological infrastructure [green infrastructure] for water security [blue infrastructure that supports life]
Bringing together Economists, conservationists, water managers, business, catchment residents, etc. – to learn in a community of practice
Investing is the key element – advancing investment for the green infrastructure – the course is strengthening this through education (social learning)



Xabisa Indalo for Water
BRANDMARK COLORWAYS

- project name (Xabisa Indalo for Water) and logo are the key aspects of the conceptual navigation – giving more popular access to a complex concept of EI4WS.
- use of different graphic device colour options on booklet covers, presentations, etc. – to support participants navigate the different conceptual streams of the course and associated concepts and activity streams (e.g. use gold colour versions for the investment activity; red for the policy activity; and green for the monitoring activity streams).
- different photographs to show inclusion and social learning of a diversity of actors.

CHAPTER 3:

COURSE DESIGN, AND PILOT TESTING THE COURSE IN TWO SITES

3.1 Initial design and framing of the course

As indicated in Chapter 2 above, the course was strongly informed by the TNA and the knowledge assets review process. It was also framed as an expansive social learning process (Wals, 2007; Engeström, 1987; 2016). In embracing the expansive learning intentions of the course, we identified that the course could have four key modules that build on each other in probing for transformative learning pathways through development of change projects[3] as a modality for course participants to implement their learning insights to strengthen and expand EI4WS practices in the demonstration catchments.

[3] Change Projects are self-defined institutional and practice change initiatives. They include curriculum and pedagogical innovations for transformative change at individual, collective and organisational level. Importantly, all Change Projects will be orientated towards sustainability and better management of EI4WS, informed by relevant EI4WS policies and planning tools. Course participants will be supported on conceptualising and developing their change projects. The focus will be on any strengthening and scaling EI4WS practice improvements at implementation activity, financial investment activity, planning and policy activity.

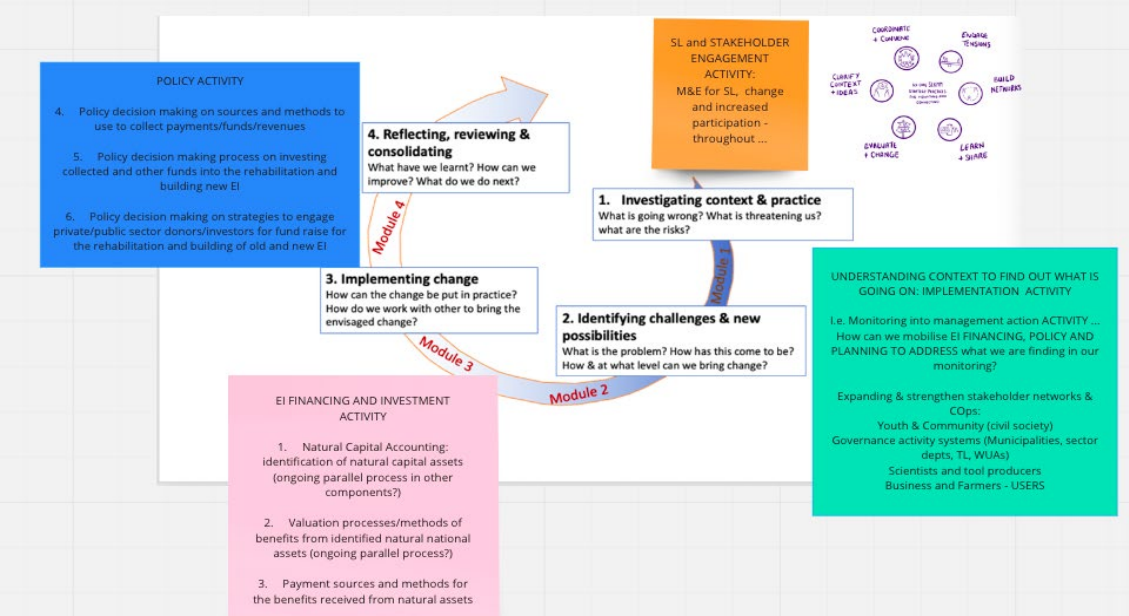


Figure 3.1: Broad overview of the course curriculum process

In developing the content for the identified four course modules, we were able to provide a broader contextual framing on what we had identified in the TNA, knowledge resources and assets review and case studies (by this time we had co-developed a number of case studies with participating organisations (see below). Shared below, is the initial framing of the course, based on the extensive consultations and TNA processes described in Chapter 2, and the expansive learning trajectory mapped out in Figure 3.1.

- **Module 1** (Investigating context & practices): here will provide introduction to methodologies and tools for facilitating transformative social learning and learning-oriented stakeholder engagement (we called this a social learning & stakeholder engagement activity, orange colour in figure 3.1).
- **Module 2** (identifying challenges & new possibilities): this is an implementation activity which focuses on exploring EI4WS practice in the demonstration catchments (green colour in figure 3.1). So far, we have identified monitoring into management as a key focus for the course (see appendix B, case study on monitoring activity). Here we will support course participants in identifying their change projects (i.e. monitoring challenges they could address via change projects), Prioritising what needs to be done and who to involve? How to design a social learning process? What knowledge resources and networks can be built on? What do we want to start with "start small, think big and act now"
- **Module 3** (implementing change): the focus of this module is on developing and implementing a social learning process via change projects with the focus on exploring

planning and financial investment tools (we called this a EI financing & investment activity (pink colour in figure 3.1). Here we will explore how the course can support scaling and strengthen different EI4WS practices identified as priorities in module 2 (i.e. monitoring into management). We will explore the available knowledge resources on planning & diversified investment activity, and identify gaps and opportunities for further development, and this will form part of the change projects.

- **Module 4** (reflecting, reviewing and consolidating): the last module aims to develop a reflexive monitoring and evaluation process via value creation framework as evidence on policy implementation. Here will explore and reflect on key policy tools for enabling better management and governance of EI4WS practice. We called this policy activity (blue colour in figure 3.1), focusing on exploring what and how these policies can inform water pricing, unlock green jobs, strengthen accountability and compliance, and support organisational capacity development.

3.2 Refined course framework and piloting approach

In consultation with colleagues in the WG 3, the WRC and SLKMM teams, the Xabisa Indalo for Water team continued to refine the course framework, which also provided a good 'navigation tool' for participants to access the background materials that were available, as collected in the knowledge assets review (note that this was just a starting collection, cf. Chapter 2).

The course framework described below outlines the more refined structure of Xabisa Indalo for water participatory course which was then later used in the course materials to guide the course. This was the main navigation tool for participants into the EI4WS field, the course and its expansive learning, change oriented processes.

Overview of the course

Here we share the overview and purpose of the Xabisa Indalo for Water course, and a short introduction to the four modules of the course. We have also provided a visualised presentation of the course navigation tool using the Miro board online resource (figure 2.17).

Course orientation

This certificate Course in Social Learning and Valuing Nature for Water is a high quality, accredited in-service and contextually directed programme for a range of professionals and engaged citizens who share a concern for investing in, and taking better care of ecological

infrastructure for water security in South Africa. Besides developing new knowledge and understanding of ecological infrastructure for water security, course participants will need to be able to engage collaboratively with others to develop Xabisa Indalo [valuing nature] for water' activity, and to stand back and reflect on their shared activity. The course will help participants to understand the broader and the more immediate context of Xabisa Indalo for Water in South Africa.

Purpose of the course

The Xabisa for Indalo course aims to support practitioners in the biodiversity, water and natural resources management sector, and their partners (including active citizens, business organisations, etc.) who have an interest in securing South Africa's ecological infrastructure for water security. Ecological infrastructure is a term used by policy makers, managers, scientists, interested citizens and other stakeholders to show the value that natural systems have for people. This course will focus particularly on the value that natural systems have to secure our water, hence the title of the course 'Xabisa [valuing] Indalo [nature] for Water.

The South African National Biodiversity Institute defines Ecological Infrastructure as follows:

> *Ecological infrastructure refers to naturally functioning ecosystems that deliver valuable services to people, such as water and climate regulation, soil formation and disaster risk reduction. It is the nature-based equivalent of built or hard infrastructure, and can be just as important for providing services and underpinning socio-economic development. Ecological infrastructure does this by providing cost effective, long-term solutions to service delivery that can supplement, and sometimes even substitute, built infrastructure solutions. Ecological infrastructure includes healthy mountain catchments, rivers, wetlands, coastal dunes, and nodes and corridors of natural habitat, which together form a network of interconnected structural elements in the landscape.*

This definition emphasises that nature is valuable to people, and that we need to develop strategies and approaches to take better care of nature, especially in our catchments if we are to secure water for South Africa. Nature not only provides services to people, but is valuable intrinsically for its life-giving value to other creatures, for its beauty and aesthetics, and for keeping planetary systems in balance.

The course provides a participatory social learning platform for a range of different actors to work together to better care for and engage in 'Xabisa Indalo for Water!' [Valuing Nature for Water!] activity. By social learning we mean people collaboratively learning from each other, from the environment, and from knowledge resources to co-develop and change their 'Xabisa Indalo for Water' activity.

Course Objectives

The course seeks to support participants involved in ecological infrastructure for water activity to,

- Develop an understanding of ecological infrastructure for water security in South Africa, and why 'Xabisa Indalo [valuing nature] for Water!' is needed.
- Differentiate between, and review ecological infrastructure activity in a particular context, with a view to advance or expanding Xabisa Indalo for Water activity
- Strengthen participatory and social learning approaches to ecological infrastructure for water security activity,
- Contribute to the broader objectives of improving Xabisa Indalo for Water security through reflection, monitoring and evaluation, reporting and scaling for impact.

The course requires all participants to interact with and contribute to the development of ecological infrastructure for water activity (of their choice and relevant to their own context of practice). To ensure that this occurs, the primary method of assessment for the course is a 'Change Project' chosen by the participant in consultation with stakeholders, partners or colleagues that they work with. The Change Project links theory and practice by giving participants an opportunity to advance their knowledge and skills and to put this learning into practice in their own context.

Course orientation

Box 3 below carries the course introduction and orientation to the modules as presented to the participants in the course orientation text. It gives an overview of the final course structure and an overview of the content and intended outcomes of the course.

BOX 3: COURSE ORIENTATION (as shared with course participants)

INTRODUCTION

The course will focus on a number of contemporary 'Xabisa Indalo for Water' activities, which are mostly done in collective groups of people, sometimes involving a diverse range of partners, not all of whom may have a strongly shared understanding or interest in the activities. The course allows working professionals to improve their practice through a 'work-together' (during the training sessions) and 'work-away' (in the workplace with others) model. The course adopts a social learning approach that helps to develop shared understanding and capacity for change towards greater water security in our catchments.

There are three main types of Xabisa Indalo for Water activity that we will focus on in the course which are:

- Policy, Planning and Governance activity
- Investment and Partnership activity
- Monitoring into Management Action activity

Each of these types of activity have a range of smaller practices or associated activities. For example, the policy, planning and governance activity may involve land use planning, or development of catchment management plans, or improving Integrated Development Planning, developing new policy, strategies, legislation and by-laws where necessary. These are needed at all levels of the system, and everyone can participate in this activity. When it comes to investment and partnership building activity, there are approaches such as water fund modelling and feasibility studies, water taxes and water pricing, payment for ecosystem services and more. Similarly, when it comes to monitoring and management action activity, there are national monitoring tools such as Natural Capital Accounting that are gaining strong traction, and other types of monitoring such as community-based water quality, or biodiversity monitoring. Management actions here are for example, rehabilitation actions, or pollution control actions. From this we can see that there are many different ways to get involved in securing ecological infrastructure for water security in South Africa.

The course will offer a range of opportunities for participants to expand and further develop Xabisa Indalo for Water activity with others. Participants will all be engaged in an Xabisa Indalo Change Project, which they will develop over the different modules of the course, starting with a review of existing activity, moving on to develop a deeper understanding of the benefits and challenges of the activity and how it could be expanded, and then moving on to working out how to practically engage with others to further the Xabisa Indalo activity, and finally to monitor and evaluate the activity.

Text Box 1: overview of a change project

A Change Project is typically a collaborative process of changing, enhancing, expanding, reviewing or developing a Xabisa Indalo [valuing nature] **activity**.

By activity we mean a collective effort to do something substantive together over a period o
f time (e.g. develop a land use plan, a catchment management strategy, monitor a river, develop a water pricing mechanism, etc. This differs from smaller actions or practices that together build the bigger **activity.** For example, to develop a land use plan, you may engage in a number of smaller actions or practices such as GIS mapping, public consultation, biodiversity assessments, etc. ALL of these actions are needed for the bigger activity.

The Xabisa Indalo Change Project will be supported by course sessions, online and offline course activities, a rich resource 'pack' of materials and tools that can be used to advance Xabisa Indalo Change Projects and activity. The course sessions will be organised into four modules as outlined below, and will follow an expansive learning cycle as shown in figure 3 below.

OVERVIEW OF THE COURSE MODULES

The Xabisa Indalo for Water course is structured as four interrelated modules. These modules allow for local adaptations and ongoing review of Xabisa Indalo activity. Importantly the course is explicitly structured to support each and every course participant to engage pro-actively in Xabisa Indalo activity of some kind or another through a Change Projects process as explained briefly above and in the Xabisa Indalo Change Project Guidelines Document.

- **Module 1: Background to ecological infrastructure for water security [Xabisa Indalo for Water] in South Africa**

This module starts by sharing a history of the work that has been done to develop ecological infrastructure as an important policy and practice concept for 'Xabisa Indalo for Water', and why it is needed in South Africa. The module shares some of the more well-

known facts about water security and related challenges in South Africa, and explains how giving more attention to ecological infrastructure has become a significant national response to our water challenges. Developing the concepts and practices of ecological infrastructure has involved a number of large-scale national projects, and has involved substantive research and partnership development. Over time the early notion of ecological economics was transformed into the concept of ecological infrastructure as this helps to indicate that Xabisa Indalo for Water is not just about financing, although this is a very important part of securing ecological infrastructure for water security. It also includes a range of other types of value, such as social and cultural value and intrinsic ecological value which is not always easy to cost or quantify, but is nevertheless of huge value. This module will also introduce some of the current large-scale ecological infrastructure for water security projects and programmes in South Africa that are operating at national level and in catchments, which indicates that Xabisa Indalo for Water activity occurs at multiple levels and scales. The module also briefly introduces the three types of Xabisa Indalo for Water activity that we focus on in Module 2 in more depth.

The intended outcomes of this module are:

- Demonstrate an understanding of the history of ecological infrastructure for water security in South Africa and why it is needed?
- Explore and reflect on key ecological infrastructure financing / investment, policy and planning tools and their relevance to own practice
- Identify a key ecological infrastructure activity most relevant to your sphere of influence and workplace interest (Choose from Policy Activity, Investment Activity and Monitoring Activity)
- Critically consider current challenges and issues related to ecological infrastructure for water security in your catchment and context
- Explain why a partnership and social learning approach can (better) advance ecological infrastructure for water security in your context

Module 2: Advancing ecological infrastructure for water security [Xabisa Indalo for Water] activity in South Africa

Module 2 provides more insight into three main types of ecological infrastructure for water security activity. The module looks at a range of different options that are possible for developing these three types of activity. As indicated above in the introduction, we focus on three main types of Xabisa Indalo for Water activity in the course which are:

- Policy, Planning and Governance activity
- Investment and Partnership Building activity
- Monitoring into Management Action activity

Firstly, when it comes to **policy activity**, we elaborate policy decision making on 1) sources and methods to use to collect payments/funds/revenues, 2) investing collected and other funds into the rehabilitation and building new ecological infrastructure, and 3) strategies to engage private/public sector donors/investors to fund raise for the rehabilitation and building of old and new ecological infrastructure. These forms of policy decision making structure planning and governance activity in specific ways.

Secondly, when it comes to **investment and partnership building activity**, we elaborate the different tools for assessing value, including financial and investment value. Natural Capital Accounting helps governments to identify natural capital assets, which informs policy and decision making around investment including for example protection investments. There are also other valuation processes or methods, besides natural capital accounting (e.g. water funds) that are used to identify benefits from natural assets, making these important forms of Xabisa Indalo for Water activity! The module also shares insight into how different payment sources and methods such as water pricing and payment for

ecosystem services, are used to finance the benefits received from natural assets. Most often these arrangements require new kinds of partnerships, hence we emphasise partnership building for collaborative financing in public-private partnerships, or co-operative funding arrangements, or sustainable value creation initiatives which include the creation and recognition of other forms of value other than financial arrangements only (e.g. community participation in water quality monitoring may not be a financial investment in 'dollars' but it is a significant social investment on the part of the communities concerned).

And lastly, when it comes to **monitoring and management activity**, we elaborate the important role that investing in both monitoring and management activity has for Xabisa Indalo for Water. We look at different types of monitoring activity (e.g. large scale biodiversity assessments, e.g. the National Biodiversity Assessment, Green Drop and Blue Drop water monitoring, monitoring of land degradation and loss of soil, etc.), as well as national forms of monitoring of ecological assets and funds (e.g. NCA by StatsSA). We also include catchment level monitoring activities for example by CMAs and WUAs, as well as local government monitoring of effluents from water treatment plants, and water resource governance. And we include monitoring practices that involve the citizen sciences, youth movement, and government employment programmes that stimulate new forms of monitoring activity (e.g. Amanzi Ethu). With regards to management activity, we cover especially prevention activities such as pollution control, effluent management, sustainable land use management, stewardship, and response activities such as restoration and rehabilitation, biodiversity management, compliance enforcement, etc. We consider some of the major national investments in these activities (e.g. EPWP NRM programmes), and also new models of investing in these activities (e.g. collaboration within networks such as the UIEP).

Participants will be invited to examine their own forms of ecological infrastructure for water security activity and will be encouraged to focus on one or more of the above activities in a process of expanding or further developing Xabisa Indalo for Water!

The intended outcomes of this module are:

- Identify and describe the stakeholders and main actors currently involved in the activity
- Describe the start and evolution of the activity so far
- Identify current influences, plans and achievements shaping the activity
- Review the efficacy of the tools / resources / partnerships, etc. that you are already working with
- Identify gaps, challenges, tensions and opportunities for advancing the EI activity

Module 3: Expanding learning, value creation and networking

This module crucially considers the opportunities and constraints associated with advancing Xabisa Indalo for Water activity. The module however, does not get stuck on articulating problems and challenges, rather it offers ways of considering 'what to do when there is a challenge or a constraint'. In particular, it emphasises the power and importance of partnerships and learning together 'what is not yet there' and 'what can be done'. Even the smallest action is better than none, and undertaking small actions with others can amplify even the smallest action. This brings methods of stakeholder engagement, stakeholder mapping, partnership and relationship building and social and expansive learning to the fore. The ecological infrastructure for water security programme has developed a useful set of social learning tools that we will share with course participants in this module. These include: convening and co-ordinating Xabisa Indalo activity, clarifying context, engaging and analysing tensions, building networks, clarifying ideas and options that are important to the advancement of the Xabisa Indalo activity. The

module also shares approaches to improve learning together, and sharing of knowledge and experience with others. It also provides tools for pro-actively creating different types of value with others. Participants will be involved in practical aspects of advancing their Xabisa Indalo for Water activity with others using these tools and approaches.

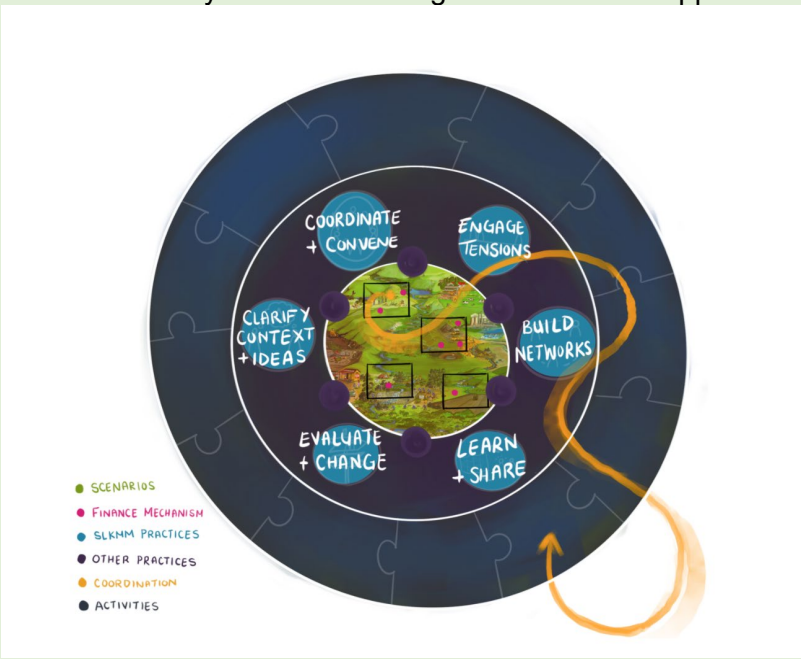


Figure X: The six core Six core 'Strategy Practices' which together form the strategy framework for Social Learning, Knowledge Management and Mediation (SLKMM) in the EI4WS project.

The intended outcomes of this module are:

- Describe how you would respond to the identified gaps/ challenges/ opportunities for advancing the EI activity.
- Identify who else (other stakeholders/ partners) needs to be involved in the response, and how you will involve them in learning co-learning to advance the EI activity
- Identify a doable action-activity, and implement it in collaboration with your others
- Describe the different types of value is being created for stakeholders through their involvement in EI activity
- Reflect on how the values created for stakeholder groups can be expanded/ scaled in different EI management action

Module 4: Monitoring, evaluation and scaling for impact

In this module we reflect back on the other three modules, and on the advancement of shared ecological infrastructure for water security activity. The module offers practical tools for monitoring and evaluating the development of Xabisa Indalo for Water activity. We focus on the value that is created for different stakeholders in the process of co-developing the activity, and we also focus on the outcomes in terms of advancing Xabisa for Indalo for Water activity in South Africa. We invite participants to consider what in their activity can be shared more widely, especially with national partners and local / regional / catchment networks who are supporting ecological infrastructure for water security. Last, but not least, we invite participants to consider what they may take forward in order to 'scale their work for impact'!

The intended outcomes of this module are:

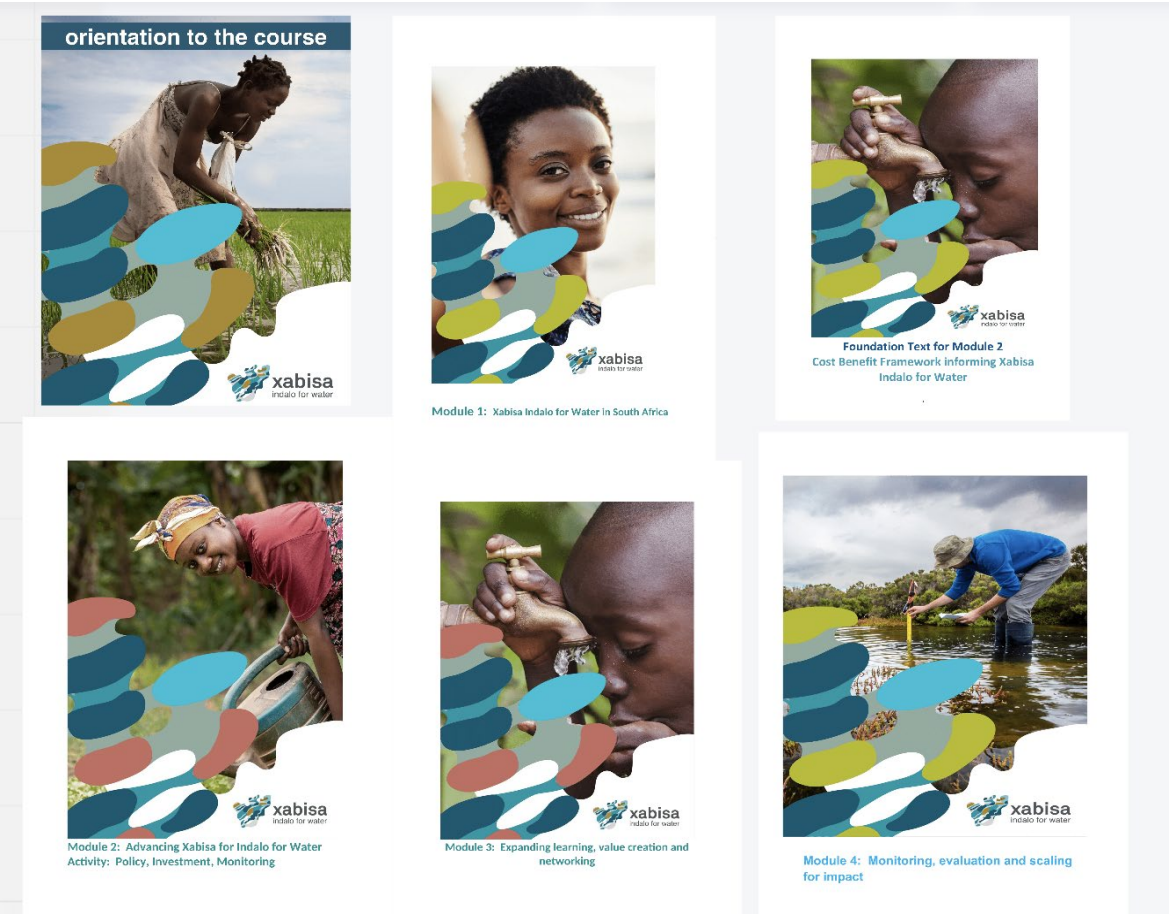
- Reflect on what you have learnt/ has change in your EI activity as the result of the course

- Explain if and how your stakeholder networks/ CoPs developed to expand the EI activity
- What you do next/ identify as key priorities your activity going forward,
- Is there anything significant that you could share with GEF, SANBI, WRC who are coordinating EI4WS at national level,
- Based on your reflections, would you have done anything differently in your change project

Structure of the course materials

The Xabisa Indalo for Water course is structured as four interrelated modules. In each of the modules participants will have the opportunity to engage and work through the following:

- A **core text** which provides a broad overview on the content of the module and provides references to additional materials that participants may want to read to gain more insights on a particular concept; project; programme or any other linked information relevant to the module.
- A **case study example** to help participants learn more or understand better how some aspects from the core texts are applied in reality or in a real-world context.
- **An assignment to** help participants build their change project and to broaden their participation by anchoring key concepts, ideas and issues related to their ecological infrastructure for water security activity.



In addition to these materials, each module will contain a resource pack which contains extra reading and or visual material, references to key documents which are packaged to access through a link.

Change project assignment, assessments and certification

The Xabisa Indalo for Water Change Project will be developed in four phases with one assignment per module. The assignments are designed to assist participants to focus on specific aspects of the entire Change Project as they work through the modules. The assignments are:

Assignment Tasks:

- Assignment task 1 (At the end of Module 1): Develop a contextual profile to identify relevant EI4WS activity(ies) in your context of practice
- Assignment task 2 (At the end of Module 2): Identify and describe the current status, challenges and opportunities for advancing an EI activity of your choice

- Assignment task 3 (At the end of Module 3): Practically engage with your group to implement advance/ change an aspect of your EI activity, and identify the value that was created for them
- Assignment task 4 (At the end of Module 4): Complete the monitoring and evaluation workbook in module to reflect on your experience and progress Xabisa Indalo for Water change project process and the value that was created.

Course assessment and certification

The Xabisa Indalo for Water course will be offered as a short course under Rhodes University. The accreditation process is currently in process. The assessment of the course was developed in the piloting process, and involved adapting a model of assessing most significant learning, based on the Change Projects of course participants. Time did not allow us to finalise all of the course assessment by the time of this reporting. This process is therefore also still underway. Preliminary assessments from the first pilot in uMngeni catchment where participants shared their change projects as journeys of change can be accessed on this link: https://drive.google.com/file/d/1kEmuiMdOeFXf_mKfQcuMDGfIRi3_HATK/view?usp=share_link

Course piloting

The course-in-development was piloted in two sites. This means that we piloted aspects of the course as it was being developed in two very different contexts with a view to learning about its features and implementation in order to inform a more fully developed course that can be rolled out into other catchments or that can be more widely applied in the two demonstration catchments of the EI4WS project. The two pilot sites were:

1. the uMngeni catchment (towards the end of 2021/early 2022 to coincide with Phase 2 of the Amanzi Ethu Nobuntu (AEN) Programme (PES Funded). Here the focus was on integrating the emerging course ideas into the Amanzi Ethu Nobuntu programme as identified in the TNA. This involved adapting some aspects of the course to the programme and context, as will be outlined below. This pilot helped to develop the course processes and some of the tools used in the course such as the assessment framework were tested. This pilot was particularly useful for strengthening the **monitoring into implementation activity** insights for the course.
2. the Berg-Breede catchment (towards the end of 2022 / early 2023). This pilot used the course as almost fully developed. In this pilot we worked with the foundation materials

on economics – developed in support of Module 2 – to strengthen the economics dimensions of investing in EI4WS. This pilot course was particularly useful for strengthening the investment, policy and governance insights for the course.

3.3 Course Pilot 1: uMngeni Catchment with focus on monitoring activity (Amanzi Ethu Nobuntu)

Background and context of the pilot

The following section outlines the course training activities implemented through an existing catchment wide programme in uMngeni catchment-Amanzi Ethu Nobuntu. This pilot was undertaken in the initial stages of the course design and development. The pilot was conceptualized to align with Phase 2 of the AEN programme, where DUCT received PES Funding to train 500 EnviroChamps in more than one catchment to undertake EI4WS activities, with emphasis on monitoring to inform improved catchment management. As the AEN was seeking support to develop and strengthen the training that they would be offering the new and existing EnviroChamps, the Rhodes University team agreed to work with the managers of the AEN to offer accredited training to the graduates who were employed by the AEN to provide training to these EnviroChamps. The graduates fell mainly into two groups (with the third group of project officers recruited later to support the team management):

- River Rovers (they undertook field training and support of EnviroChamps), and
- Data Detectives (they undertook work to collate the monitoring data captured on a mobile app by the trained EnviroChamps and share it for informing management actions)

Background to Environmental Champions and Amanzi Ethu

The uMngeni River Basin faces significant water resource management challenges. Some of these challenges are climate change, land transformation, compliance and enforcement, governance failures, solid waste management, agricultural intensification, water supply and alien invasive plant infestations. The challenges are not unique to the catchment. Unfortunately, these challenges are usually connected to complicate and amplify water resource problems within the catchment. It was this context that resulted in several efforts by various stakeholders to address, lessen and improve the water resources management challenges of the catchment. These stakeholders are varied and reside in and out of the catchment: UEIP. The uMngeni Ecological Infrastructure Partnership was formed in 2013. It is made up by more than 20 signatory partner organizations that represent ecological interest entities in the greater uMngeni catchment. Its role is one of collaboration, strategy development and research.

The Enviro Champs (EC) Programme

DUCT is a pioneer of the ECs model and has gained vast experience and knowledge in mobilizing, leading and implementing projects. The Enviro-Champs initiative was born in Mpophomeni, Howick, out of a partnership between uMgungundlovu District Municipality (UMDM) and DUCT (funded by Expanded Public Works Programme) and has been running since November 2015. The main aim of the initiative is to reduce pollution, especially to stop sewage flowing, in the uMngeni catchment and especially Midmar Dam.

Twenty (20) ECs (members of the Mpophomeni Community) worked on this project from Nov 2015 to September 2018. It is remarkable that over 7 000 households were visited by these ECs, as part of the door-to-door community education programme since the 1st of November 2015!

These ECs had a weekly programme that included a day for training. This training included:

- Environmental issues such as ecology and climate change
- Administrative skills, e.g. report writing and reporting,
- Technical skills such as the use of citizen science tools and replacing a tap washer
- Personal development such as financial management

The rest of the week was dedicated to a programme that is specific to the group. Each EC knew what is expected of them every day of the week. Some of the key activities by the ECs are:

- Invasive alien plant control
- Waste management
- Door to door community environmental education
- Sewer Monitoring and Field survey/GEO ODK
- Measuring and reporting freshwater leaks
- Measure, audit, and clean-up illegal dump site
- River walks and citizen science tools
- Testing of Howick Wastewater Treatment Works outflow
- Speak to a range of stakeholders from councillors, plumbers, government employees, municipal managers to friends and neighbours
- Support school Eco clubs

The work of ECs requires healthy, strong, hardworking individuals. ECs are generally recruited through word of mouth and through community structures, e.g. Councillors who are provided with the requirements, e.g. age, gender and location of project. In a few areas such as Vulindlela the opportunity was also advertised, and interviews held.

For fairness, to avoid conflict and nepotism, community structures (Councillors and Traditional leaders) are usually requested to provide names. They have systems that are known and accepted by residents. This is important since it helps the relationship with the project implementor who will not start working under accusations of, e.g. discriminating against some individuals. While most ECs only have matric, some have tertiary qualifications.

In the first quarter of 2021, the UEIP partnered with the Department of Science and Innovation (DSI) to run a 3-month employment stimulus project. The project brought together numerous UEIP partners who provided co-funding and enrolled 300 unemployed youth (Enviro Champs (ECs)) to undertake varied work including removing solid waste, reporting sewer spillages, monitoring river-health and clearing invasive alien vegetation. In the last quarter of 2021, the project was extended with a few changes. One of the changes was in the type of youth employed. The first phase had identified some gaps in the operational structure. To address this identified gap, a new structure for Enviro Champs was proposed – Amanzi Ethu Nobuntu, and the eventual second phase of the employment stimulus project.

As a result, DUCT ECs (and Project Officers) that were recruited into AEN already had some training and experience in the above tasks. The EC initiative has since been adapted by other areas and organisations. The POs and the ECs were trained by the DDs, Rovers as well as by their respective organisations. The DUCT group of ECs was selected as the focus of this report. There were 11 teams each with 10 members.

For uniformity within the programme a training programme was developed that would enable the entire group of ECs to meet their AEN obligations as well as those of their respective work teams. The focus for AEN was:

- Citizen science tools – As with DDs, Rovers and POs, all ECs had training in the use of identified citizen science tools: mini-SASS, turbidity clarity tube and the streamflow velocity plank. Since the ECs would all be field workers and therefore play a key role in data collection, it was necessary that they have a good understanding of the purpose and use of the various citizen science tools as well as how they facilitate river health monitoring and assessment.
- Field survey – since ECs would be involved in most of the monitoring and data collection it was necessary that they learn and understand the different data management processes and tools. For this project, Field Survey was the application (app) identified and selected for data collection. As with all other groups, ECs were trained in using the app. ECs in some of the teams had additional training of which

converting waste to useful items and Personal Development and Career Mentorship were considered very useful. Especially the personal development training.

Amanzi Ethu Nobuntu translates to "*our water and humanity*" and was birthed from the extensive collaborative citizen science monitoring work done by Environmental Champions from a township known as Mpophomeni together with uMgungundlovu District Municipality.

This phase was a window of opportunity for DUCT and the Environmental Learning Research Centre (ELRC) to begin the piloting of the course in the uMngeni catchment. It was also an opportunity to test concepts developed through the P4G (Partnerships for Green Growth and the Global Goals) project looking at business cases for investment in ecological infrastructure (especially a blended finance model) and WRC work on upscaling community-based water quality monitoring practices.

The course pilot was with the 25 Data Detectives (DDs) and the River Rovers (Rovers) only. The trained youth (DD & RR) later trained the Project Officers (POs) and the Enviro Champs (ECs). From the graduates trained, 17 change projects were presented by the end of the pilot. Some of the graduates collaborated on their change projects. The 3-month pilot was used to collect data on rivers; service delivery issues in communities and stories of change where possible. A key difference between Phase 1 and Phase 2 of the AEN was the greater focus on training, especially the training of trainers (graduates) who were employed to support the 500 EnviroChamps in the catchment with their EI4WS work.

AEN Programme Objective and Approach

The purpose of AEN is to strengthen the use of citizen science tools to encourage active citizenry and institutionalize a practice of working for the common good in water resources management. By so doing, citizen science becomes a driving force for securing (i) ecological infrastructure for water security and (ii) employment opportunities for unemployed youth, thus also enhancing EI4WS monitoring activity. The work was actualized through a partnership model, that was also developing a blended finance model, implying the need for investment where projects across a catchment work collaboratively towards a common vision.

The Amanzi Programme is an **innovative** social, economic and environmental programme fundamentally framed as a community-private-public partnership programme. The programme is unique in contrast to other government led social programmes in that it is not solely skills driven, but aims to thrive on building networks and partnerships around practices. In addition to this, the implementation of the programme is strongly founded on a co-/**blended financing**

model. The blended finance model seeks collaborative funds as a source of enabling EI4WS activities, in this case monitoring and management action activities. The AEN blended finance model was of interest to the Xabisa Indalo for Water team, as they were able to observe this model in development as the course unfolded. It produced a useful case study for the second pilot of the course.

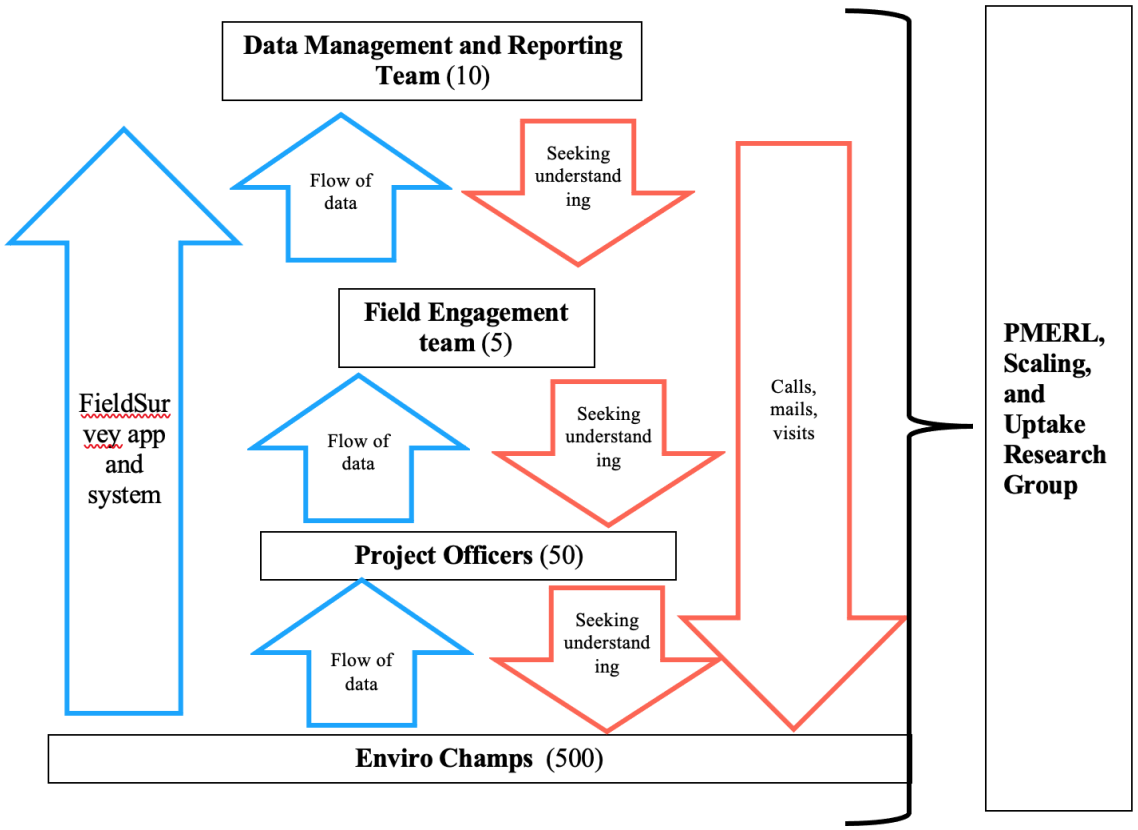


Figure 3.2: Simple diagram showing the working relationships between ECs, POs, RRs(Field Engagement team) and DDs. These POs and ECs teams work in different organizations.

Practices within the programme

River health monitoring is the main activity/practice within the AEN programme. EnviroChamps work collectively (See Figure 3.2 and 3.3 below) on various activities contributing to improving the health and quality of river systems and the natural and physical environment. The teams are made up of:

- Data Detectives: This is the team that works mainly with the data collected by the teams working on site through a mobile application.
- River Rovers: Rovers are the field engagement team. They move across sites to engage with Champs and act as the citizen science technical support team for the Enviro champs across the catchment.
- Project Officers: POs manage teams across the catchment.

- EnviroChamps: generally made up of youth who have matric or less and are based at the various sites where partner organizations work. The work of EnviroChamps varies based on the organizational mandate and is not limited to the citizen science tools which is main to AEN DDs and RRs.

Activities within AEN are spread across the above roles and include:

- Addressing wastewater related issues;
- Work on restoration through alien plant clearing
- Environmental awareness campaigns
- River quality monitoring
- Capacity development of Champs

The programme allows youth to be capacitated weekly on various aspects; and become environmental activists in their environment. Through this unique approach of working, youth can develop a sense of being **response-able** individuals who can support their local municipalities as “collaborators” in service delivery issues. The use of digital platform for uploading data (sites cleared, species cleared, etc.) offers a relevant and efficient approach to data collection. This way teams on the ground can work directly with data management teams.

Facilitating social learning for EI4WS through the AEN Project

The Xabisa for Indalo course aims to support practitioners in the biodiversity, water and natural resources management (NRM) sector, and their partners (including active citizens, business organisations, etc.) who have an interest in securing South Africa’s ecological infrastructure for water security. To achieve this, we devised a participatory course that applies social learning theory in its methodology: Social learning is a **process** that (1) demonstrates that a **change in understanding** (ideas, meanings, values) and practice change (organizational, institutional, social, cultural, systemic), has taken place in the **individuals** involved; (2) this change transcend beyond the **individual to collective** and becomes **situated within wider social units** (communities of practice); and (3) occur through **social interactions and processes** between actors within a social network(s).

Within this phase of the AEN programme, a course-activated learning programme (broadly referred to as the ‘River Commons Citizen Science, Organisational and Social Learning Programme’ by AEN) was initiated for the youth practitioners who are environmental champions. As indicated this was done in Phase 2 of the AEN, which presented a window of

opportunity for two collaborating organizations (DUCT and RU)) to begin the piloting of the course in one of the case catchments: uMngeni. In this pilot, the idea of the change project to support change in the EnviroChamps practice was introduced, to strengthen young people's agency for change.

Developing monitoring activity through the customized course on citizen science monitoring

As indicated above one of the key types of activity being advanced in the Xabisa Indalo for Water course is monitoring activity. In the AEN, the main focus was on advancing practical citizen science skills, and support development of facilitating, reporting, and monitoring in the practice of river health monitoring and assessment. To develop this activity within and for the wide Xabisa Indalo for Water course, the Xabisa Indalo for Water team co-developed a citizen science monitoring course with GroundTruth and DUCT, customized for the AEN project, given the large numbers of youth. Our emphasis was on training the trainers, namely the Data Detectives and the River Rovers who were supporting the EnviroChamps.

For this we undertook several planning meetings with DUCT, and co-designed a sub-course within the Xabisa Indalo for Water course wider framework, that ended up being articulated into a customized set of short modules / course sessions (i.e. adapted the Xabisa Indalo for Water Course framework for this specific purpose). This was offered as an initial one-week training programme, with ongoing weekly follow up, and then supported by a second group reflection and MEL session, using the following framework that was co-designed with Rhodes University, DUCT and GroundTruth.

COURSE FRAMEWORK DOCUMENT:

CURRICULUM FRAMEWORK FOR: CITIZEN SCIENCE COMMUNITY MONITORING COURSE

The course framework combines social, economic, and ecological innovation, within a transformation innovation framework. The course was developed with the aim to support scaling of the enviro-champs programme nationally, creating a nation-wide movement of 'Mzansi's enviro-champs'; young people capable of working and learning for the common good in South Africa's living catchments. The course is currently being piloted through a programme called Amanzi Ethu-Nobuntu in uMngeni catchment and supported through Presidential Economic Stimulus. It seeks to catalyse a just recovery to the unemployment crisis, and the ecological crisis in two ways: 1) by creating and unlocking new work opportunities for young people with a substantive 'education futures' impact, and 2) address the fundamentals of sustainability, especially (but not limited to) improved monitoring and management of South Africa's water resources and catchment health.

COURSE STRUCTURE:

This is an accredited course offed as a level 5 and Level 6 short-course certificate. Level 5 is for enviro-champs/ monitors who have completed matric. Those who didn't complete matric can also access the course at level 4. And level 6 is for graduates (those with diploma/ degree)

The course is broadly referred to as in *River Commons Citizen Science, Organisational and Social Learning*. And it is cutely developed and offered in three streams:

- WORKSTREAM 1: Citizen Science, Organisational and Social Learning (*Riverhealth Monitoring & Field Management Specialization)- level 6*
- WORKSTREAM 2: Citizen Science, Organisational and Social Learning (*Data management & Reporting Specialization)- Level 6*
- WORKSTREAM 3: Citizen Science, Organisational and Social Learning (*Riverhealth Monitoring & Field Management Specialization)- level 4/5*

NB: IN ADDITION TO ATTENDING COURSE CONTACT SESSIONS AND ACTIVITIES, PARTICIPANTS AT ALL STREAMS WILL BE REQUIRED TO DEVELOP A SERIES OF CHANGE PROJECT ASSIGNMENTS IN ORDER TO SUCCESSFULLY COMPLETE THE COURSE.

COURSE OUTCOMES:

At the end of the learning programme, participants will be able to:

- *Provide substantial field-based expertise and training support for river health monitoring and social learning activities*

- *Provide relevant reporting to support communication and uptake of river health monitoring activities*
- *Engage proactively with participating catchment partnerships on field-based support, reporting, communication and social learning*
- *Show understanding of why South Africans need to care for their rivers*
- *Successfully report river health data using citizen science tools*
- *Engage community of practice members and other stakeholders in river health monitoring activities and actions*
- Understand the integrated approach to citizen science monitoring, in which different stakeholders and partners work together for common good.

COURSE MODULES AND PROCESS

MAIN FOCUS: *Advancing practical citizen science skills, and support development of facilitating, reporting, and monitoring in the practice of river health monitoring and assessment*

1. MODULE 1: UNDERSTANDING OUR RIVERS
   Understanding of biodiversity, water and river health challenges and opportunities for change –

2. MODULE 2: ECOLOGICAL LITERACIES
   Understanding basic ecological principles for, and of river health within a social-ecological systems / catchments perspective -

3. MODULE 3: USING CITIZEN SCIENCE TOOLS AND APPROACHES FOR MONITORING
   Understanding the purpose and use of various citizen science tools and how they facilitate river health monitoring and assessment – Some of the citizen science tools we focus on include: Mini-SASS activities, Turbidity clarity tube test, and Streamflow velocity plank

4. MODULE 4: DATA MANAGEMENT AND REPORTING
   Understanding different data management processes and tools; data analytic methods; digital spatial data collection tools; Monitoring tools for management action

5. MODULE 5: STAKEHOLDER ENGAGING, NETWORKING, AND PARTNERSHIPS COMMUNITIES AND STAKEHOLDERS
   Explore approaches for transformative and organisational learning, learning together, and knowledge sharing. Tools for pro-actively creating different types of value through citizen science monitoring

THE LEARNING AND REFLECTION PROCESS IS FURTHER DEVELOPED THROUGH A CHANGE PROJECT ASSIGNMENT AND WORK-AWAY-TASKS. And ongoing monitoring, evaluation and learning to expand and scale citizen science practices in communities, organisations and catchments. Participants will also be given learning materials

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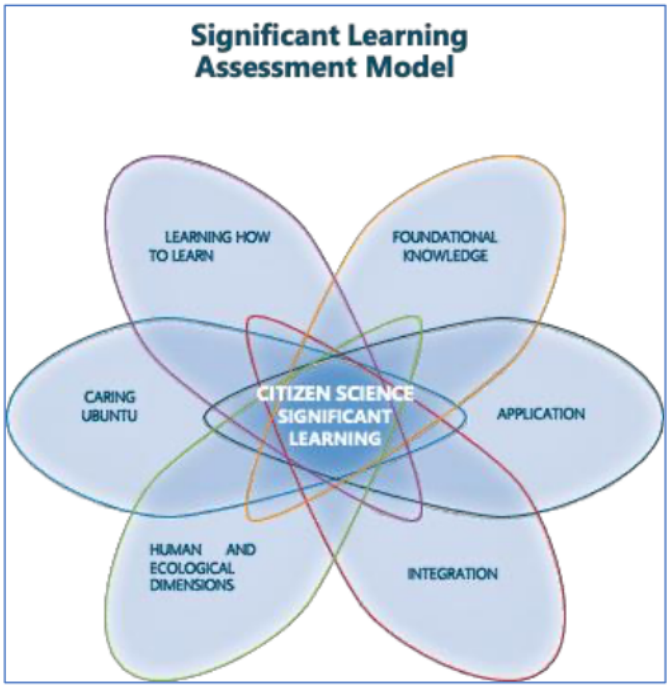
ASSESSMENT FRAMEWORK:
The course will use the significant learning assessment model to evaluate learning progression of participants in course activities and change projects.



Attribute	Assessment questions
Foundational Knowledge	Can participants identify, critique, understand, and describe the water quality or water management issue? Can the learner use systems thinking to develop foundational and in-depth understanding of water and catchment river systems issues?
Application	Can the participants analyse, and apply knowledge to solve problems in relation to

	catchment rivers and water management matters of concern in a particular context?
Integration	Can the participants describe, synthesise, and align different types of knowledge(s), values, and skills in order to contribute to problem solving and change processes?
Human and ecological dimensions	Is the participant able to show care and concern for the human and the ecological dimensions of water-based life, and show the ability to relate well to others and the world around him/her?
Caring ubuntu	Can the participant reflect on a situation and show ubuntu, empathy, and compassion for self, community, and the other life-forms around him/her
Learning how to learn	Is the participant able to critique, evaluate, review, formulate, and generate new ideas and suggestions for change?

Piloting a 'sub-course' as part of the wider initiative to develop the Xabisa Indalo for Water course

Initiating a citizen science and river health monitoring social learning 'sub-course'

The customized 'sub-course' on citizen science and river health monitoring, developed for the Amanzi Ethu Nobuntu / EnviroChamps context, combines social, economic, and ecological innovation, within a transformation innovation framework. The intention was to co-design this course with GroundTruth and DUCT for wider roll out at a national level for citizen science training and for expansion of the possible nation-wide movement of 'Mzansi's enviro-champs'; young people capable of working and learning for the common good in South Africa's living catchments. This programme was 'in motion' and linked EI4WS to catalyse a just recovery to the unemployment crisis, and the ecological crisis in two ways: 1) by creating and unlocking new work opportunities for young people with a substantive 'education futures' impact, and 2) address the fundamentals of sustainability, especially (but not limited to) improved monitoring and management of South Africa's water resources and catchment health. We therefore designed this course as an accredited learning programme for young people to participate in

at different levels. Ground Truth developed an online platform where learning materials can be accessed by the course participant, and the RU team provided conceptual and training of trainers support.

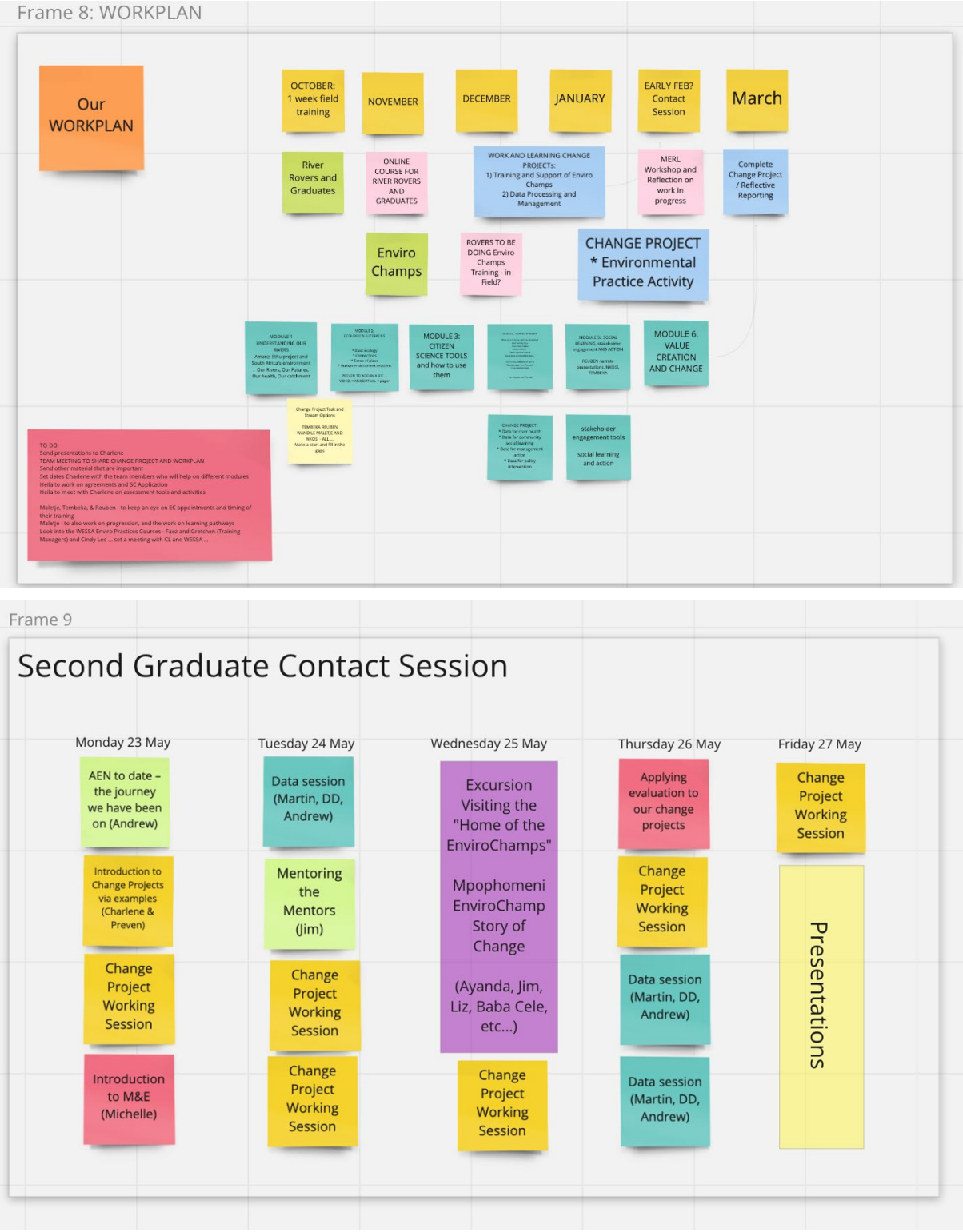


Figure 3.3: Collaborative planning of the course and sessions using Miro board

To initiate the course piloting, an initial onboarding training was facilitated with youth graduates who work with the data collected by the field-based cohort of enviro-champs. In this onboarding process the focus was on Module 1 where we dealt with the following content:

- Eco-Literacy (Understanding our rivers as systems)
- Using citizen science tools and approaches for monitoring
- Introduction to Learning Pathways and stakeholder engagement processes
- Introduction to the Mentoring Process of young professionals in the environmental sector
- Working with Data differently

The course was developed with the EnviroChamps practices in mind. The above modules were adapted to suite entry level (new) practitioners and was then also further adapted by GroundTruth and the River Rovers to suit the EnviroChamps' programme which was implemented by multiple organisations in the uMngeni, hosted and guided overall by DUCT.

The Xabisa Indalo for Water supported a sub-course which was essentially a Training of Trainers programme that also helped to develop a wider course for EnviroChamps, was offered to a group of graduates who were employed under the AEN programme as River Rovers and Data Detectives, with the explicit task of training and supporting the 500 EnviroChamps that were being appointed into the programme across a range of diverse organisations under the blended finance model that was in development. Participants in this group were 25 graduates (see Figure 3.4 below).

Figure 3.4: Group photo of participants of the first onboarding field-based training on Monitoring into management action activity

The images below show some of the training in practice, with the main one-week training programme being co-facilitated by DUCT, GroundTruth and the Xabisa Indalo for Water course developers (see Appendix A).

Figure 3.5:Citizen science tools field-based learning activities with river rovers, data detectives & project offices

Figure 3.6: Data Detectives (EnviroChamps) work collaboratively through various stages of the programme

To support the course participants, there have been ongoing support meetings to the EnviroChamps as a way to facilitate continuous reflection and learning. This is an important aspect to ensure the learning continues and progresses over time. Similar to the Xabisa Indalo for Water participatory course design, this pilot is applied to a scenario where EnviroChamps "work away" on various activities in the programme and "work together" with the team. In this pilot, the RU team also worked extensively with EnviroChamps who work regularly with the data submitted through their digital platform (*Monitoring into Management Action activity).* As the Champs begin to understand how the data are collected, we have introduced the idea of different data purposes to emphasize the need for a data management plan. This is to

- Explain Management and Analysis processes for Amanzi Ethu Nobuntu (AEN)
- Introduce the AEN Data Management and Analysis Plan
- Learn how data can be used for different purposes
- Understand and explore the concept of river health through data analysis

Figure 3.7: During the course pilot, EnviroChamps work on activities individually and again as a collective to support learning throughout the programme

The above sessions were supplemented by weekly meetings to address any issues the data team may be having and to reflect on the processes of work. We identified this as an important innovation in support of translating monitoring data into management action, in other words, it was key to more fully developing monitoring activity, as previously in Phase 1 of the AEN data was collected by youth on the Field Survey app, but little was done with the data.

Main outcomes of the course

An online course linked to the Xabisa Indalo for Water main course

An outcome of this process was the co-development of an online course for citizen science river health monitoring which can be implemented in an ongoing manner by GroundTruth. This course was developed with support from the Xabisa Indalo for Water team, especially the curriculum framework (see above) and the approach to Change Projects. Charlene Russel, who was leading this programme, worked with Reuben Thifulufhelwi, Maletje Mponwana, Preven Chetty, and Martin Micklesson (RU Xabisa Indalo for Water and River Commons research team) to co-design and pilot the course, with support from the SKLMM project lead: Prof Heila Lotz-Sisitka and Dr Jess Cockburn, and WRC staff Michelle Hiestermann and Roderick Juba.

In this pilot, we developed a training course for the Training of Trainers, those who train the EnviroChamps, namely the Data Detectives and River Rovers. By having champs who work in the same programme learning together, we intend to use this setup to inform planning for the course and similar programmes where the course can be implemented in future. We are anticipating that GroundTruth will continue to play a lead role in providing this citizen science training, and in future a learning network would need to be put in place to expand the network of providers for this training. Thus, part of our contribution in this Xabisa Indalo for Water pilot was to support a new training programme that could be offered as an extended option out of the main Xabisa Indalo for Water course. In the process, valuable insight was gained into monitoring activity, and how to develop this activity via training and social learning processes.

As part of the ongoing MEL work, the team undertook *midway reflections* and again conducted reflections after the change project presentations were done. Insights from the evaluations indicate varied process and programmatic aspects to consider for the further implementation of the course and for the learning process in general.

uMngeni Course Pilot Reflections

- **Onboarding takes time even beyond the contact sessions**

In the first onboarding sessions with course participants, there was a need to spend adequate time planning with the participants and start visioning as the course has continuity implications, i.e. change projects do not end per say, but evolve over time. With this pilot, it was required of the host organization to spend time orientating participants to the programme and that meant the course facilitators had to continue engaging with champs to understand their practice and to align efforts as there are two processes that are always running: i) working on a practice and ii) working on the course.

- **The idea of change project can be intimidating, and participants requires scaffolding**

What is unique in this pilot is that we worked with graduates who are new into the sector, world of work and have little to no work experience. Some of the existing EnviroChamps were familiar with change stories yet the graduates were concerned particularly with the vague understanding of the assessment process of the change projects. The idea of a structured change project needs to be articulated to emphasize that it has a learning component that is attached to a practice – and not a course to be completed for the sake of a competence achievement. EnviroChamps felt overwhelmed by their work and felt that the change project

may be too much in addition to their current workloads. This required better mediation of the Change Project as a process that is part of their work, rather than an additional task.

- **Regular feedbacks act as a useful learning and reflection tool for facilitators**

Working with the Data Detectives directly has highlighted the need for continuous engagements (even if remote). Through regular reflection meetings, it was easier to highlight key issues as they emerge. This was a valuable experience in the course and allowed a process of co-developing solutions to support participants.

Reflections from participants:

- Time requirements from the training teams
- Who should be involved, how, when,
- More commitment from the management team – strategic directions/ delegation
- Content branding and acknowledgement of authorship and facilitation
- Course developed by Rhodes University, GroundTruth, Uppsala University – needed more time for planning and set up processes and follow through processes

What needs to be improved – Process wise:

- Art activities (games) that are contextualized: team develop games before hand
- Mixing and reshuffling of groups
- Need for individual activities/ presentations
- Change project – identify a key learning river health issue (citizen science & data) – Identity environmental issue, interview people, how can we engagement with people
- Need more examples from the field.

There is also a need for follow-up Training with Rovers and Data Detectives (These are two groups from the cohort of EnviroChamps). There was a request for putting more emphasis on practices that participants are engaged in in an ongoing manner.

Change projects

A second training workshop was co-hosted by RU and DUCT approximately four months after the EnviroChamps programme was into its second phase. This was to support the trainers to share their Change Projects and also to introduce the 'assessment of significant learning' into the programme. One of the challenges we were addressing here, was that some of the River Rovers and Data Detectives were not sure about the parameters of a Change Project, and how to go about sharing it. We therefore encouraged presentations and less formal

approaches to sharing an analysis of the changes that the trainers had implemented along their pathway. The Rhodes University team, together with DUCT and GroundTruth captured some of the outcomes of this process. The Change Projects have also been captured by DUCT as 'significant change stories'. The change project was comprised of smaller tasks along an emerging learning pathway in which the Enviro Champs worked with a defined environmental issue of choice.

Change Projects as personal journeys of development and learning

"sometimes it's the journey that teaches you more about your destination" – graduate opening statement"

The graduates were offered space to present their journeys of change through AEN. In these presentations, graduates reflected on their learning journeys through the programme as individuals and as a collective. In the presentations made, there was a common thread of references to specific events, or moments in learning that were meaningful to the graduates. Graduates were expected to reflect on how they joined the programme; the key activities they were involved in; their journey of change and what they could improve if given the chance. Reflections were unique but in summary, the main themes reflected upon were: graduates valued teamwork as a catalyst for enhanced co-learning; new technical knowledge was acquired; graduates learned about social processes of engagement; learning was applicable, and the personal development programme (A2B) implemented by DUCT as a complementary programme to the Monitoring Training of the EI4WS training served as a key part for personal development.

Key learnings from River Rovers and Data Detectives

a. Graduates appreciated the ability to work and contribute to the team effort

The use of the phrase "power-partner" was used a lot by different groups referring to a particular team member they had identified as complementary [whom they resonate well with] to their journey of growth and development. In most instances, this made it easy for graduates to embrace their abilities and tap into team members' abilities in order to get work done. Here are some of the descriptions capturing this:

"Teamwork is key. I learned a lot from this team, I can reference different attributes about my teammates. One person would say – you do not have to always say something. Another of our teammates is all about the people, so each person played a pivotal role in my growth. I realized that in the end we are all learning".

"The amount of peer to peer learning we had was good. We would have in house training as DDs, and we would train each other on"

"All trainings came with challenges that enforced change. I felt empowered in the first week of training. My anxiety was at its peak in the first week of training. But working with a unified team assured my capabilities. In addition we received a complimentary letter of thank from the uMngeni E. Champs team"

"I would have the River Rover and Data Detective teams working more closely together, if not completely as one larger team. Teamwork makes the dream work, and teamwork caused us to find a stonefly!"

Participants learned from each other by working collaboratively and in so doing are able to capitalize on each other's strengths. Co-learning happened when team members understood the value each member brought to the team and thus work was done effectively.

b. Graduates learned a lot from the champs who they were tasked to train.

Data Detectives unlike River Rovers spent most of their time working with data coming in through the field survey app. The field visit in particular exposed many to the context where they agree was an insightful learning experience that revealed more than what the data was showing. The training of EnviroChamps was also a learning process for the graduates and they appreciated the wealth of knowledge that came from the champs.

"We facilitated change through the trainings. We had a lot of roles such as administrative roles and facilitation roles. It was through the training where we were learning a lot. We titled our trainings – "training of trainers" when we realized we were trained and mentored to be ready and go into the space and had a role of training others. While we were enabling the Champs, we were learning ourselves. For example we found that a lot of the EnviroChamps taught us so much. in one of the rural areas where champs were based, we found they had so much knowledge to learn, and they were teaching us indigenous knowledge"

"The training facilitated a lot of growth for us. Different organizations were dealing with different practices. For example with the Eastern Cape team, they were dealing with land rehabilitation…we learned a lot about their practices and that was insightful".

"The DUCT ECs generally understand why they do what they do. This is due the fact that their work has mainly been in response to issues they were part of identifying within their own communities. Their work is part of solutions they themselves identified. "

"...*there was immense value creation for me-through people I have interacted with – their indigenous knowledge and cultural experiences…* **"**

This reflection co-learning indicates there has been knowledge sharing and co-generation as it adds value to the trainers and the trained.

c. The training on the use of citizen science tools and ecological literacy was new for many graduates and was perceived as useful

Not all graduates are from a science background. The group was comprised of individuals with different educational backgrounds such as commerce and social science. However, most of the graduates learned new knowledge from the training. New knowledge was acquired in the ecological literacy module, social learning and stakeholder engagement and using citizen science tools.

"...as a team, while we analyse the data submitted by champs, we realized that for example, the clarity was used incorrectly[which was evident in the pictures they sent showing us how they used the tubes], and the identification keys were not well understood from the same data sent each time. It was then there as a group we decided to do re-training. but the re-training started with us being re-trained."

"...We are not all experts. The Citizen science and miniSASS training was meaningful and powerful. It was a reference point for us in the verification of micro-organisms recorded by envirochamps. The champs would say they found stoneflies and because of our assumptions, we sometimes thought their data may be incorrect[as we had to use pictures as reference points sometimes]. When we went to the field to verify the data, we learned that they were right as the data was correctly verified – there were stoneflies. further investigations showed us there was raining the day before and hence organisms could be found. This was space for learning..".

“Initially, there were problems with the quality of the data uploaded. Retraining did not immediately resolve the issue because of different information from the trainers. Eventually most issues were resolved. It was evident that ECs who were part of Phase 1 performed better overall. Training was said to be easy to follow and helpful once the differences in training were resolved...”

From the above reflections, one can clearly see the articulation of issues, challenges and draw insights about the learning process in general. What is evident here is that the application of learning leads us not only to the positives, but the not so positive, critical reflections by graduates on the course itself.

d. From the training participants were able to reflect on the bigger picture of the project linking to ecological infrastructure for water security

Sharing their journeys of change, the learning and training that occurred has led to further reflections of the bigger picture of EI4WS and what it means for the graduates. Some graduates were able to draw links between the training, their work and the bigger objective of the project.

“*....The reality behind effective catchment management is challenging, sometimes discouraging, time consuming, necessary, still needs to happen and requires a lot of patience.*”

“Coming from a BSc background, I had to shift from a scientific to more social societal focus of work. I had to zoom out and look at the bigger picture to consider societal aspects”

“Mpophomeni is a good example of the AEN programme significance. It was clear that our river basin are in a deteriorating ecological state. Subjected to slow but intense violence. Resilience of the basin is at risk. In order to reverse this state, an immediate, integrated, multi-agency response at scale is required. Tech and financial resources are required. A lack of resources is not the issue, but various stakeholders to come together to solve the problem.”

"I have improved knowledge on the use of CS tools through the training we received. Including the retraining we received. My knowledge on river health and ecological literacy has improved. I am now aware the ecological literacy is not just about numbers and stats, but acquiring social knowledge outside, observe connections, finding out the background, what issues they stem from"

"**I have learned about social learning dimensions considering how people think differently and environmental issues are complex and treated differently according to the context of individuals…**"

***"...**we give tools and leave it like that – how do the tools contribute to the bigger picture?" This clearly indicates that perhaps monitoring (using tools and collecting data) on its own is not enough. This is not a new sentiment – for river health to improve, ECs and communities need to understand the bigger picture.*
*The focus of Amanzi Ethu Nobuntu and therefore the training is on rivers. There is recognition that wetlands and grasslands, for example, are also important for river health and the work of the Enviro Champs. The training included minimal grassland training. This approach would result in a much bigger programme. This could lead to additional tools, training modules and more accredited courses. Some expected more than citizen science tools. That other aspects, e.g. wetland related tools would be included. Making videos was not easy since it was very early on while participants were still strangers in different locations (Port Shepstone & PMB) so, finding a suitable partner was a challenge**. "***

One key reflection by graduates was that change projects development should be more focused on water, be implemented and results to clearly support NRM. In Phase 1, ECs in DUCT areas started change projects, e.g. converting illegal dumping sites into gardens. Each of the 10 teams (at the time) had to have a project in the community. These, however, get compromised by the "Start. Stop. Start" nature of AEN, which relates to the problem of sustainability of funding for EI4WS.

e. Social learning processes are highlighted in the processes of co-learning and collaboration.

"...What I could have done differently… It's important to do more site visits. Based on the Mpophomeni site visit, you get to learn more about the history of the area they

work in. The data doesn't tell you why it is difficult to achieve river health monitoring. This helps you understand the human-ecosystem relationship that exists and the challenges. Approach to solution modelling then becomes contextually relevant. More engagements with community members helps you see the mindsets of people..."

"I had a different idea of what management looks like. From the site visit, I can see management does not only refer to people in managerial positions. It starts with small things on the ground and a collection of those things makes up management. Implementation requires me to look at everything and focus on the processes and steps that are needed to make things happen…"

"...I would ensure there exists a mutual understanding between AEN and project partners. All our activities link to one common goal despite their differences. I would ensure that the work that NGOS are doing links to the bigger picture of river health and why projects incorporate river health monitoring to their daily tasks…"

f. Graduates learned more about themselves in this journey of change, and continuously applied their personal development [A2B] training

Participants highlighted the personal development [a programme called A2B] training as a key component to their personal development. The training focuses on understanding oneself better and working towards being a more 'response-able' individual. There were many references by graduates to the [parallel] A2B sessions as a pivotal process that compelled personal reflection and development. Graduates expressed the value of the personal development training on understanding self and their potential. A few statements that reflect this:

"I am actually shy….so we had people in the team who would encourage us, we didn't want to crush each other, … one would say, "no shame"[response phrase from A2B]...we wanted to build each other. I can say we did the umuntu ngumuntu ngabantu. So the unity and ubuntu we did that as a team".

"I was comfortable being an energizer. Every time I would sit in my corner and wait for me to energize people. Up until I was given a chance to lead rovers and then I realized I was capable of doing so much. I told myself I told myself I need to stop limiting myself. I had to come out of my shell...learning to take a step back and

allowing others and work with the team. Take a step back and allow teammates to lead. That is what leaders do"

"A2B brought out a more optimistic approach to working"

"We went from training site to training site. This was a lot and thinking about what we learned in A2B served as a space to rationalize the work pressures associated and for me it helped me to be more calm in my work"

"in terms of A2B training on occupational intelligence…zooming into intricate details for the training to be a success and to zoom out to see why it was important to ensure the training occurs to the best of our ability in phase 2 and what not to do in phase 3. It encouraged us to overcome challenges that we previously thought were impossible"

"A2B training was a surprise for me because we didn't do it in phase 1. It was not my cup of tea at first because it required learning about self. But now I am able to tell people no. That may seem small but it is a big step for me"

From the various journeys of change that were presented, and it was clear that there are many aspects of the training that contributed to the overall development, capacity and learning process of the graduates. There are also issues that highlight some of the course shortcomings, and learnings that need to be taken forward in the refinement and future implementation of this kind of course.

Strengthening learning networks and learning pathways

AEN uses a multi-level or layered team structure to cover various aspects of its work. This division of labour ensures that there are dedicated teams to focus on a particular activity within the project. To align to the concept of activating learning networks, the structure of the AEN team has been conceptualized follows in terms of advancing learning through learning pathways:

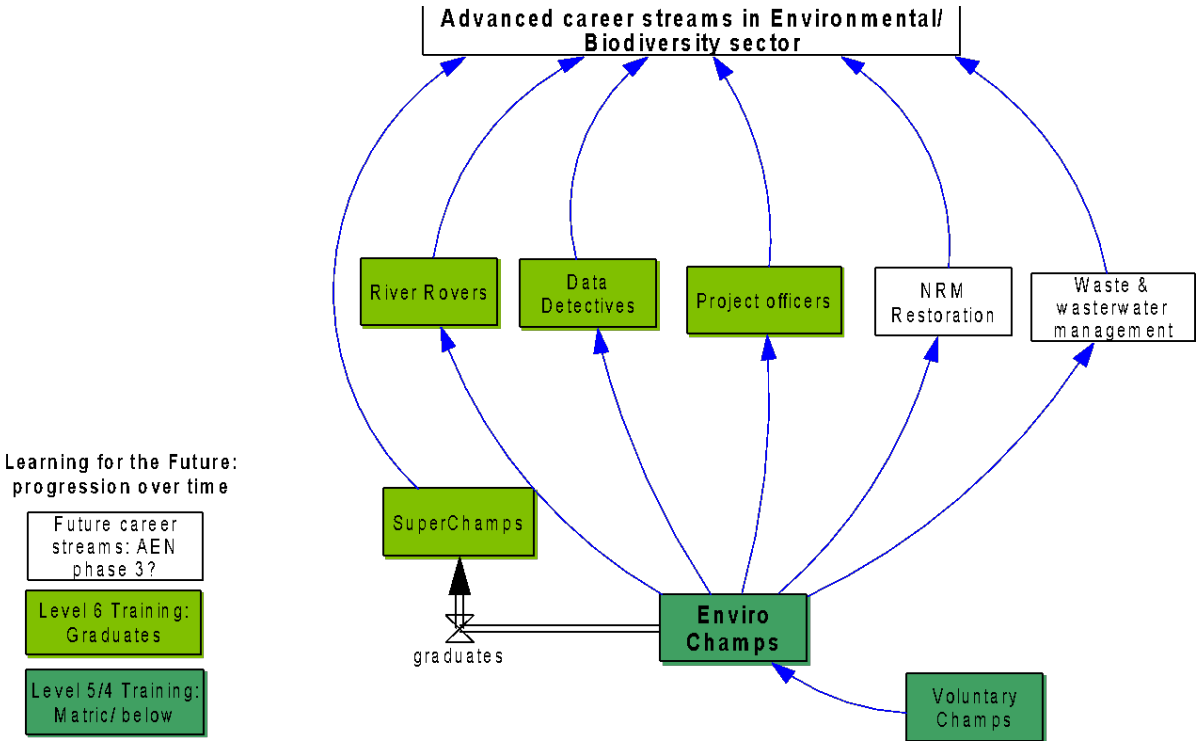


Figure 3.8. Schematic showing the different levels at which the course will be implemented to support all participants for learning

Given the current challenges with South Africa's EI4WS and its river health, a massive national transformative innovation 'work for the common good' programme to assist with monitoring water quality and related ecological degradation concerns within a systems-based, citizen science and civic action approach is needed.

The pilot AEN training conducted in partnership with GroundTruth, Rhodes University and the Xabisa Indalo for Water / SLKMM team, offered an opportunity to work with the concept of "social employment" as a key focus for EI4WS to advance monitoring activity. The course provided the opportunity to advance the concept of 'work for the common good and learn for the future', which was then carried into a national policy engagement meeting in Johannesburg in March 2022. This workshop provided an excellent MEL opportunity, where all stakeholders could reflect on the process of integrating a grounded approach to training and 'learning for the future' into social employment programmes. Here the need for establishing more sustainable structures for the 'learn for the future' programme was discussed. Additionally a framework for the 'learn for the futures' programme was put forward for discussion.

A key discussion at this workshop was the progressive learning opportunities that can be provided via such an approach. Ideally, as visualized in Figure 3.5 above, the EnviroChamps can move progressively along learning pathways (if these are adequately put in place), as they take up new roles as represented above. However, to strengthen the learning pathways,

a wider set of training programmes need to be on offer in support of youth who are 'working for the common good and learning for the future', as proposed in Figure 3.6 below. This work needs to be more systematically researched and it also requires substantive engagement with the national system of skills development, especially also the teams working on skills for youth in the Presidential Employment Stimulus programmes, and the Quality Council for Occupations. Maletje Mponwana is developing this work further in his PhD, and we are forming a partnership with Wits Researching Education and Labour teams to advance this work going forward, as well as with UNICEFs YOMO team.

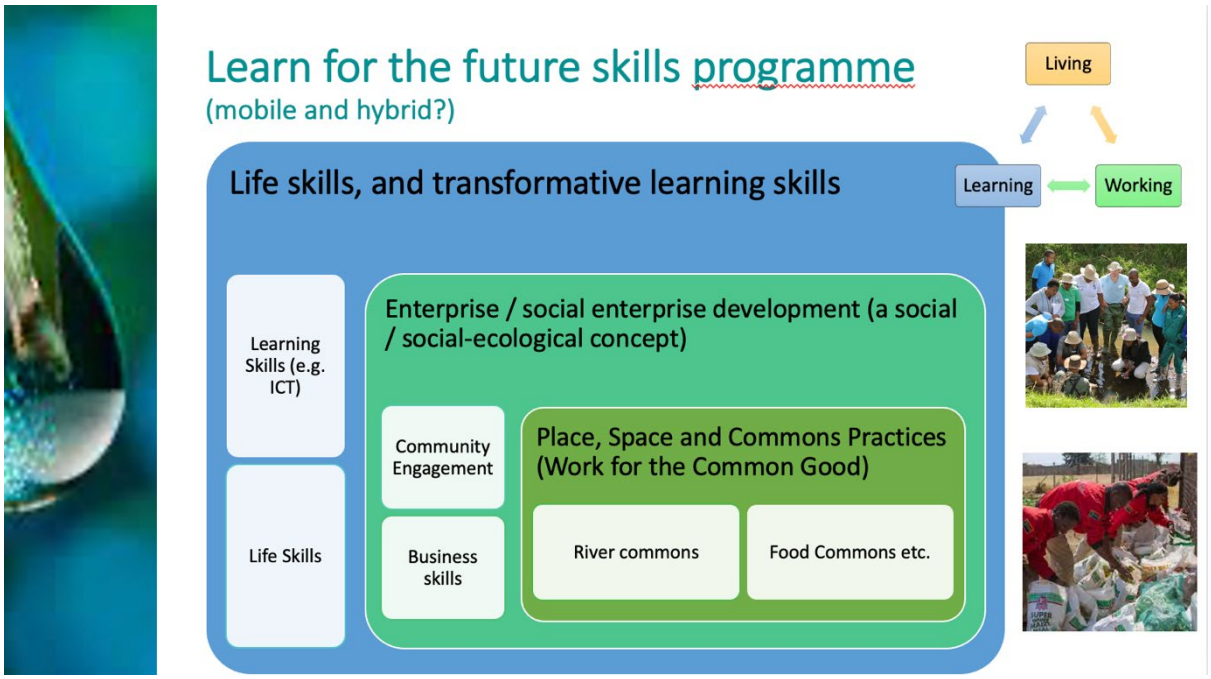
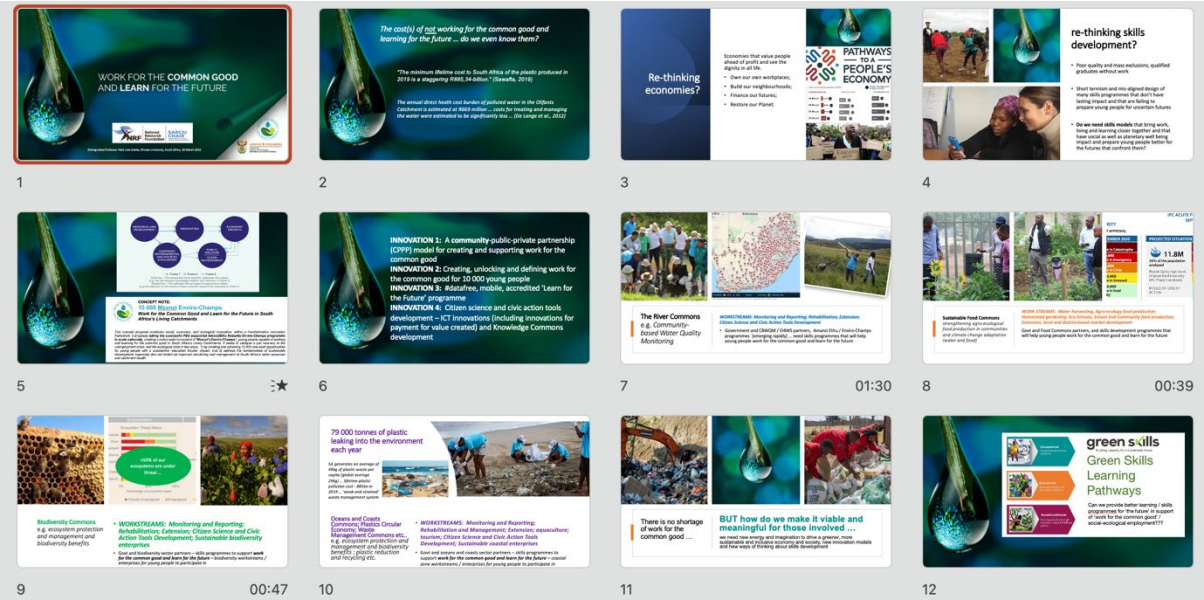


Figure 3.9: Framework for a more substantive 'work for common good and learn for the future' learning pathway for unemployed youth

National policy dialogue and programme reflections

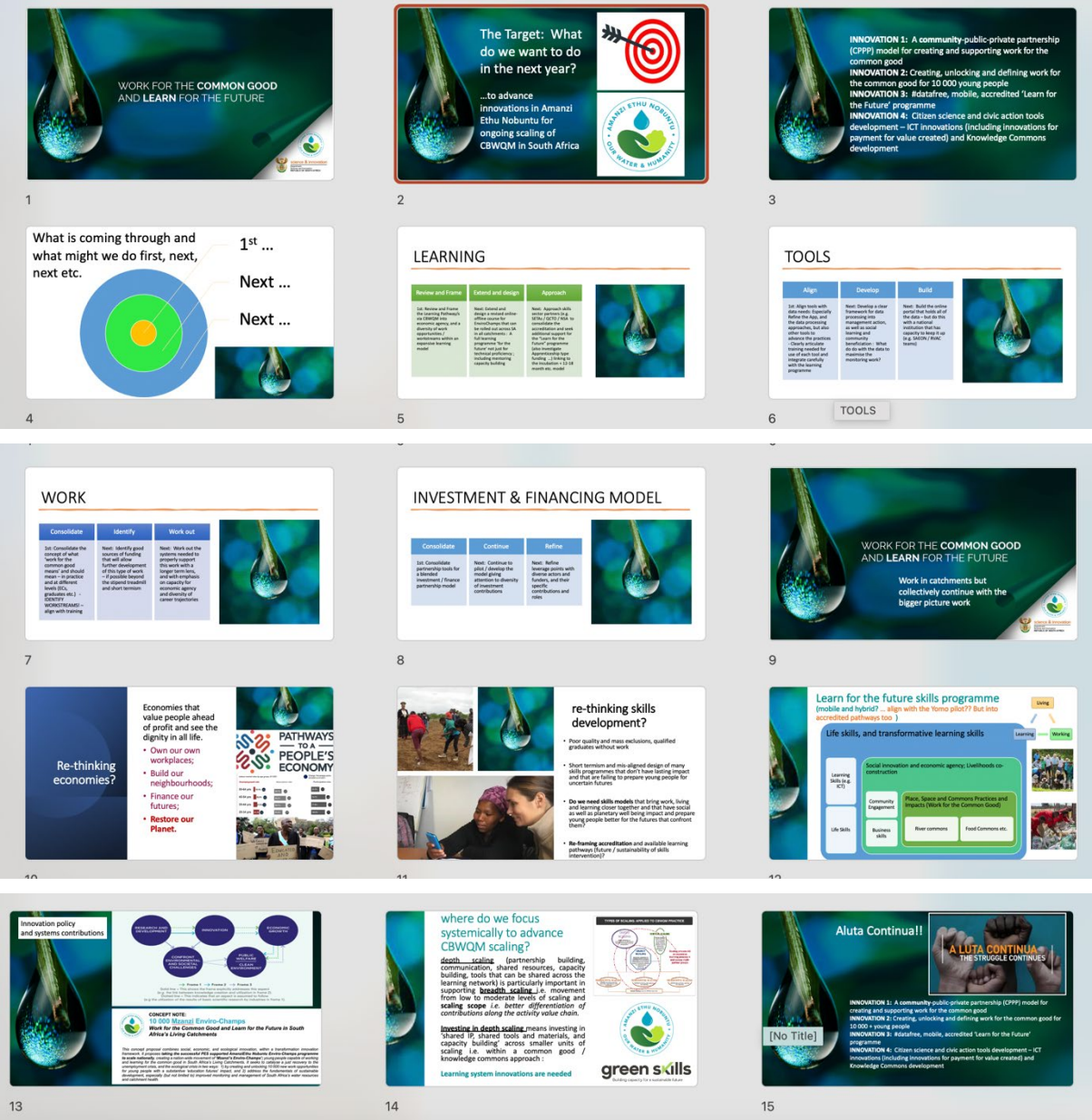
The Xabisa Indalo for Water course team and the SLKMM teams were involved in two large scale meetings in which ongoing reflections on the Amanzi Ethu courses and learning pathways took place. The Xabisa Indalo for Water / SLKMM teams regularly presented at these meetings, and contributed to the ongoing deliberations on how to advance and scale this training in the national arena.

Below are two presentations offered by the Xabisa Indalo for Water / SLKMM team into these processes.



The presentation above, made at the AEN hosted National Indaba on Work for the Common Good and Learn for the Future in April 2022, as contributor to DSI / PES Innovation, covers how the work of the Amanzi Ethu Nobuntu programme and Xabisa Indalo for Water courses can contribute to development of the wider green skills landscape, and how advancing the wider green skills landscape can advance EI4WS training programmes such as the AEN and the Xabisa Indalo for Water course.

The presentation below, offered at the end of the Amanzi Ethu Nobuntu Phase 2 programme in Howick (final reflection workshop), helped the teams to consolidate what had been learned, and to facilitate discussion on where to next. As can be seen the focus was on learning, tools, work and the investment and financing model.



An overall report on the AEN process (see below) was also prepared and presented into the second course pilot – see slides below. This was to bring continuity between the two pilots, and to connect what was learned in one course with what was being discussed in the other course, thus also facilitating cross-catchment learning.

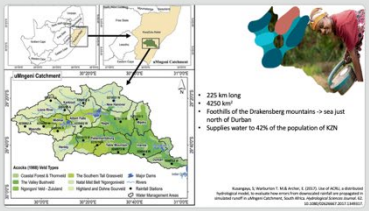
Amanzi Ethu Nobuntu

a case on Monitoring Activity for advancing EI4WS in the uMngeni Catchment

Mahetjie Mpanvana
11 November 2022

XABISA INDALO FOR WATER COURSE

1



- 225 km long
- 4250 km²
- Foothills of the Drakensberg mountains -> sea just north of Durban
- Supplies water to 42% of the population of KZN

2

UEIP - uMngeni Ecological Infrastructure Project

- Catchment wide partnership
- Formed in 2013
  - South African National Biodiversity Institute (SANBI),
  - eThekwini Metropolitan Municipality,
  - KZN Department of Water and Sanitation and
  - Umgeni Water
- More than 20 organizations now form this partnership.

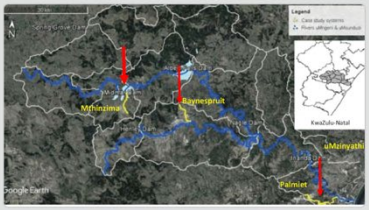
- How can ecological infrastructure (EI) support built infrastructure to improve water security in the catchment?
- 3 demonstration projects

3

UEIP Strategic Objectives

- Strategic investment in ecological infrastructure contributing to enhanced water security in the uMngeni catchment
- Improved governance that is contributing to slowing the rate of degradation of ecological infrastructure
- Strengthened institutional capacity for the rehabilitation, maintenance and protection of ecological infrastructure
- An enabling policy environment for investment in the rehabilitation and management of ecological infrastructure in the catchment
- An improved knowledge base on ecological infrastructure that informs policy and practice
- Effective collaboration, coordination and co-learning that enables the UEIP to consolidate, grow and demonstrate its value

4



5

5 YEAR PROJECT [2018]

- An enabling environment strengthened to allow biodiversity and ecosystem services to contribute to improved water security;
- Demonstration of proposed approaches in the Berg-Breede and Greater uMngeni River catchments; and
- Improving the integration of biodiversity and ecosystem services into the water value chain through social learning, credible evidence and knowledge management.

6

Emergence of Amanzi Ethu Nobuntu

- UEIP, DSI (PES), DUCT ...
- Emerged from the UEIP demonstration projects
- And now operates as independent programme as an entity to manage the AEN programme.
- Blended finance model as a proof of concept
  - Investment model aimed at extending the programme and attracting more partners to collaborate

7

Phases of the Project

- **Enviro Champs phase 1:**
  - 3 month employment stimulus project -early 2021
  - 300 youth
  - Graduate and non- graduate teams
- **Enviro Champs Phase 2:**
  - 8 month programme - from October 2021
  - Project officers added as additional support to teams

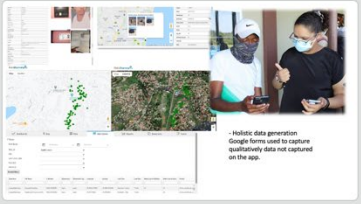
EnviroChamps scope of work

- **River clean ups**
- Clearing alien invasive plants
- Door-to-door environmental education campaigns
- **Monitoring of cleared and cleaned rivers**
- **Reporting and monitoring of** sewage spillages and illegal waste dumping sites
- **Fixing domestic water leaks**
- conduct **biomonitoring and wetland monitoring using citizen science tools**

8

FIELD SURVEY APP

9



- Holistic data generation
Google forms used to capture qualitatively data not captured on the app.

10

Some stats

- 1190 home visits were recorded over the three months across different communities in the catchment;
- 25 species of alien plant were identified and cleared from the sites, with data being collected on the types and numbers of the alien plant species identified, as well as data on the clearing methods, herbicides and biomass treatment.
- A total of 198 municipal sanitation leaks were identified, with over 50% of these classified as 'gushing'. All leaks were reported to authorities for remediation
- 1275 solid waste sites
- 93520 bags of litter collected from concentrated and/or scattered litter sites.
- 848 concentrated and 987 scattered sites identified in the catchment.
  - 96 were concentrated medical waste,
  - 90 industrial / commercial,
  - 95 construction waste, and
  - 567 domestic waste,

11

12

[No Title]

Monitoring purposes

- Supports learning and training for envirochamps
- Raising awareness regarding river health from large data sets
- Support and learning with people and communities who wish to make a difference or are already making a difference to the health of their rivers by integrating science with indigenous knowledge
- Generation of knowledge sets that will offer evidence and location of issues identified,
- Collaboration with local municipalities for reporting purposes
- Provides access to data that can be analyzed for reflection, and co-creation or innovation around issues

13

....

- Supporting the feedback and co-learning between data analysis and field teams on the contextual conditions under which the daily reporting occurs.
- Enabling consideration for unexpected aspects of river health not covered only by the
- Field Survey App reporting, substantiating the transdisciplinary analytical work and resulting in greater depth and generative strength of the analytical results of the project.

14

Advancing EI4WS through monitoring activity

- AEN showcases the possibilities for real government, private, and civil society partnership
- Linking local projects across a catchment, working towards a common vision, sharing data, and all benefiting from the environmental, social and governance impacts, are just some of these gains
- The presence of a collective such as UEIP signifies the belief in collaborative efforts and the identity with working for the common good
- Recognizing the value of community members in the management of water resources is key. By monitoring, engaging and interpreting findings from the monitoring allows meaning making processes to develop and development of solutions

15

3.4 Course Pilot 2: Berg-Breede Catchment (with focus on investment and policy activity)

Background to the Berg-Breede Catchment

The Berg-Breede catchment area consists of two distinct catchments: the Berg and the Breede. The Berg river catchment spans 7,715 km² and the Breede river catchment is 12 625 km² in size. Both catchments contain a variety of different land use types, including settlements of various sizes, agriculture, industrial development and natural vegetation.

The Berg river spans approximately 294 km. The Berg river originates close to the town of Franschhoek, and flows into the ocean at the Berg river estuary, one of the largest estuaries in the country. The Breede River is about 322 km in length, originating close to the town of Ceres, and flowing into the ocean close to Witsand. Both catchments are home to Strategic Water Source Areas (SWSAs), high rainfall areas that comprise 10% of South Africa but produce 50% of its water and are particularly vulnerable to climate change: The Berg-Breede system extends across four SWSAs, namely the Grootwinterhoek, Table Mountain, the Boland Mountains, and the Langeberg (SANBI, 2016).

Both catchments are known as agricultural hubs, with a majority of the fruit, grapes and wine produced in these areas being exported to the international market, primarily European countries. Because of the reliance on agriculture for these two catchments, as well as industrial development and large settlements, such as the City of Cape Town, water is an essential ecosystem service that provides not only for the basic human need for water access, but largely drives the economy of these catchments. Since the major drought and narrowly avoided ‘Day Zero’ in 2017, there has been heavy investment in protecting and rehabilitating the ecological infrastructure that provides the water resources that flows through the Berg-Breede. The main form this investment has taken is through clearing of alien invasive trees, primarily in riparian ecosystems. Invasive species such as Eucalyptus, Pine, and Wattle can extract as much as 30% more water than natural Fynbos ecosystems. Nearly half (40%) of the Berg and Breede water source area is covered by invasive alien plants (Cartwright, 2020). It is also estimated that the rainfall in the Western Cape will decrease by 30% by 2050; and the population is predicted to rise by 30% over the next 15 years, which will increase pressure on water resources which are already over utilised.

Different institutions and collaborations have also sprung up over the years to better help support the implementation of this work. The Greater Cape Town Water Fund in the Berg, and

the Upper Breede Collaborative Extension Group (UBCEG) and the Breede-Sonderend Catchment Collaborative (BSCC) in the Breede are multi-stakeholder platforms that bring together multiple different governmental and non-governmental organisations. These structures allow for stakeholders to share their work, learn from each other, and better coordinate the implementation of natural resource management at a catchment scale. They are also used to channel resources and funding to the relevant organisations.

Other institutional arrangements include the Breede-Gouritz Catchment Management Agency (BGCMA), which operates in the Breede, and is one of only two fully formed CMAs in the country.

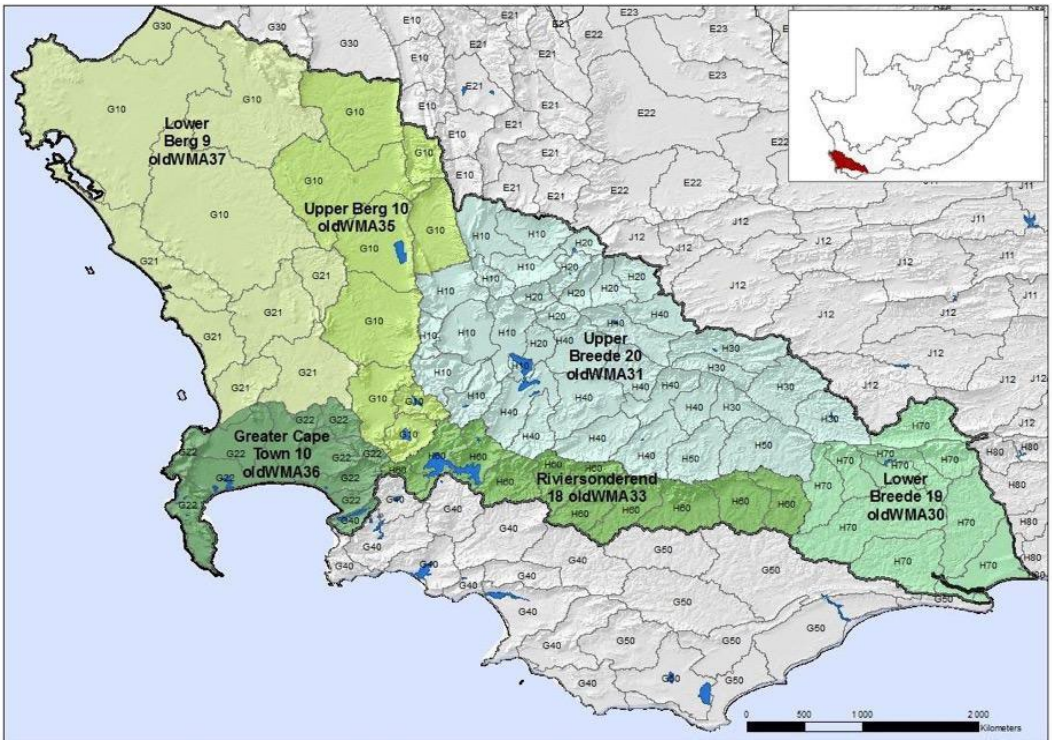


Figure 3.10. The Berg-Breede Catchments in the Western Cape Province

Course Modules and facilitation process

The Xabisa Indalo for Water short course with fully developed modules was facilitated in the Berg-Breede Catchment in the space of three months from Nov 2022-Jan 2023. This pilot sought to unpack the various applications of ecological infrastructure for water security and investments in relation to various existing practices in the Berg Breede. The pilot in the Berg-Breede Catchment was structured as three separate course sessions with each session consisting of two-day face to face interactions. The content for each session was developed in relation to the intended outcomes of the four modules [and a foundational text to economic

thinking on valuation/ing] which would supplement the development of Change Projects. The four modules [each with a different focus] were used as mediating tools to introduce EI4WS; the economics of investments associated with EI4WS; unpack the three EI activity; introduce change projects; social learning and work towards a shared understanding of EI4WS.

A process of co-enquiry [exploration, interaction and activities] into economic valuation, social learning and EI4WS offered us a glimpse into what associations different participants have with EI4WS [or not] how they are working with these and how each practice contributes to the bigger picture. This created space to work with whatever knowledge emerged as discussions occurred in the collective setting (learning as participation). Participants were given work-away tasks [see spiral model below] in between face to face interactions to create a sense of continuation and to strengthen applied learning. We made use of a remote access, content hosting platform known as Miro Board [see fig 3.8] and a WhatsApp group to allow space for continued engagement as a group.

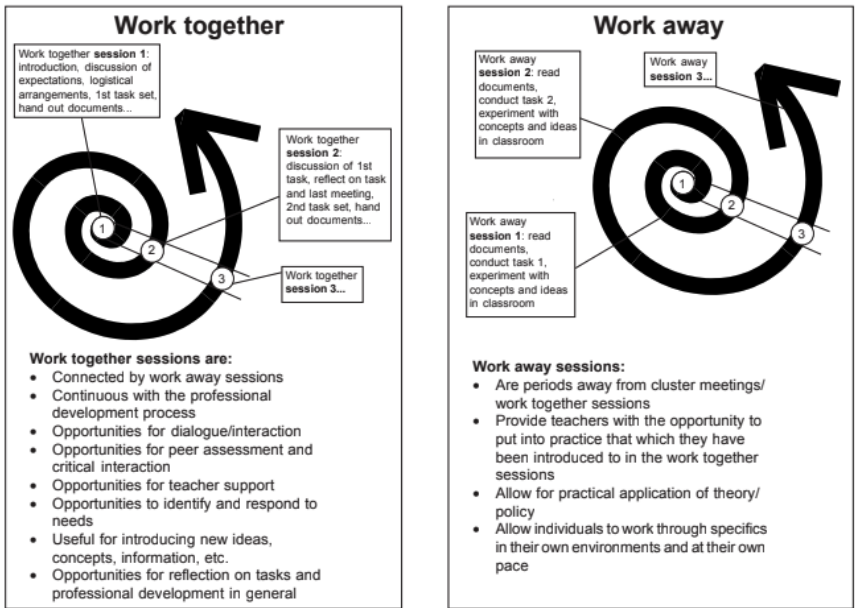


Figure 3.11. The spiral model approach to work as applied in the EI4ws short course (Source: Du Toit and Squazzin, 2020)

Course Participants Selection Process

A call for participation was circulated using existing networks such as ACDI, UBCEG, SANBI to attract participants. In terms of the selection, we received 20 applications and it was agreed that all applicants be accepted as participants as a practical, workable number of participants for this pilot. In the initial planning we had planned to host a week long session but upon further discussions it was decided that it would be ideal to have “contact sessions” as spaces for

participants to engage with content and "work-away" tasks so that there is time to work on change projects and then later reconvene to see what is emerging.

In the Berg-Breede pilot, the participant group was representative of

- Sector departments & government: DWS, DFFE, SANBI
- Provincial government – Dept of Agric, DEA & DP[Dept of Environmental Affairs, and Development Planning]
- NGO sector – CWBR [Cape Winelands Biosphere Reserve], WWF
- Public sector – CASIDRA [Cape Agency for Sustainable Integrated Development in Rural Areas]

Figure 3.12: Course participants in the second course session

The participants in this pilot course work in different capacities such as catchment co-ordinators, citizen scientists; water manager, project co-ordinator; interns; engineering technicians; environmental officer and area managers. The pilot offered a unique generative space to understand how practitioners translate frameworks, policies, mandates into practice, and how they contextualize EI4WS and investments as it relates to enhancing ecological infrastructure for water security. The course also had some participants that were quite experienced with EI4WS policy and practice, and some who were new to the concept. This created an environment where participants could learn and share insights. It also created an

environment where different government sectors could interact with each other, and with other stakeholders, in other words the course created a multi-actor networking space.

Figure 3.13 below shows the course flyer that was developed and used to recruit participants.

Figure 3.13. Xabisa Indalo for Water course first Call for participation.

Teaching of the course modules

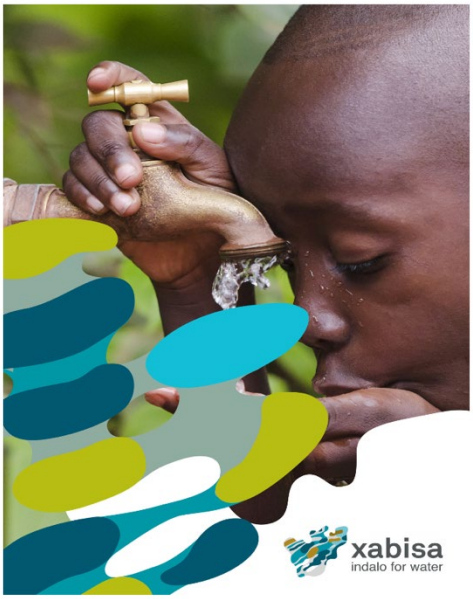
Session 1: November 2022 – Module 1 and 2: Introducing the course, exploring the concept of EI4WS and investments into EI4WS

The purpose of the first course session was to introduce the concept of EI4WS in the context of existing discourse and to bring this into the contexts of participants. To do this, we developed a living catchment picture on the floor of the room (see Figure 3.11), and all participants introduced their work by graphically and verbally articulating what their stake and interests are in EI4WS in the catchment. In the process design, articulation of the purpose of the course served as an entry point to us working with the concepts of ecological infrastructure for water security [as a starting point] from a facilitation point of view; conceptualizing

investments as a practice, value and valuing ecological infrastructure for water security and the three EI activity types with which we planned to work through in the course. In a way this session allowed us to begin to contextualize the concept of EI4WS as a co-defined emerging shared new object of activity in the Berg-Breede, and participants could see all of the different contributions being made to EI4WS in the catchment as represented by their practices.

Figure 3.14 The catchment mapping activity to locate everyone's contribution to EI4WS

A foundational text on economic measurements and valuations was provided to participants in advance. After getting a profile of the course attendants, however, the presentation of the course material was modified. Revised presentation slides for the group were created on the day before the first session. While the core text material was more general in the way that it presented topics on the pros and cons and the role of measurement in Economics, the first session discussion took a step back away from Economics concepts. We discussed generally the meanings of concepts like the act of investing in something, investments in general, including investments of effort, time and money. We then discussed the meanings of value to establish a common understanding of these meanings. This was done before discussions of what economic valuation or measurement or estimation meant. The reason for doing this was to ensure that we all shared the same or similar understandings of these concepts. This was important to establish because participants came from different backgrounds and experiences.



Foundation Text for Module 2
Cost Benefit Framework informing Xabisa Indalo for Water

Further unpacking of concepts and investments into EI4WS was facilitated using videos and presentations from existing examples of investments into EI4WS from different catchments throughout the country. The foundational text was used to anchor the session and to offer us a guiding framework to understand where the emerging practices and concepts are coming from and to offer us a national perspective on EI4WS. A course miro-board was developed and used as an interactive platform where all course materials and resources were uploaded and shared.

As part of the mediation processes: activities were used to further engagement with participants as one way of introducing the different practices that practitioners are involved in but also to encourage a collaborative process of learning and knowledge sharing – where common ground can be established or gaps identified for us to work through.

DAY 1:
Introducing the Course; Introducing EI4WS, and Xabisa Indalo for Water Change Projects

DAY 1	Course Introduction and Overview	Facilitator
8:30 – 08:45	Welcome remarks – Welcome to the Berg-Breede Catchment	Pienaar du Plessis
08:45 – 09:00	Introductions & Overview of the Programme and EI4WS Course	Maletje Mponwana
09:00 – 09:30 09:30 – 10:30	ACTIVITY- What is your experience of, & or interest in EI4WS? AND What are your expectations of the EI4WS course? CATCHMENT ORIENTATION ACTIVITY- Where do you situate yourself into this catchment?	Maletje Mponwana Heila Lotz Sisitka
10:30	TEA BREAK	
11:00 – 13:00	Introduction to the concept of Ecological Infrastructure for Water Security (EI4WS) – what do we mean by this concept? How this course fits into this bigger story of EI4WS….and… What does it mean to 'invest' in EI4WS	Heila Lotz-Sisitka Nhlanhla Mbatha
13:00	LUNCH	
14:00 – 15:15	Xabisa Indalo for Water Security: Cases from various catchments/contexts ACTIVITY- Viewing and analysis of videos: *What are people doing to 'Xabisa Indalo for Water'? How are they doing this and why??* *Can you think of examples of Xabisa Indalo for Water in your work/context*	Heila Lotz-Sisitka
15:30 – 16:30	Introduction to Xabisa Indalo for Water Change Projects – what do they look like? How can we start them?	Heila Lotz-Sisitka

DAY 2:
Investing in, and valuing ecological infrastructure for water security: foundations, cases, principles and possibilities

DAY 2:	Examples and Principles for advancing EI4WS Activities	
8:00 – 9:30	Background to Ecological and Environmental Economics and Economics Instruments to guide EI4WS : Useful tools for different purposes	Nhlanhla Mbatha
	ADVANCING ACTIVITIES OF EI4WS- CASE STUDY EXAMPLES	
9:30 – 11:30	Activity for the day: Let us further unpack EI4WS Get into groups – three groups of 5 according to similar practice or line of work Guiding Questions to facilitate discussion on EI4WS A. *Reflecting on our context and work* 1. In your group/practice what would you say is your understanding of Ecological Infrastructure for Water Security? 2. Can you give an example of how your work is linked or contributes to EI4WS?	Maletje Mponwana Nhlanhla Mbatha Heila Lotz-Sisitka
	3. List all the other role players [i.e. institutions, sectors, officials, communities etc.] that you work with that contribute to EI4WS? 4. What does it mean to 'invest' in EI4WS? 1. Based on your understanding of EI4WS, Identify benefits of EI4WS we receive 2. Think historically in terms of these benefits, what has changed in terms of these benefits of EI4WS and how has it changed? 3. From the tools discussed this morning, could we use 'tools' to estimate the value of EI4WS benefits? What other 'tools' or methods could be used? 4. What are the associated challenges using such TOOLS, can they be used in your PRACTICES?	
11:30	Reflections on Group Discussions	
12:00	Case Study 2: **Policy and Governance Activity** advancing EI4WS – uMzimvubu Catchment case study	Mzukisi Kuse
12:20	Case Study 3: **Monitoring Activity** advancing EI4WS – uMngeni Catchment case study	Maletje Mponwana
12:40	Questions, Comments and Discussion Session	
13:10 – 13:40 13:45	Next Steps between now and the next session – Work Away Tasks to ID a Change Project (either to develop or to review) Reflections of the two day sessions- what worked, what would you like to see work better next time?	Mzukisi Kuse & Maletje Mponwana
14:00	Lunch and departures	

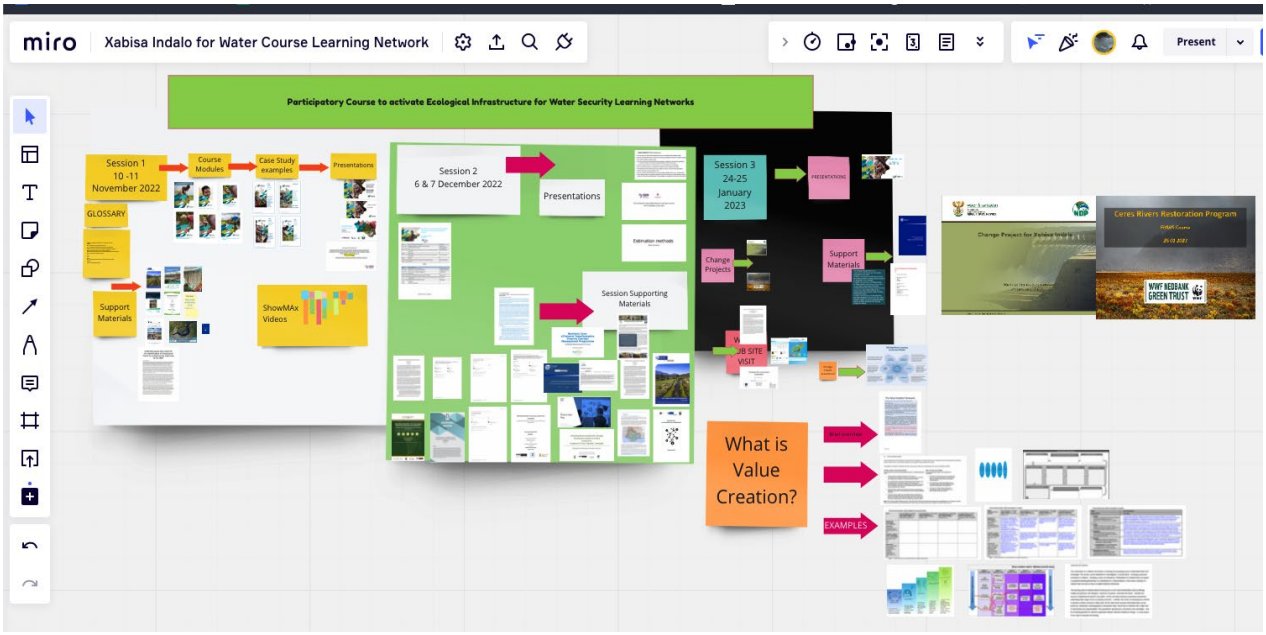
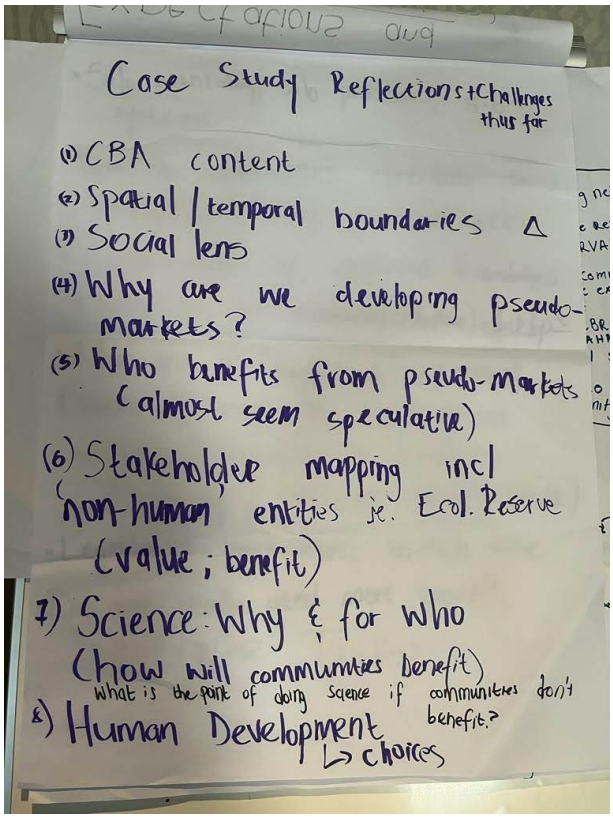


Figure 3.15. The EI4WS Course Miro board was used as a an interactive, remote access platform. The full set of materials, videos and other tools used in the course are on the Miro board (i.e. it is a full repository of the course and its materials) - see [EI4WS Course Platform]



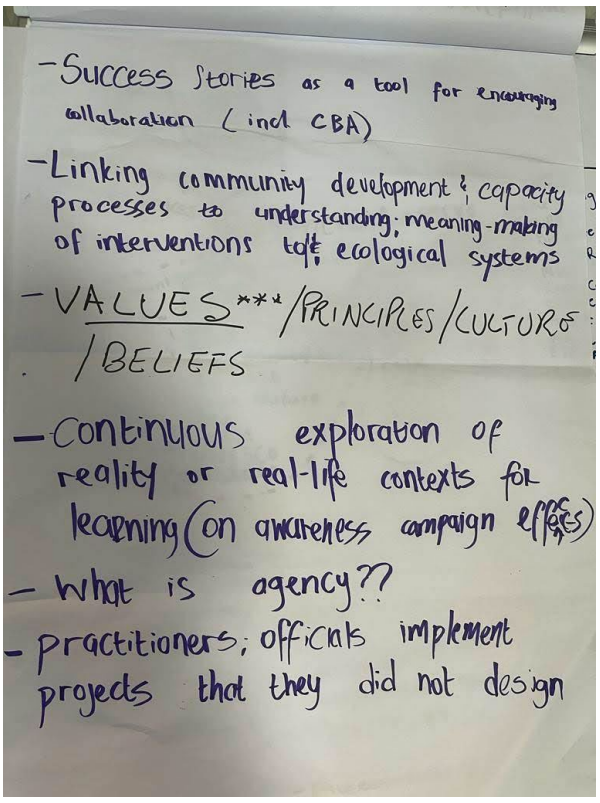


Figure 3.16. Reflections captured reflecting key principles and comments from the examples of investments into EI4WS in South Africa.

Session 2 – December 2022: Introduction to Social Learning as an approach, Investment into EI4WS, different methods of valuing and costing, identification of EI4WS activity

The presentation on economic concepts in the first session surfaced the need to revisit the economics of investments or investing in nature as a practice or process. As such we had to dedicate significant amount of time to unpacking key questions that participants raised. In this second session we looked at one specific tool in economic practice – the CBA [cost-benefit analysis] tool as an example and mediating tool for the emerging discussions. What this session offered was an opportunity to unpack the technicalities of applying economic concepts in a space with environmental practitioners. Working through the difference between ecological economics and environmental economics enhanced the discussions and may require an in-depth process of the historicity of both concepts in relation to EI4WS.

Participants were offered the opportunity to articulate the activity or cases or change project that they would be working on. This step in the process would then guide participants to start thinking about investments in relation to their change projects.

This session was also used to introduce social learning principles. We used a catchment based case study [RESILIM-O Programme] to unpack and explore the complexity that exists in socio-ecological systems, and how to leverage on stakeholder processes and networks in such cases. What was essential for the course participants in this session was to introduce social learning as it is a key component to the activation of learning networks.

There are various principles detailed within social learning theory which support the idea of “process” as a means of exploring, surfacing ‘contradictions’ which are spaces of learning. The use of a case study embedding principles of social learning was therefore key to explaining the practicality, time requirement and investments implied within social learning. Participants were introduced to stakeholder mapping as a tool for stakeholder engagement which were developed in groups to gather a more holistic view of the stakeholders with whom each group works with. This particular tools assists participants in one of their change project developments to map out who they work with in their immediate circles of work but to also expand to secondary partners. This process or activity of mapping can be a powerful tool for

looking for opportunities of collaboration, networks and leveraging on strengths of all respective and potential stakeholders/partners.

Participatory Course for activating ecological infrastructure for water security learning networks

6th – 7th December 2022
Programme

xabisa

DAY 2:

DAY 2:	Course Logistics	
8:00 – 8:15	Reflections on the learning process	Maletje Mponwana
8:15 – 9:30	Introduction to Social Learning Principles	Maletje Mponwana
9.30- 10.30	Other tools for Stakeholder Engagements	Mzukisi Kuse
10:30 – 11.00	TEA BREAK	
11:00 - 12:00	ACTIVITY- STAKEHOLDER/ POWER MAPPING EXERCISE	Mzukisi Kuse
12:00 – 12:30	WORK AWAY TASK- Discussion of take away task (to be completed before the next session)	Discussion
12:30 – 13.00	Way ahead: what still needs to be done	Facilitators
13:00 13.30	Reflections LUNCH and departures	

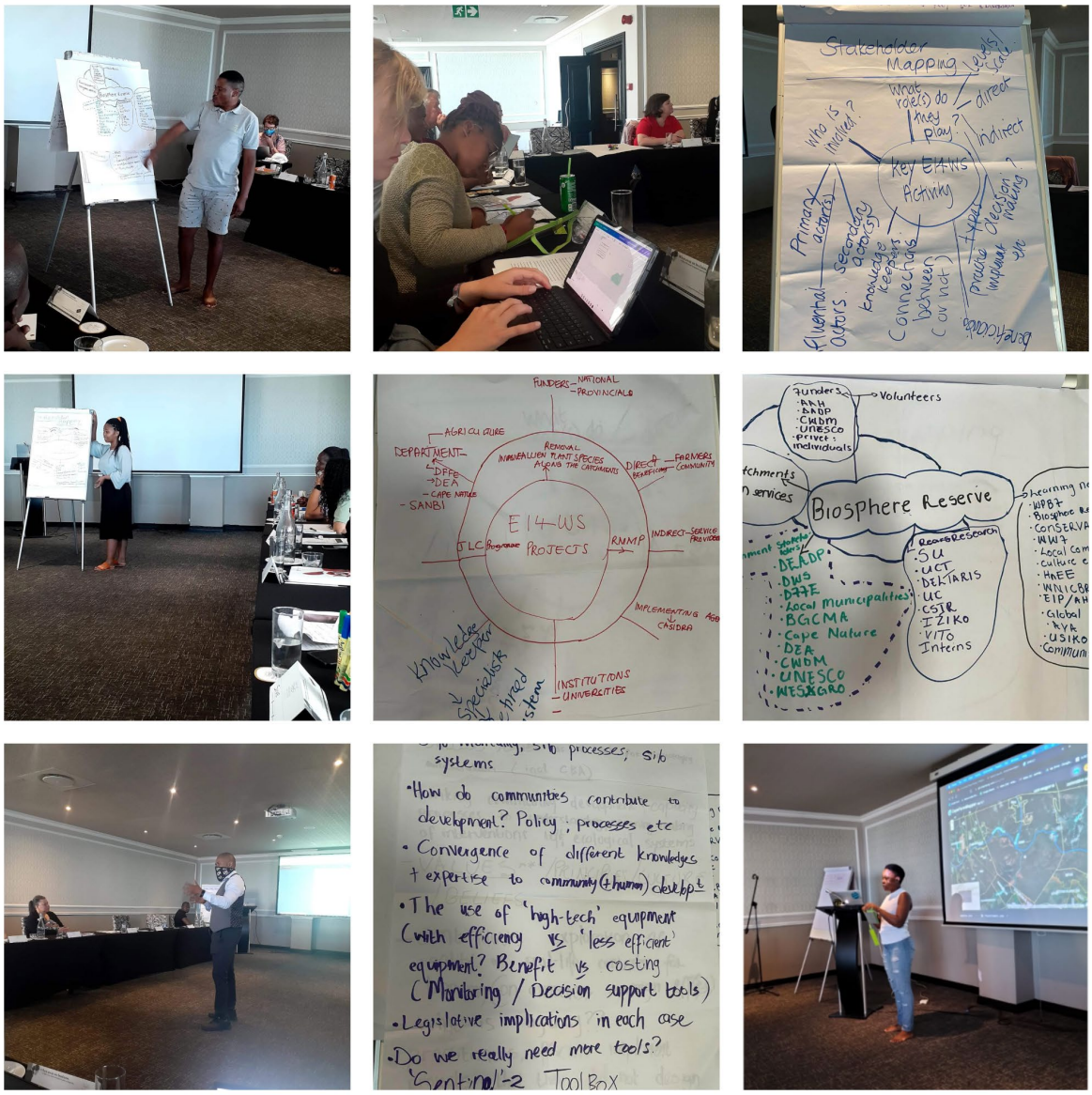


Figure 3.17. Stakeholder mapping was used in the second contact session to begin to understand where challenges and opportunities for collaboration, and networks may exist

Session 3: January 2023 – Module 3 – Looking at Social Learning Principles, and value creation; Change projects

In the third and last session of the course we furthered the discussion on investments when we visited the Franschhoek Water Hub Future which is a project of the UCT Future Water Institute as a case study example of a practice in the landscape that offered a learning opportunity for investments into EI4WS. The Water Hub of the FWI is unique in that institute provides a co-learning space for transdisciplinary fields to address critical issues, holistically. We used the Water Hub object of activity [of resolving polluted water flows in a catchment that was experiencing increasing water scarcity] to lead us into discussions around innovation and

investments in EI4WS. The Water Hub case was very interesting because it was also following and working out how to use nature-based solutions to stimulate investments in ecological infrastructure.

Building on the RESILIM-O case study example used in the second session, we explored in depth, the processes applied, the experiences and the challenges faced in the use of social learning principles in a resilience building programme. Drawing from different sources we looked at universal principles of social learning to consolidate the case study example. There was no way to unpack such complexities without allocating adequate time for such a discussion to get an enriched picture of the magnitude of investments [time, process development, relationship building, guiding implementation framework and monitoring and evaluation].

Following the excursion and the reflections on the experience in relation to the course content, participants were allocated time to share progress on their change project development process. Participants were provided with a template on what to include in their presentations or progress on change projects, yet it remained unclear for most as to how to share their progress.

Change Projects

As indicated above, we used a change project model to support applied learning on the course. The Change Project framework is outlined below in Figure 3.16.

The Change Project is the **main 'assignment'** for the course, and will be developed in four parts:

- Part 1: **Contextual profiling to identify** what Xabiso Indalo for Water activity needs to be advanced in own context.
- Part 2: **Development** of Xabisa Indalo for Water Activity **(self-chosen focus and scope)** with a community of practice.
- Part 3: **Reflection** on how **social learning approaches** can further advance the development of the Xabisa Indalo for Water Activity with others.
- Part 4: **Identification** of the value that has been created **for whom and how,** and decision making on how to scale the Xabisa Indalo for Water activity (in the Change Project) for impact.

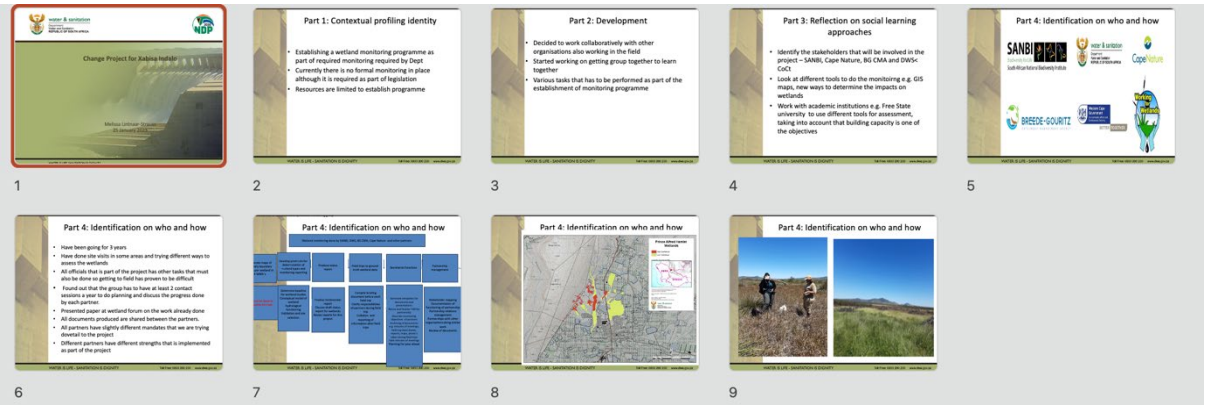
As indicated above, the piloting process did not have enough time for Change Projects engagement and development. However, participants did present Change Project concepts, and each participant was able to conceptualise an area of EI4WS practice that they wished to further develop in their context of work, with others.

Figure 3.18: Course participants presenting their change projects on the last day of the course

The change project concepts and plans include:

DWS wetland monitoring programme – DWS

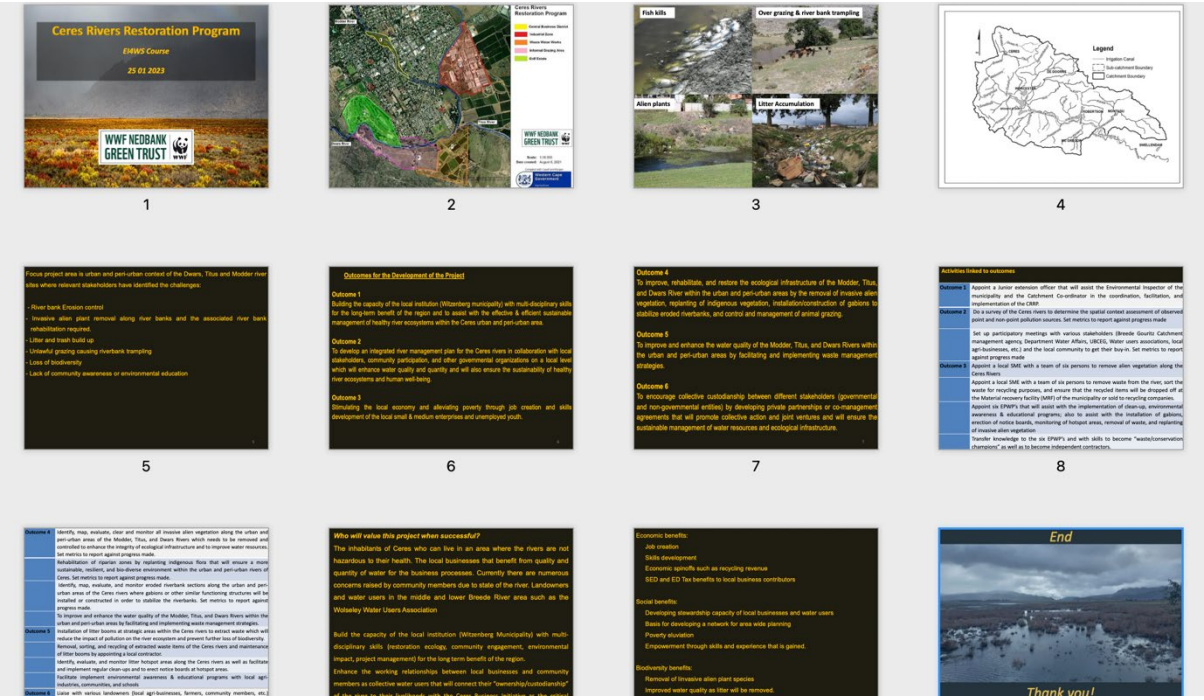
Melissa's change project is based on the Department establishment of a wetland monitoring programme. The aim of this project is therefore to establish a wetland monitoring programme for the Western Cape Regional office that would form part of the RQO monitoring. The wetland discipline requires specific skills that must be mastered to be competent as a wetland ecologist. Some of these skills include GIS skills, identification of wetlands plant species, ability to delineate a wetland, etc. The Resource protection unit in the Western Cape Regional office is tasked with providing recommendations for the management of water uses for the environment. Giving specialist advise on the management of wetlands and estuaries therefore is part of the responsibility of the unit. Most of the scientists in the unit are specialists in rivers and do not necessarily have the same level of specialist knowledge in wetlands or estuaries. The unit therefore had to look for assistance to get the wetland monitoring project started.



Presentation on Wetland monitoring change project.

Ceres River Restoration Programme – WWF-SA

This project focuses on the restoration of the Ceres River. The focus is the urban and peri-urban context of the Dwars, Titus and Modder Rivers sites of the town of Ceres, Western Cape. The change project focuses on a number of issues affecting the ecological condition of the Ceres including riverbank erosion, invasive alien plant removal, litter and trash build up; unlawful grazing causing riverbank trampling; loss of biodiversity and the lack of community awareness or environmental education.



Developing a River Maintenance Management Plan – WC DEA&DP

The purpose of this change project is to create a comprehensive River Maintenance Management Plan ("RMMP") that will ensure the protection and maintenance of infrastructure within the watercourse while complying with the National Environmental Management Act, 1998 (Act 107 of 1998) ("NEMA") and the Environmental Impact Assessment ("EIA") Regulations, 2014. The plan will be designed to prevent damage to natural habitats, infrastructure, and public property, and to improve overall water quality.

Construction of Erosion Protection Structures in the Baviaans River: Genadendal – CASIDRA

The core purpose of this change project is the construction of erosion protection structures, known as gabions (groynes) in the Baviaans River. The potential benefits of this project include: water security, river- and property protection. This project's objectives include:

• Protecting the river from erosion;

• Protecting nearby houses

• Channelling water in a structured manner to allow water to flow downstream;

• Ensuring water security for those who benefit from the river

Herbicide safety and environment – DFFE

The change project proposes to conduct herbicide and environment safety project for the financial year 2023. This exercise will take place in the Goukamma Nature Reserve. The purpose of this change project is to train beneficiaries on Safe herbicide application methods, Personal hygiene practice, Ability to associate herbicide and working conditions as well as On-site trainings /Toolbox talks. The project will be coordinated by the project manager supported by the respective area managers and Project teams. The campaign intends to be ongoing and will include all beneficiaries and not only the herbicide applicators for Environmental Safety in handling and usage of herbicide in field.

Educational Healthy Vegetable Garden – Cape Winelands Biosphere Reserve

This change project is aimed at educating youth on how to be self-sustainable through developing home vegetable gardens. The change project additionally aims to teach about food nutritional value, so people know what they are eating and in turn develop life skills on food systems.

Storm water drains cleaning and plastic recycling project – Klapmuts

In this change project, the participant aims to develop a community recycling project in Klapmuts (Stellenbosch), where people can turn recyclable materials into crafts.

Project manager:

Planning and governance, investment, monitoring and management action and education.

NB: we have to come together as youth, for us to deal with the challenge (pollution) and number of hands, tools and time needed. To accommodate all the parties with veto rights to give us a green light.

* Municipality, community members and business owners.

* To know the importance of leaving in a clean environment and reduce the rate of illness, also to generate income.

* Am involved in decision making, planning, monitoring and management.

* COSTS : time and labour

* BENEFITS : money and healthy living

* CHALLENGES : not all community members will come to the party.

There will still be illegal dumping and funding issues.

ACHIEVEMENTS: education on how to keep an environment clean and low risk of getting ill.

* People need to be educated more about the importance of living in a clean environment and water security.

Recycling Project 2 – Cape Winelands Biosphere Reserve

This change project is another project started by a collective to collect and recycle materials in recreational spaces in the community of Jonkershoek (Stellenbosch). As stated by the course participant:

I started my recycling project on the 12th of December 2022, when I started this project, the focus was to keep the environment clean, but I saw an opportunity to make a living at the same time. There are three of us involved in the project. Ever since the project started there has been an improvement in the cleanliness in the area and people are no longer dumping things around instead they keep them for us to collect.

The challenge we face is with the picnic sites where people throw broken glasses into the river, but we do what we can to get them out of the water. Another challenge is transport fare to transport the waste to the scrapyard. Sometimes I end up using funds out of my own pocket, I have partnered with a friend in terms of hiring a transport and this helps a bit.

I have also decided to focus more on the items that generate the most revenue to compensate for the transport fare, things like paper and cardboards even though they are not as plentiful as the other items. If I had my own transport I would focus at other areas to grow the project.

Happy Nappy Project – Cape Winelands Biosphere Reserve

This change project is about saving water usage by influencing or encouraging the use of re-usable nappies [cloth nappies] in the community. Surveys have been initiated in the community where the interest in nappies buying patterns, their use and general perceptions of nappies. In this change project, an alternative brand and type of nappies are presented as a potential solution to the nappy problem – the cloth nappy. There are projected financial and water savings implications in the medium to long term for community members who are interested in exploring the use of these cloth nappies.

Course Reflections

Participants have since submitted summaries of their change projects as shown above. There is still need for further follow through with participants on the change projects development, and also analysis of change projects in relation to the types of EI4WS activity that are being advanced, and how the course is contributing to this. This will be discussed in the next chapter on MEL.

The change project progress update and development process has helped us as facilitators think through the flexibility of this method for various contexts – there were two participants who were unable to follow the template guidelines that was offered for the change project development: The change project methodology assumes that there is ample time allocated to complete the various phases of project development from contextual profiling up to scaling for impact. With the uMngeni pilot, it would have been more realistic and practical [time wise] to spend ample time in the beginning to expand on its development process and reflect on a towards the end considering the 8-month period within which the graduates had worked in AEN.

CHAPTER 4:

MONITORING AND EVALUATION FRAMEWORK: ACTIVITY SYSTEMS, VALUE CREATION AND SCALING FOR IMPACT

4.1 Design and Development of the M&E tools

The M&E framework forms a key component of the Xabisa Indalo for Water course, and offers a structured approach to understanding the evolution of EI4WS activity, tracking the value created through learning processes which include development of EI4WS Activity Change Projects. Through this, the M&E is designed to surface emerging issues and innovation around scaling up Change Projects for impact within and beyond the demonstration catchments (uMngeni & Berg-Breede). In this framework monitoring and evaluation includes learning, research and reporting as processes (MERL).

In the Xabisa Indalo for Water course, in relation to the objectives above, designed a set of three different M&E tools, which both extend and align with the SLKMM MEL framework. These are:

- **Activity Systems Analysis** – which allows for both stakeholder understandings and a systems view of EI4WS activity, as being developed by stakeholders in their catchments and specific contexts and partnership structures; this also allows for 'gap analysis' or analysis of what needs to be changed, and a pre- and post-course activity system mapping and analysis (to be developed as part of the course assignment work)

will also point to key changes in the activity and its operationalisation. It also allows for a deepening understanding of the three *types* of activity that we identified as being important in the TNA and knowledge assets review, which we then also used as a conceptual framework for guiding the course design, and building learning networks.

- **Value Creation Analysis** – which allows for tracking the value that is being created for a) participants, and b) their institutions as they participate in the course processes. This will help to inform how the course can be enhanced and/or improved.
- **Scaling for Impact Analysis** – which allows for identifying how EI4WS can be further advanced in the context of specific change projects, but also collectively across the catchment as participants engage in advancing their selected EI4WS activity.

In the section below, we elaborate these three dimensions of the M&E framework and also the tools that could be used to extend the MEL work of the SLKMM, and the course. Our intention was to include these tools into an MEL 'workbook' that makes up Module 4 of the course.

Activity Systems Analysis – M&E of the activity and its advancement

EI4WS is a recent concept in South Africa and not widely applied at local catchment scale. Therefore, as indicated in the SLKMM and in Chapter 2 and 3 above (TNA and knowledge synthesis reviews and course pilots) there is a need for a transformative methodological framework that supports co-learning towards probing and strengthening the development of EI4WS concept and its associated practices. As indicated in the TNA (Chapter 2) to guide the Xabisa Indalo for Water Course design process, we have drawn on the Activity System Analysis approach to identify key streams or types of EI4WS Activity, which we have identified as:

- Monitoring Activity
- Investment Activity
- Policy Activity

As indicated in Chapter 2, the Activity System Analysis was carried out with participants involved in the EI4WS SLKMM, Components 1, 2 and 3 consultations, materials review and activity mapping in the two demonstration catchments. This helped us to map the knowledge assets and resources from the EI4WS components and partners. As discussed in Chapter 2 and 3, the course material development and curriculum deliberation process has been explicitly designed to expand the initial Activity System Analysis by drawing on learning experiences from partners in the Berg-Breede and uMngeni catchments to further deepen and contextualise the identified EI4WS training and capacity needs in form of course modules and

structure. Our analysis shows, which was confirmed by the *types of activity* that course participants worked on for their Change Projects, is that it is around these forms of activity that EI4WS practice emerges, and it is therefore around these forms of activity that the course has been designed. This can therefore also form a good focus for the evaluation work emerging from the course.

Activity does not just exist, it emerges in cultural historical activity systems – in other words, activity is contextually grounded – and in the EI4WS context, this activity is contextually located in catchments, hence we are working within demonstration catchments, and hence we also developed case studies of the types of EI4WS activity that are emerging in the catchments as described in Chapter 2. These were categorised according to the types of EI4WS activity. In this way we were also able to identify existing EI4WS in the catchments that could be further advanced.

At a more substantive level, we will therefore involve participants in analysis of the activity systems in which they are part. This will form a core part of their Change Project work. This will offer useful material for the M&E process.

Activity system analysis is a co-inquiry and learning-oriented tool for involving multiple actors in working out how to collectively learn and work together. Its strength is in enabling co-learning processes aimed at supporting collective transformation of practices, in what Engeström (1987; 2016) called “learning what is not yet there” (Figure 3).

Figure 3 below is the schematic representation of Activity System Analysis model that shows the relationships on how the leaner (subject) engage with their problem space or issue under investigation (object), using mediating artefacts (concepts and practical tools), to achieve their desired goals (motives & outcomes) of an activity (e.g. EI4WS Monitoring / Investment / Policy as an activity). This subject-tools-object interaction is mediated by the rules in the activity (formal and informal). For collective action, the subject must identify other stakeholders interested or involved in their problem space/ matters of concern (community), and in order to work together the subjects and community must develop a sense of responsibility and commitment to action based on their capacities and capabilities (division of labour).

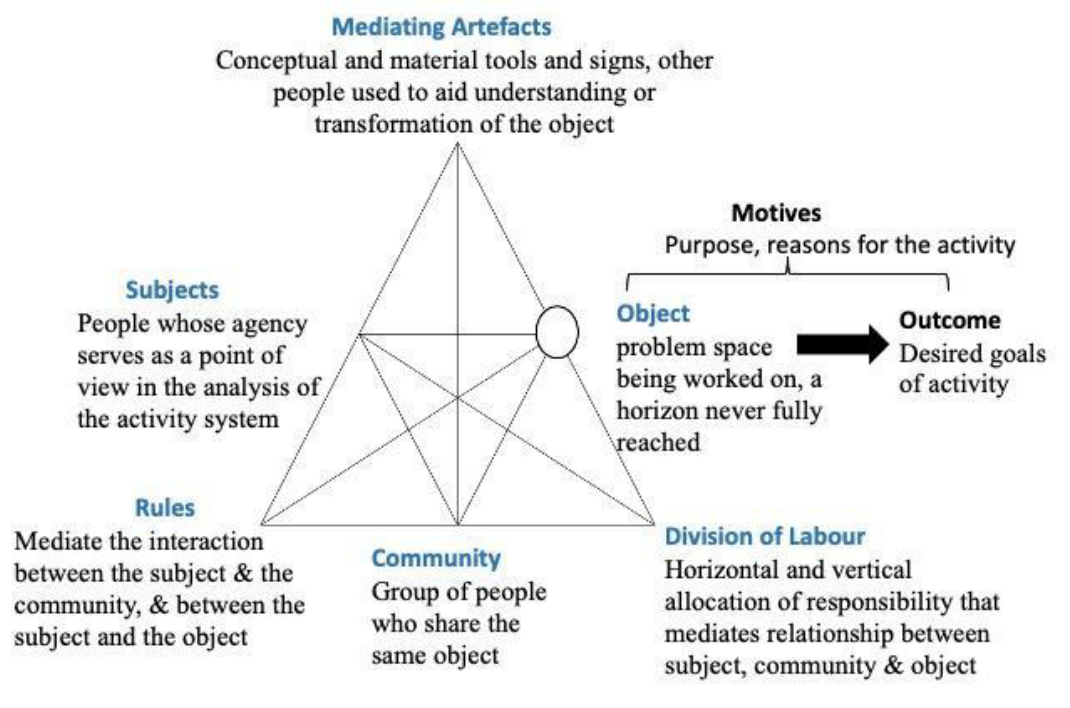


Figure 3. The Activity System Analysis approach (Engeström, 1987)

Some of the key notions of the Activity System Analysis approach and most relevant to the Xabisa Indalo for Water participatory course include:

- Learning is situated in cultural traditions of practices (e.g. Invasive Alien plants control is a restoration EI4WS Investment Activity that is governed and managed by different tools such as catchment management plans, strategies and policies or legislations, and these are informed by specific tools such as natural capital accounting).
- Learning happens when we confront contradictions in a historically developing EI4WS Monitoring / Investment or Policy activity (i.e. activity as a set of durable actions with a purpose or intention, e.g. EI4WS is an activity which involves a set of actions or practices such as policy development, financial investment, social learning mediating, etc, and the transformative learning emerges through our questioning and deepening matters of concerns within such practices).
- Learning is mediated by the use of tools (i.e. both conceptual and practical), e.g. the course participants will be using tools to mediate EI4WS activity; introducing new tools (via the Xabisa Indalo for Water Course) can therefore help to expand and extend the EI4WS activity in the activity systems that the participants are working in.

A key objective of the course is therefore to support participants to:

- Better understand and reflect on the EI4WS activity that they are part of (Monitoring Activity, Investment Activity or Policy Activity) or want to develop, and
- Expand this activity by using new tools and knowledge resources such as NCA and other economic or social learning tools.

Therefore, the Activity System Analysis can provide participants with a conceptual model that can help them to collectively engage with, and reflect on matters of concern, contradictions, challenges and tensions, as well as envisioning the transformation pathways (think critically, identify solutions or alternatives, take action) that are possible.

In Figure 4.1 below, we have illustrated how to explore the context of Xabisa Indalo for Water Activity using the activity system diagnostic questions. In the Change Project guidelines and M&E Module of the Course (Module 4) we will use this framework to assist participants to reflect on the activity that they are involved in be it either an EI4WS monitoring activity, an investment activity (e.g. NCA) or a policy activity. The questions in the framework below (Figure 4.1) will form the basis of the M&E process involving reflection on and further development of the activity. We will use this as a 'pre-' and 'post' course review tool. This will help to assess and monitor:

- What activity are Xabisa Indalo for Water course participants aiming to develop (object of their activity – monitoring, investment or policy activity)?
- Who is involved in the EI4WS activity in the catchment (subjects)?
- What tools, concepts and materials are they using to advance the EI4WS activity?
- Who is doing what in the EI4WS activity?
- What are the governance rules for the EI4WS activity (formal and informal, explicit and implicit?)

What tensions, contradictions and problems are confronting the activity system as they try to advance their EI4WS activity? (start of the course) and how has the course helped the activity system participants to address some of these challenges, tensions, contradictions, etc. to advance their activity? (after the course).

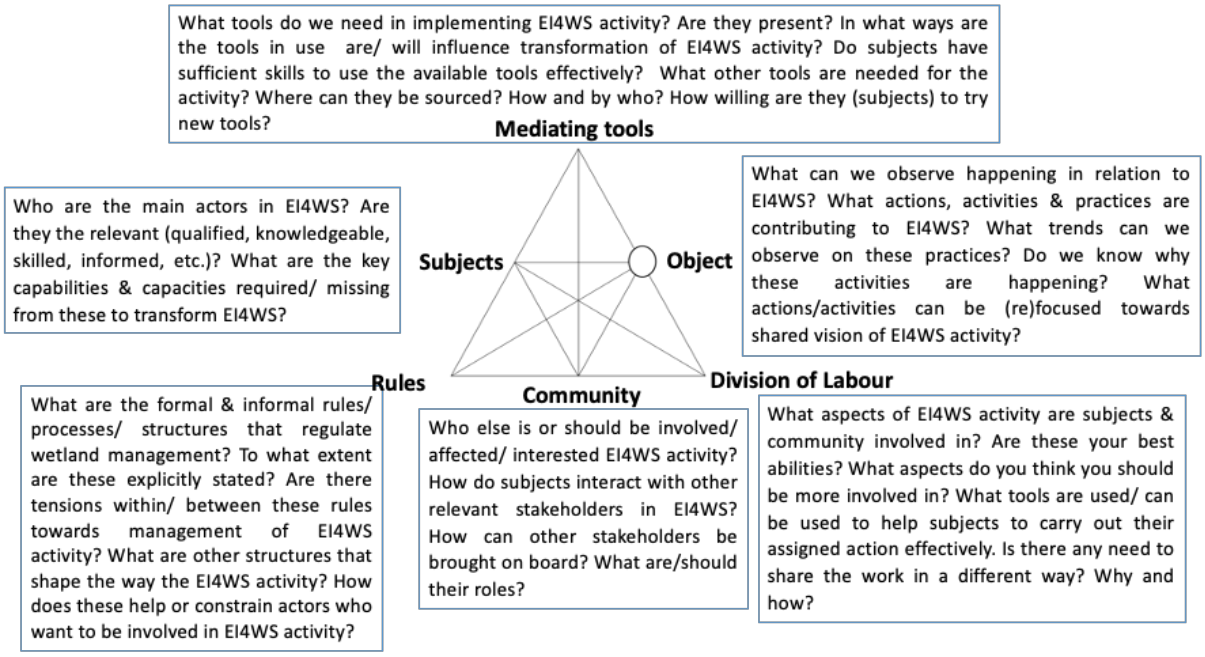


Figure 4.1 Activity Systems diagnostic questions

The Activity System approach is supported in the EI4WS SLKMM Strategy (see figure 4.1 above), with a recognition that no one person can change or transform a complex multileveled activity such as EI4WS, but rather sees the activity systemically, as being implemented in partnership by a range of stakeholders or actors through co-learning over time. This is why we use this as a framing for the Training of Trainers programme, and also within the M&E tools that will be used in the course. This can offer perspective on the activity in ways that review the advancement of EI4WS activity via a multi-actor engaged, systemic and co-learning orientation.

Importantly, one can involve participants in analysing and reflecting on their own activity systems, as it relates to the core interest / object of their activity. For example, a Xabisa Indalo for Water Course Participant interested in investment activity can be asked to reflect on his/her activity system using the Xabisa Indalo for Water M&E Tool 1 below:

M&E Tool 1:

Xabisa Indalo for Water Activity System Analysis

(pre-course / start of course) – to be adapted for end of course reflection

What type of activity are you involved in / interested in developing:

1) Monitoring Activity
2) Investment Activity
3) Policy Activity

Give a more specific description of this activity:

_____

_____

_____

_____

- Who is the main group involved in this EI4WS activity in the catchment (subjects) from your perspective / point of practice?

_____

_____

_____

- What tools, concepts and materials are you using to advance the EI4WS activity?

_____

_____

_____

- Who else is involved in the EI4WS activity and what do they do?

_____
_____
_____
_____
_____
_____

- What are the governance rules for the EI4WS activity (formal and informal, explicit and implicit?)

_____
_____
_____

What tensions, contradictions and problems are confronting the activity system as they try to advance their EI4WS activity? (start of the course) and how has the course helped the activity system participants to address some of these challenges, tensions, contradictions, etc. to advance their activity? (after the course).

_____
_____
_____
_____
_____
_____

Include any pictures or artefacts that give more information on the EI4WS activity that you are involved in, especially also information on the challenges or tensions in the activity.

NOTE: The use of this tool can be repeated at the end of the course as an 'outcome mapper' or tool for reflection on how the activity has transformed or changed as a result of engagement with the Xabisa Indalo for Water course.

Via use of the M&E Tool above as a pre-course / start of course and end of course reflection tool, the Activity System Analysis can be employed as a mediating tool during training workshops, working with identified course participants in the two pilot catchments (Berg-Breede and uMngeni). This can help participants to fully explore and contextualise the concept of EI4WS as a co-defined emerging and shared new object of activity, which allows one to identify practices that are already engaged in the activity of EI4WS these catchments (as well as identifying future EI4WS practices that are currently not implemented), partners and networks (i.e. existing or missing, as well as the mediating tools and learning processes in these networks), and the capacity development pathways to expand the EI4WS practices and address related contradictions within these EI4WS practices. The expansion of the activity can involve a process whereby course participants will be guided and supported in developing their own EI4WS Activity Change Projects.

The M&E team can then also further analyse the outcomes of these M&E processes offered by participants, in order to develop broader and more contextual understandings of the three types or streams of EI4WS activity that are in focus in the course. As indicated at the end of Chapter 4, there was not enough time to fully mobilise this approach to MEL in the course, but it has a lot of potential for the SLKMM strategy going forward.

The activity system analysis further offers lenses for understanding the EI4WS activities historically (i.e. how they have emerged or are emerging) and to explore current and future tensions in the EI4WS activity (see the SLKMM strategy below) on some of the existing tensions in the EI4WS activity, Lotz-Sisitka et al., 2020). Therefore we should not view Activity Systems Analysis as static, but overall, we should recognise and give attention to the fact that the Activity Systems Analysis framing posits that learning takes place through collective activities that are purposefully conducted around a common object of activity (shared purpose – e.g. the improved monitoring of water quality for EI4WS as one example, or integrating NCA principles into planning, or integrating EI in finance, etc.). Additionally, the activity system analysis further offers lenses for understanding the EI4WS activities historically (i.e. how they have already emerged or are emerging) and what the current tensions are in the activity (e.g. why it might be difficult to integrate EI into the financing models, or why it might be difficult to integrate management costs of EI into water licence conditions). Using the Activity System analysis framing, it is possible to a) develop further insight into the stakeholders involved in,

and interested in advancing EI4WS activity, thus contributing to the Stakeholder Mapping of the EI4WS SLKMM overall, and to contribute insights that integrate the systemic, learning and developmental components in the EI4WS SLKMM framework (Figure 4.2 below):

a) **systems component** – helps to construct meanings (i.e. knowledge asserts, gaps, needs, contradictions) from different EI4WS activity systems (i.e. NBI, CLCB, EI4WS components, catchment networks) contexts and situations in a range of catchments;
b) **learning component –** for exploring co-learning processes from these meanings, and
c) **developmental component** – expands meanings towards practical change projects that focus on the EI4WS scope of activity and intended outcomes and impacts as outlined above.

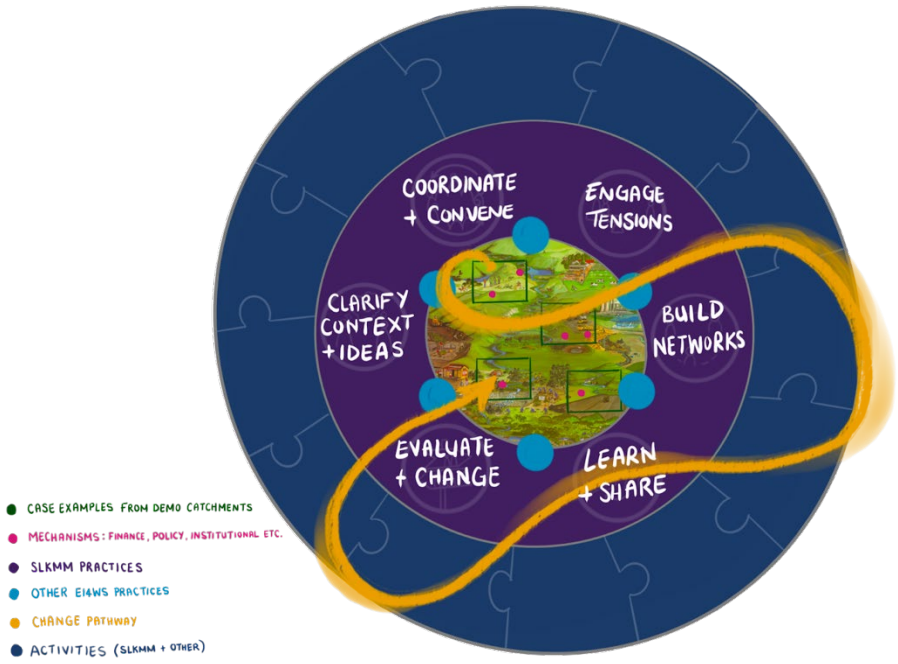


Figure 4.2. The SLKMM Strategy as Practice Model (from the SLKMM Strategy – Lotz-Sisitka et al., 2020)

Value Creation: M&E of the social learning process

The second approach to MEL in the Xabisa Indalo for Water Course involved use of the value-creation framework focussing on social learning evaluation (Wenger et al., 2011; Wenger-Trayner & Wenger-Trayner, 2019). This was also proposed in the SLKMM strategy (see Lotz-Sisitka et al., 2020) as a tool to guide the evaluation of emerging social learning processes. We were able to use and test this framework will in the Xabisa Indalo for Water course, at least to some extent [given the truncated time for the programme overall, this affected the MEL work]. In the course, we mainly used the value creation framework (VCF) as a process-based evaluation tool to reflect on the value that is created through the course processes and the developing EI4WS Monitoring/ Investment / Policy Activity Change Projects (as outcomes) and the application of social learning methodologies to support [social] innovations around partnership building; knowledge mediation and learning networks.

The value creation framework was designed into a useful M&E tool (see M&E Tool 2) for participants to develop insights into their own learning, and the value that is created for them as they participate in the course and work on their Change Projects. The VCF data generated by the course participants can also be used for wider more systematic review of the Change Projects as they develop across a landscape of practice, time permitting. The data can also inform context-specific cases that expand the evidence base of EI4WS that are aligned to broader M&E of the EI4WS SLKMM Strategy.

In SANBI's policy document titled '*A Framework for Investing in Ecological Infrastructure in South Africa'* Principle 7 states that …"investment in ecological infrastructure should include monitoring and evaluation and that …monitoring should apply to biophysical data, as well as data on any additional socio-economic benefits that the project is aiming to achieve". As indicated in Chapters 2 and 3 of this report, this course focuses on mobilising knowledge capital that exists in research and practices and through the use of the VCF framework. As such, the course can generate data that can contribute to this relatively under-researched field of EI (in South Africa) and thus complement contributions to investments focusing on aspects of financing, planning and development of EI4WS practices in the demonstration catchments.

As discussed in Chapter 3, the Change Project is another tool that forms part of the bigger framework. It is a tried and tested approach (cf. Lotz-Sisitka et al., 2016; Burt et al., 2020; Pesanayi, 2019; Burt et al., 2018) – pilot tested through 20+ years of research in the Environmental Learning Research Centre (ELRC) at Rhodes University and in a number of

WRC social learning projects) that is based on an expansive learning framework which emphasizes transformation of practices through collective social learning processes. It allows for boundary crossing and collective transformative agency development that is supported by applied use of new knowledge in ways that build on existing knowledge and experience assets, networks and contextual dynamics. It is also an approach that has tried and tested results in the formation of social learning networks that continue after courses have been implemented, and offers a strong mechanism for catalysing learning networks while also leading to practical results on the ground (ibid).

The value creation framework is an appropriate framework for evaluating expansive social learning processes, i.e. what is unfolding through the Change Projects. Thus in developing these tools for the M&E, we were seeking alignment with the MEL framework of the SLKMM Strategy.

Background And Context Of Value Creation Tools And Monitoring

Although there has been a plethora of work on communities of practice in the social sciences, organizations and professional disciplines (Oreszczyn et al., 2010; Tran et al., 2018), an analysis of what community members accrue from their participation in these communities is still an under-researched issue (Dingyloudi and Strijbos 2015). It is imperative to obtain ways of capturing the social consequences of planned interventions such as policies, programmes and projects, and then understand the change processes emerging from those interventions by an analysis directed towards the social consequences of the interventions or projects (Argote et al., 2003). The above sentiments highlight the importance to develop methodologies and methods that allow a focus on both what is meaningful and what is measurable (Booth and Kellogg, 2015). It is to this end, that Wenger, Trayner, and de Laat's (2011) value creation framework (VCF) was formulated as a means of demonstrating value created in communities and networks (Guldberg et al., 2021). In this particular framework, value as a concept relates to participation in spaces (activity, practices, etc.) where there is social learning occurring and is defined as what is important, worthy and useful to the individuals involved in a community (Wenger-Trayner et al., 2017). The value-creation framework is grounded in social learning theory (Wenger, Trayner, and de Laat 2011), and based on viewing learning as a social process embedded within activity, context and culture (Lave and Wenger, 1991). The value creation framework embodies both a theory of change regarding how social learning can make a difference in the world and a rigorous method for assessing learning in a community.

In addition to the Activity System Analysis outlined in above, the value creation framework outlined here is an important tool which we will use to monitor processes learning and evaluate against the objectives of the project. The VCF is potentially beneficial to the project because it provides lenses on value being created for the practice/(s) out of the social learning process; it is a theory developed to see what value is being created as we follow the learning process (Wenger et al., 2011; Wenger-Trayner, and Wenger-Trayner 2014). The VCF is based on reflective praxis because people can constantly review and build on their practise as they monitor the outcomes. The importance of constant evaluation of the EI4WS practices in existing networks/platforms/ communities of practice in the demonstration catchments can be summarised by the following statement: programme evaluation is essential in order to account to stakeholders (those who invest time, money and hope that projects will succeed). However, we also need evaluation in order to learn from implementation. What is working in this project, and why? What is not working, and why? (Rosenberg, 2018).

The answers to such questions allow implementers to improve practice and change course when necessary (Biggs et al., 2003). It also allows programme designers and government to design innovative programmes and take successful initiatives to scale, based on a sound understanding of programme theories and mechanisms – why they work and in what contexts (Rosenberg, 2018). The VCF will assist with monitoring and evaluating the objectives of the EI4WS objectives, because it is designed to evaluate social learning processes, especially in this case, co-learning and strengthening social learning and knowledge mediation around EI4WS financing, policy, planning and development.

Development of a Value Creation Monitoring and Evaluation Tool

Tracking progress and continual evaluation of aims and objectives is an essential element of the EI4WS Project, which is why the VCF, which evaluates different types of value (Figure 4.2) along the process chain through reflectively developed indicators that emerge from the process via consideration of the ground or need state and the aspiration, will serve as an excellent tool for this project and will be beneficial especially in the aspect of tracking of social learning in order to scale up the participatory course in the Berg-Breede, uMngeni and other catchments. The VCF lenses (Figure 4.3) allow for reflecting on the course implementation process and articulation of evidence of stories of change/value, learning that may occur and to identify any gaps which are present and require attention.

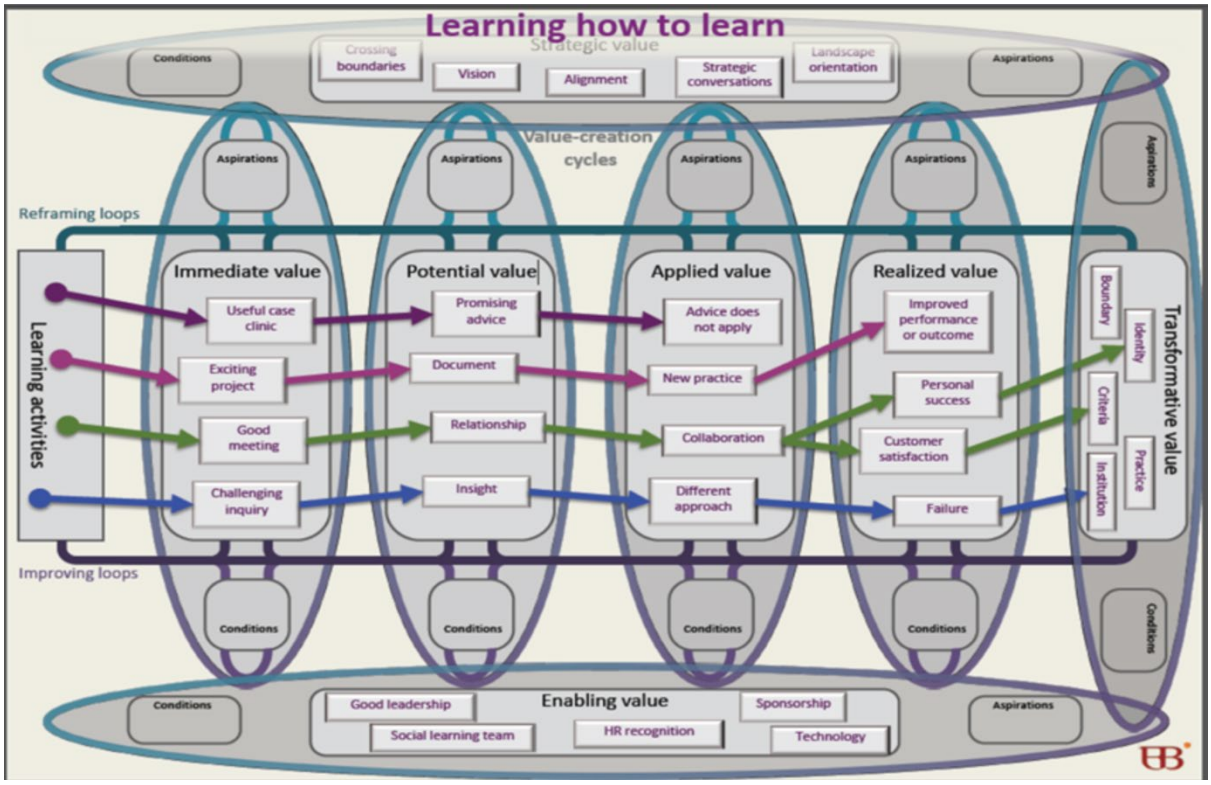


Figure 4.3. Value Creation Framework tool

(Wenger-Trayner, and Wenger-Trayner 2014) with different types of value and associated indicators that can be developed.

The VCF portrays social learning in terms of loops across value-creation cycles (Karen Guldberg et al., 2021). Wenger-Trayner et al. (2017:3) provide a description of four of these value-creation cycles in the following manner:

(a) engaging in social learning can create immediate value such as the company of like-minded people or doing something exciting;
(b) this engagement can create potential value such as insights, connections or resources;
(c) drawing on these insights, connections or resources to change one's practice requires much creativity and learning, and thus is viewed as generating applied value;
(d) to the extent that changes in practice make a difference to what really matters, social learning produces realised value.

It is also important to acknowledge that the EI4WS is a complex object that requires a multidimensional and systemic evaluation approach, and the VCF does not imply a linear process and can trace feedback loops and reinforcements. And this is a systemic approach to evaluating learning in a multifaceted object such as EI4WS.

In its design, the framework is intended to support the integration of a diversity of sources and types of data (Wenger et al., 2011) as 'the evaluation of social interventions is challenging because effects are indirect and often attributable to multiple factors' (Wenger-Trayner et al., 2017:4). It is imperative to capture the effects on things that matter to stakeholders while at the same time having the ability to claim that the intervention contributed to this effect (Wenger-Trayner et al., 2017).

For VCF, there are lenses provided by the framework to evaluate the value created for the stakeholders out of the social learning process. The lenses are as follows:

a) Immediate value: What happened and what was my experience of it? (the activities and interactions between members have value in and of themselves)

b) Potential value: What has all this activity produced? (the activities and interactions of cycle 1 may not be realized immediately, but rather be saved up as knowledge capital whose value is in its potential to be realized later).

c) Applied value: What difference has it made to my practice/life/context? (knowledge capital may or may not be put into use. Leveraging capital requires adapting and applying it to a specific situation).

d) Realized value: What difference has it made to my ability to achieve what matters to me or other stakeholders? (even applied new practices or tools are not enough. A change in practice does not necessarily lead to improved performance, so it is important to find out what effects the application of knowledge capital is having on the achievement of what matters to stakeholders)

e) Reframing value: Has it changed my or other stakeholders' understanding and definition of what matters? (this happens when learning causes a reconsideration of how success is defined. It includes reframing strategies, goals and values)

Capturing Insights for Monitoring and Evaluation

In the Xabisa Indalo for Water project, we designed the evaluation framework to make use of the two parallel monitoring and evaluation processes to develop a reinforced approach to knowledge co-creation.

- Course participants will make use of the VCF (and its associated guiding documents and tools) in their change project development to capture experiences (individually); their co-learning through engagements in catchment networks and communities of practice (see M&E Tool 2 below – which offers a narrative interview tool participants can use in reflecting on their own participation in the course, and which they can also

use to include the views of others who are participating in the Change project with them). M&E Tool 3 offers a more summative VCF tool for participants to complete at the end of the course. It can also be used during the course to offer perspective on the learning journey.

M&E Tool 2:

Value Creation Framework

Narrative Interview / Reflection Tool

(Wenger-Trayner and Wenger-Trayner, 2014) (Adapted and modified for the EI4WS project).

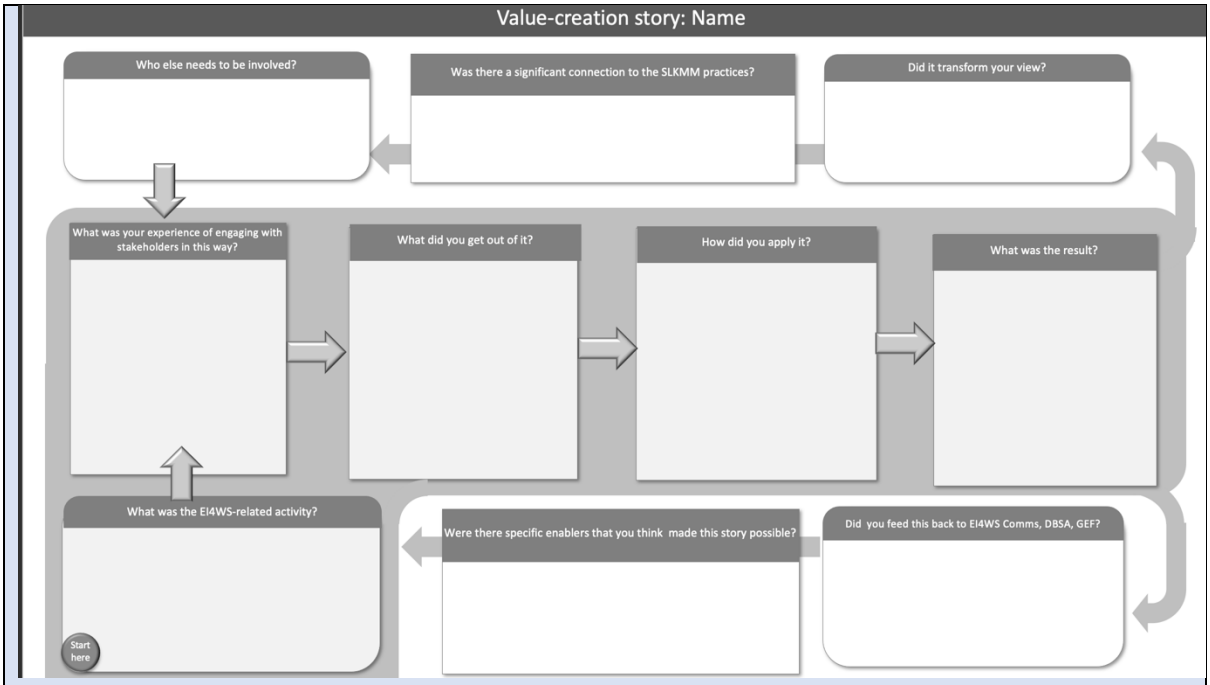
Questions	Response
1. What meaningful activities did you participate in with regards to the Xabisa Indalo for Water [investing in nature for water] course and your selected Change Project activity (e.g. monitoring activity / investment activity / policy activity)?	
2. What specific insights did you gain from this? What access to useful information or material did you gain?	
3. How did this influence your practice? What did it enable that would not have happened otherwise?	

4a. What difference did it make to your performance or your life? How did this contribute to your personal/professional development? 4b. How did this contribute to the goal of the organization or your own activity (e.g. monitoring activity, investment activity, policy activity)? Qualitatively? Quantitatively?	
5. Has this changed your or some other stakeholder's understanding of what matters when it comes to Xabisa Indalo for Water?	

M&E Tool 3:

Value Creation Story Template

Use the process map below to reflect on the Xabisa Indalo for Water Activity that you have been developing



This will be a reflective tool, included in the Module 4 workbook, which participants can complete during and at the end of the course.

Based on the data generated through the use of the VCF M&E Tools 2 and 3 above, the facilitation team can also carry out reflexive process collectively as an evaluation of course implementation, to inform the development of a Training of Trainers course to support continued course implementation and scaling up of the revised course. The VCF analysis can then also be aligned to the VCF reporting framework proposed in the SLKMM strategy (see Figure 4.4 below).

The intention is that a reflexive learning workshop be held at the end of course piloting, where stakeholders involved can review the revised materials for Training of Trainers course aimed for further scaling into other catchments beyond this project. In this we will also use the VCF reporting framework proposed in the SLKMM strategy (see Figure 4.4).

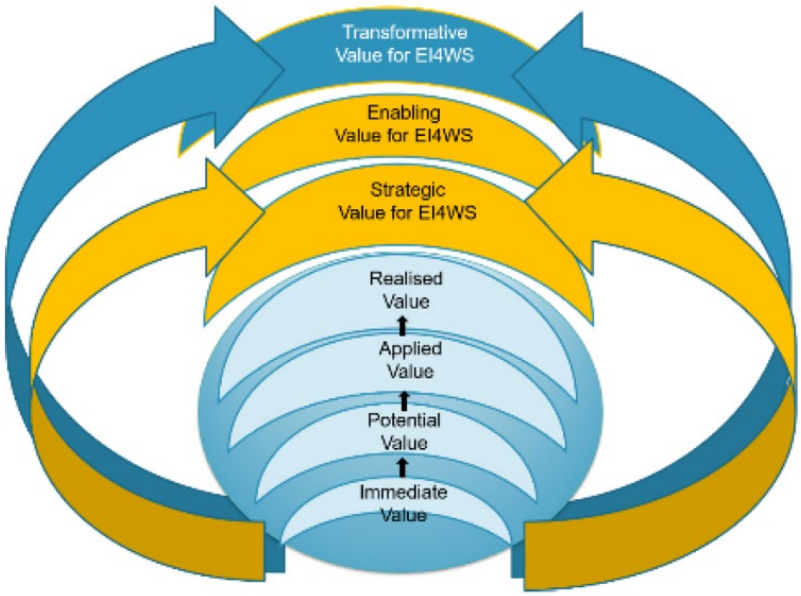


Figure 4.4. The Value Creation framework for evaluating the emergence of types of value form and outcomes of social learning over time (Wenger et al., 2011; Wenger-Trayner and Wenger-Trayner, 2019). Source: Lotz-Sisitka et al., 2020.

Scaling for Impact: Finding value and leverage points for further scaling of the Xabisa Indalo for Water

The Value Creation Framework was designed to monitor and evaluate processes of participation in social learning, which at times tends to be complex. Social learning allows for qualitative aspects to emerge, which are often difficult to measure. These 'softer results' are those such as the social capital which is built with a diverse group of people who seem to have the social cohesion required to work together constructively through tensions and conflicts. The trust within a group in creating a safe space for learning and sharing is also a 'softer result'. When we evaluate these 'softer results', we will reflect deeply on the process of learning. The Activity System Analysis framework will prove useful in reflecting on the transformative social learning and agency and thus assist us in generating credible, justifiable evidence of value creation from the EI4WS Change Projects.

The use of a value-creation framework (Wenger-Trayner, E and Wenger-Trayner, B., 2020 and Wenger-Trayner, B., 2010) additionally offers a structured way to address the questions of:

- What did we aspire to?
- What actually happened?
- What should we aspire to in the next phase of the EI4WS project?

The latter question implies planning: that while working with various processes in our monitoring and evaluation we begin to think about how to scale our work. Evaluation complements monitoring (Rosenberg, 2021) and offers valuable insights with which to reflect on the outcomes.

The question *"what should we aspire to in the next phase of the EI4WS project?"* allows practitioners begin to think about their own Xabisa Indalo for Water Activity Change Projects systemically. This process is key to the establishment/ activation of learning networks development of a refined training of trainers course that could potentially be adapted or scaled into other catchments.

When we speak of scaling, we refer to the progress and strength of a Change Project, and its potential to be replicated or expanded. This replication or expansion can be at different levels, and of different types as shown in Figure 4.5 below.

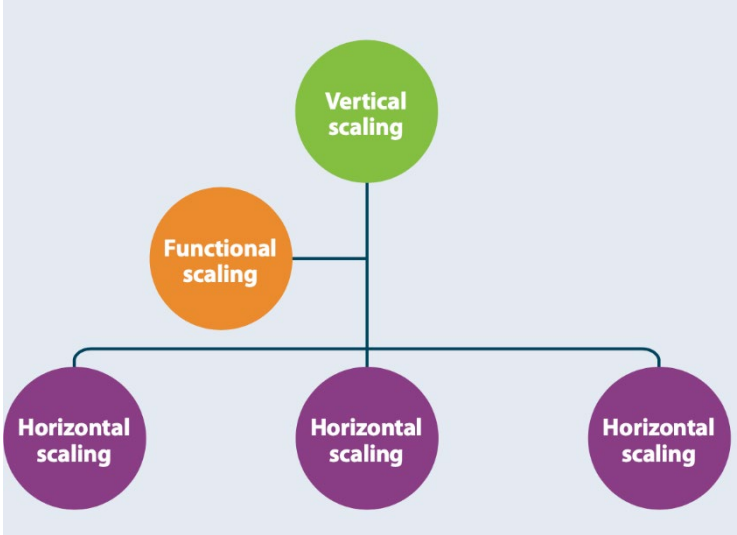


Figure 4.5. Different types of scaling for impact (source: UNESCO/RU, 2018)

- **Vertical scaling**: This type of scaling refers to working with multi-level institutions government or institutional decisions (policy changes, legal actions). For example, the Xabisa Indalo for Water Activity Change Project could lead to an EI4WS policy.
- **Horizontal scaling:** This refers to scaling for impact more laterally to cover wider geographical or institutional areas, such as scaling of the Xabisa Indalo for Water activity to cover different sector departments and/or institutions.
- **Functional scaling:** Refers to expanding the scope of the EI4WS programme, i.e. additional activities or functions. It also entails finding solutions to new problems.

M&E Tool 4:

Planning to scale or extend your Xabisa for Indalo Activity Change Project to extend impact

1. What do you plan to scale for impact in your Change Project?

_____

_____

_____

2. Where and through which levels and areas of scaling would you aim to scale your Xabisa Indalo for Water Change Project (vertical, horizontal, functional?)

_____

_____

_____

3. When do you think the activities can be scaled for impact?

_____

_____

_____

_____

4. Why do you think it would be worthwhile to we scale the Xabisa Indalo for Water activity?

_____

_____

_____

5. Who should be involved in the scaling process and impacts of your Change Project and how?

6. What resources will be needed to scale impact of your Change Project (human, financial, materials, etc.), and how can you build these into the organisation's annual budgeting process?

7. What are the anticipated impacts in terms of the dimensions (vertical, horizontal and functional) scaling?

8. What are the anticipated time frames for guiding the scaling for impact phase of your Change Project?

As can be seen from the M&E Framework above, we developed a M&E framework that covers understanding of the activity and activity system, including stakeholders who are involved in the activity, tools, concepts and activities being used and developed, the learning process on the course, and the value that it is creating for those involved and the catchment overall, as well as potential for expanding and further scaling of the activity within wider learning networks. Easy to use M&E tools have been designed (see M&E Tools 1-4) that allow participants to be directly involved in the M&E and therefore to also use the tools for their own reflection and

professional development. At the same time, the data produced in and via the tools can also be used for wider analysis across the course participants and in the catchments where participants are advancing EI4WS activity. Both sets of data will be valuable for contributing to the overall evaluation of social learning in the EI4WS SKLMM Strategy which requires data on stakeholder identification processes, networking mapping and various EI4WS activities and thinking and innovating around scaling for impact. The tools are being included into a 'M&E Workbook' that we had hoped all participants can complete as part of the course. This provides primary data, which can be complemented by group interview and reflection activities in Module 4 of the course.

As indicated in the overall evaluation below, it was not possible for us to apply all of these tools in their fullest sense, due mainly to truncated timelines in the project, and the need for more substantive integration of the MEL tools into the processes as they unfolded. We were, however, able to test some of the aspects of these tools as discussed below.

4.2 Applications of the MEL Framework and Tools

Activity System Analysis and Advancement through MEL work:

As indicated above, we have not had enough time in the project to fully apply the MEL tools and frameworks. However, there are some indications that the MEL framework that we designed is indeed useful for advancing understanding of how the course engagements can expand and enhance EI4WS. In the uMngeni pilot course, for example we could identify expansion of the following types of activity, briefly summarised below:

1) **Investment Activity:** The blended financing model and approach was expanded by DUCTs partnership building activity that involved partners contributing a percentage of the cost of hosting the EnviroChamps. The expansion of the model was supported in part by the Xabisa Indalo and SLKMM teams work to developed strengthen this model through contributing to the Feasibility Study for the Water Fund, training of the EnviroChamps working in the projects, and through ongoing reflections on the model with the teams involved, captured in brief below:

INVESTMENT & FINANCING MODEL

Consolidate	Continue	Refine
1st: Consolidate partnership tools for a blended investment / finance partnership model	Next: Continue to pilot / develop the model giving attention to diversity of investment contributions	Next: Refine leverage points with diverse actors and funders, and their specific contributions and roles

2) **Monitoring activity:** Monitoring activity was also expanded through the collaborative social learning process in a number of ways: EnviroChamps were more able to use the tools available to undertake monitoring, and especially the Data Detectives were more able to make sense of the data that was being captured on the Field Survey App, which in turn helped to inform both the scope of tools being used for monitoring, and the use of the tools themselves. Valuable insights were also gained on how to expand the tools and improve them for future use. Especially useful insights into the social dynamics of the monitoring were produced through the ongoing reflections, tools development and testing, and reporting on the use of the tools. The main trajectory associated with activity expansion here is indicated in the slide from the reflection workshop below.

TOOLS

Align	Develop	Build
1st: Align tools with data needs: Especially Refine the App, and the data processing approaches, but also other tools to advance the practices - Clearly articulate training needed for use of each tool and integrate carefully with the learning programme	Next: Develop a clear framework for data processing into management action, as well as social learning and community beneficiation : What do do with the data to maximise the monitoring work?	Next: Build the online portal that holds all of the data – but do this with a national institution that has capacity to keep it up (e.g. SAEON / RVAC teams)

3) Work for the Common Good activity / CBWQM activity: There were also useful insights gained into the model of work that was being used in the AEN programme, which also influences the kind of investment and training possibilities for EI4WS in PES type programmes. Especially the need for more sustainable models of work / investment in work for EI4WS was highlighted by participants to make this a more sustainable form of activity / investment. These are captured in brief below in the reflection slide from the AEN final workshop. Here it is interesting to note that it is important to identify viable workstreams, and to move away from the short term 'stipend treadmill' and short termism in the nature of work being created for EI4WS in South Africa.

WORK

Consolidate	Identify	Work out
1st: Consolidate the concept of what 'work for the common good means' and should mean – in practice and at different levels (ECs, graduates etc.) - IDENTIFY WORKSTREAMS! – align with training	Next: Identify good sources of funding that will allow further development of this type of work – if possible beyond the stipend treadmill and short termism	Next: Work out the systems needed to properly support this work with a longer term lens, and with emphasis on capacity for economic agency and diversity of career trajectories

4) **Social Learning / learning programmes supporting the above activity:** In tandem with the above expansion of investment, monitoring and work creation activity (all related) is the need to also expand the type of training activity – beyond a short course intervention to more situated, longer term training programmes that are aligned with the skills system and its approaches to investing in training for EI4WS, as captured in brief in the slide below (and as discussed above in Chapter 3).

LEARNING

Review and Frame	Extend and design	Approach
1st: Review and Frame the Learning Pathway/s via CBWQM into economic agency, and a diversity of work opportunities / workstreams within an expansive learning model	Next: Extend and design a revised online-offline course for EnviroChamps that can be rolled out across SA in all catchments : A full learning programme 'for the future' not just for technical proficiency ; including mentoring capacity building	Next: Approach skills sector partners (e.g. SETAs / QCTO / NSA to consolidate the accreditation and seek additional support for the "Learn for the Future" programme (also investigate Apprenticeship type funding ...) linking to the incubation + 12-18 month etc. model

Thus, overall, in the AEN case, we were able to reflect on how types and forms of related activity were expanding, and how they need to be further developed in support of EI4WS in South Africa, especially more sustainable forms of EI4WS that also create more sustainable and substantive learning pathways for those involved in the activity. This is directly related to the type of investments and how they are being made (i.e. there is a clear need to move away from short termism in the nature of investing in EI4WS, and associated job creation models).

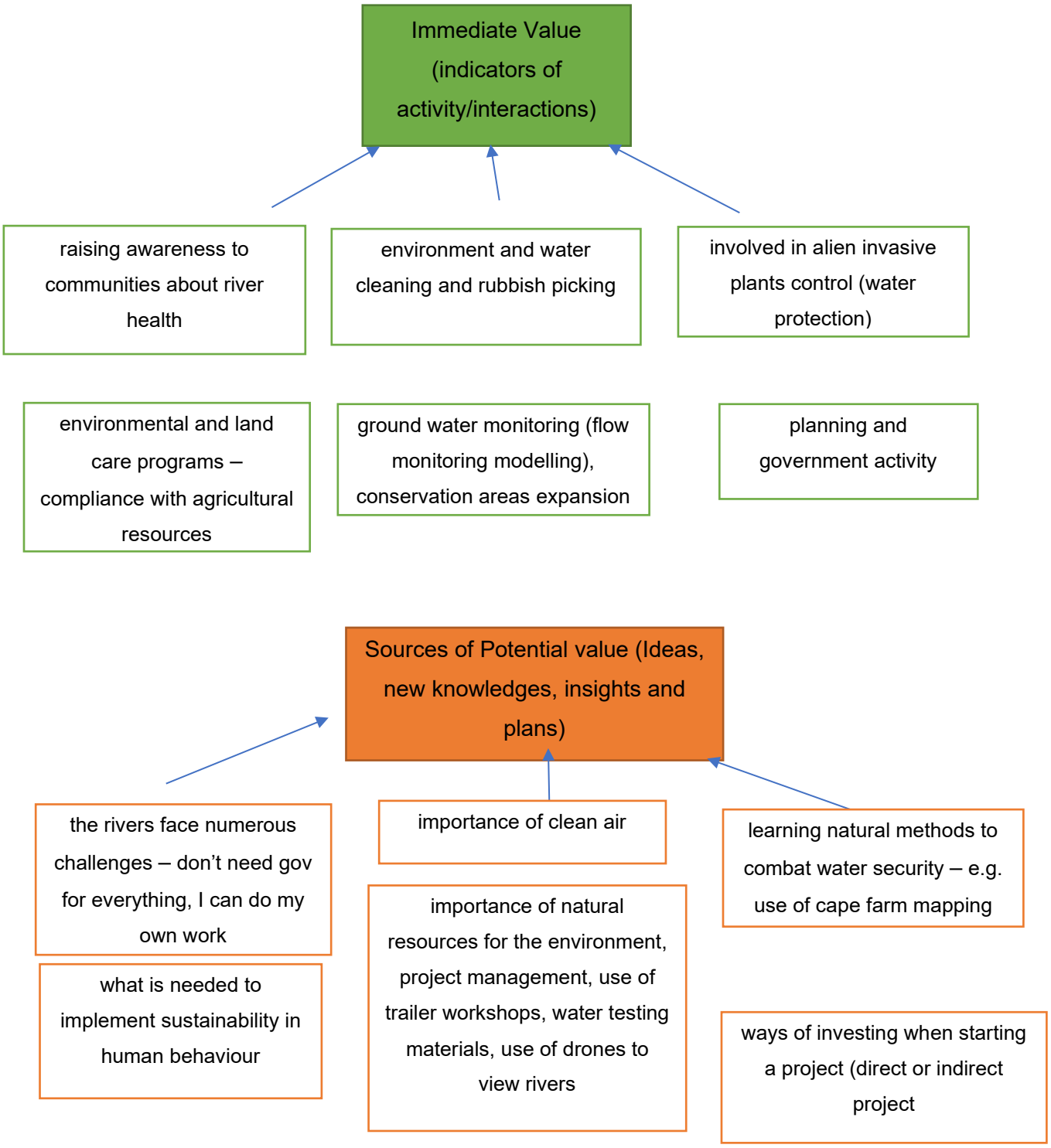
Value Creation Framework MEL tools for understanding the course learning

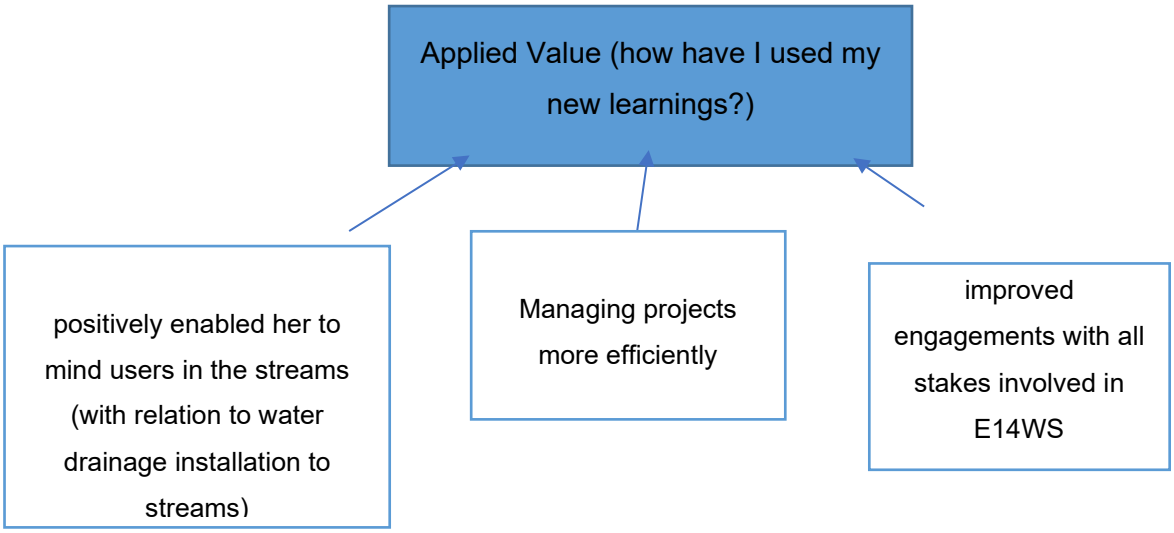
The second type of MEL that was undertaken was use of the MEL framework. This was used mainly in the second pilot, in the Berg-Breede context. It offered valuable insights into the course and its implementation which still need to be fully reflected on due to a lack of available time to invest more fully in the MEL processes. Thus, the insights shared below still need further analysis and interpretation.

The VCF was important to capture the learning which accrued from this pilot programme, both for academic purposes and practical water security purposes in the catchment. Two VCF sessions were held; one during the first session in Worcester in November, and the last one after the last course session. The VCF had certain questions, which the participants answered, and they were guided by certain questions which were contextually adapted and these were related to EI4WS (see tools above); each and every portion of the value creation was explained carefully. The different types of values which exist and are present in the framework

were explained. The first VCF was to understand the activities people were involved in before commencing on the Xabisa Indalo for Water course. The second VCF was to capture and evaluate the social learning which participants accrued during their participation in the Xabisa Indalo for Water course.

1st VCF analysis



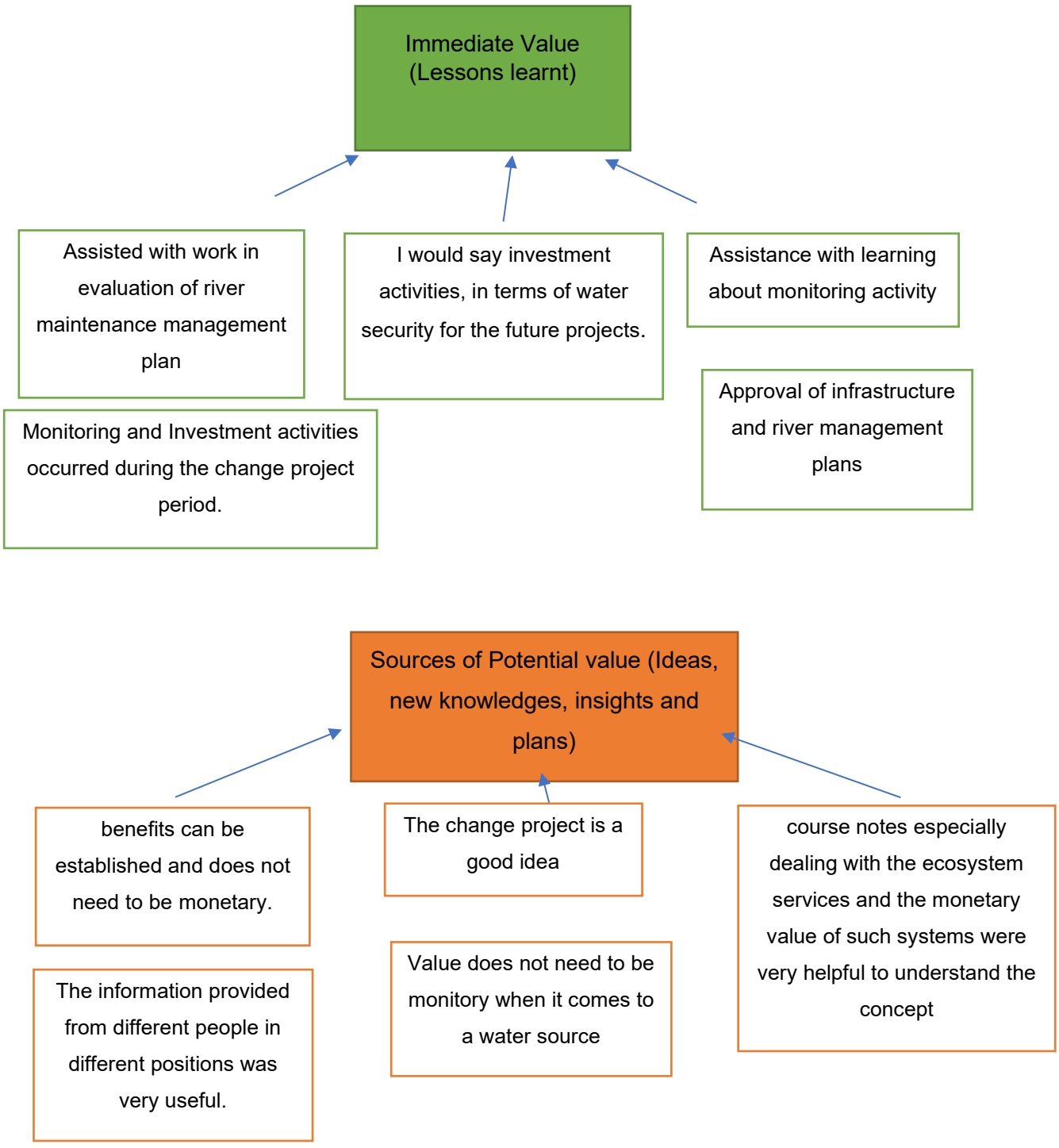


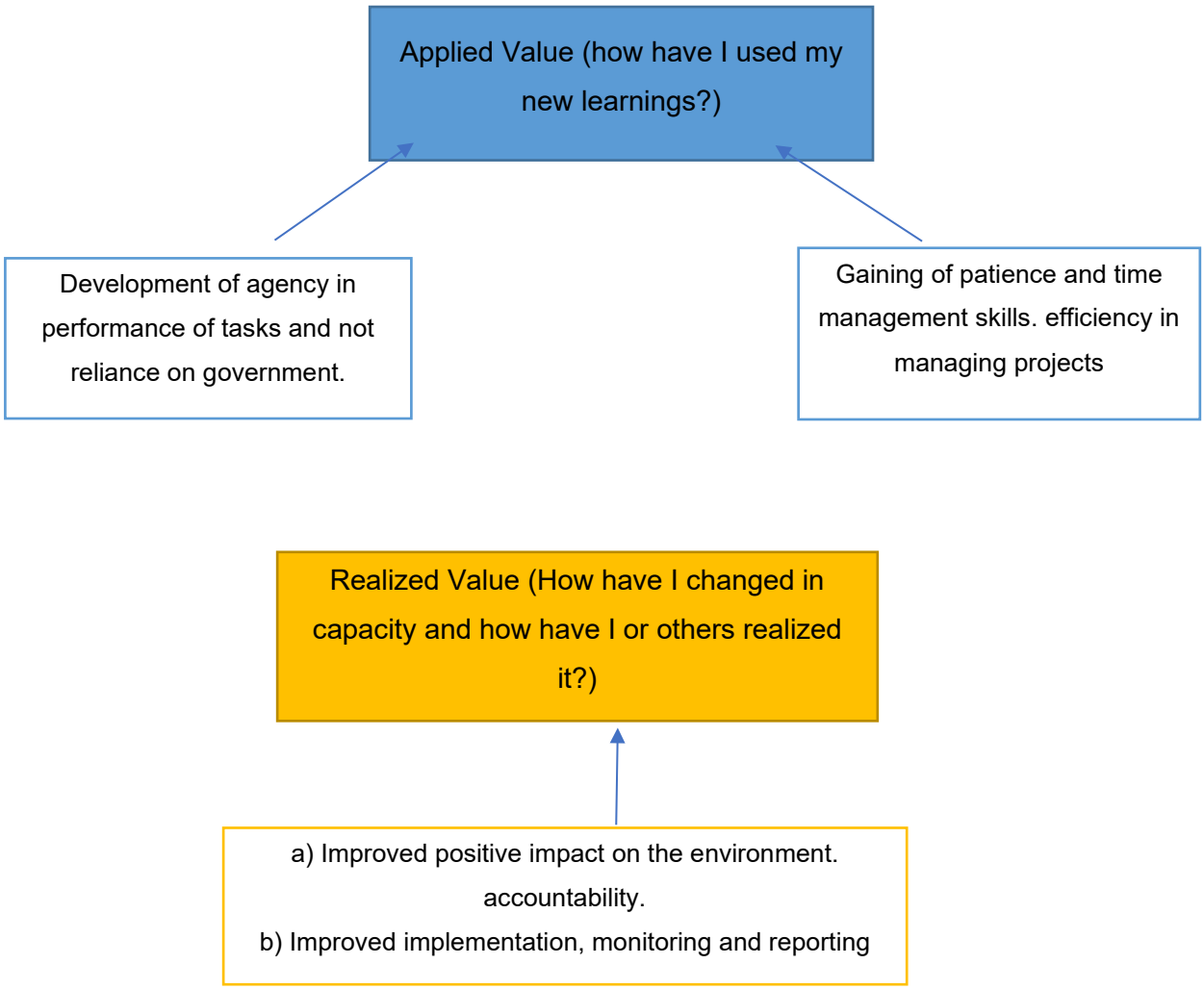
The first source of value which was looked at were the immediate value sources and we looked at indicators with activity and interactions. The activities relating to EI4WS were diverse and reflected the diverse professions which were represented in the course. Diversity is important for representation and ensuring wide spectrum of views. The course possesses a mixture of on-the-ground practitioners (involved in community projects), government officials (at ground-level and strategic levels) and hybrid between these two stakeholder levels (as reported in Chapter 3).

The next part involved the indicators of knowledge capital, which align with the potential value. So, upon people receiving knowledge about water security and water resources, they were able to receive knowledge or ideas or any sort of inspiration, which would allow them to be able to use the information regarding water security. There was a diversity of insights gained by the participants from their interaction with EI4WS activities. These new insights or knowledges are potential value because they have not been applied; they can be either applied or not applied, based on the participants' needs.

The indicators of change in practice, were reflection of the applied value which the participants had applied from the different learnings about water security they had received. The different indicators are also a reflection of the diversity of ways in which people use knowledge or learning in their own context. There were different ways in which people used their potential knowledge in order to apply them to their unique scenarios. These indicators also express the differences in the context of the participants or the stakeholders which are involved in Xabisa Indalo course; diversity offers a wider insight into EI4WS activity.

2nd VCF analysis – these give insight into the value created for participants during or through the Xabisa Indalo for Water course





The above answers are some of the key insights which came from the analysis, in fact, they represent most of the key sentiments which were expressed by the stakeholders who responded to and participated in the MEL process. These answers represent the value that the participants accrued from the Xabisa Indalo course. There were multiple learnings which proceeded out of the expansive learning process, according to the above schematics. Most of the output was associated with ideas, new knowledges, insights and plans. This is a first step towards a positive direction, because it expresses that people actually managed to learn something valuable enough to inform and potentially influence their practice. How the participants had used the new learnings was a way of establishing if the expansive learning process had an applicable value to the stakeholders. The expansive learning process has actionable repercussions and is not just a theoretical exercise. The realized value is an expression of how the learning journey was able to shift a person's role in the context of their

personal development and in their work/community and to bring value to issues of water management.

Another VCF will be embarked on after three months, because realized and transformative value develops over time. The lack of representation in the applied, realized and transformative value is an expression of the participants' need for time to work on their change projects, and to fully use the knowledge accrued from the course in their work activities. There were also some reflections which occurred throughout the Xabisa Indalo course, which corresponded with the VCF sessions. The reflections added value to the course and enable the Xabisa Indalo team to understand the areas where participants gained value, and the area where there could be improvement.

Expectations from Xabisa Indalo Course

1. *"To broaden my knowledge of ecological infrastructure; how to measure non-financial investments"*
2. *"Cost-benefit analysis, to understand this in the context of natural resources such as rivers or water bodies."*
3. *"To broaden my knowledge of the various aspects within the environmental field, in order to help me determine where actual interests are."*
4. *"To understand the value implementation of NEMA EIA regulations have on the environment especially when it comes to approving the development of infrastructure for river protection and adapting MMPs for future maintenance of a river, inclusive of built infrastructure."*
5. *"to understand the Natural environmental management act, environmental impact assessment regulations."*
6. *"to learn about the River maintenance management act."*
7. *"How are other people learning in their contexts and get a sense of where everyone else is working (e.g. politics in the Breede, challenges, etc.)."*
8. *"What do we do practically with the learning (how do we apply it in our context) and how it influences our network."*
9. *"Learn from the 'situations' we found ourselves in. How do we do this together? So in essence, how do we learn from each other and our*

experiences in our various contexts? How do we all qualify scientific knowledge practically?"
10. *"To learn how to communicate better as government officials, because the government alone cannot be the sole water custodians – water is everyone's business."*
11. *"What knowledge formats are most applicable and to whom?"*
12. *"Government has little time to review scientific/academic articles."*
13. *"How are other people learning in their own context."*
14. *"We have good, rich scientific knowledge and our issue is not the knowledge, it is how it is translatable to those who need to look at it?"*

Reflections on the Xabisa Indalo Course

In the section below we include verbatim reflections of course participants on the course, and their experience of it.

1. ***"Thinking about the process leading up to the course, what do you think we could improve on to make the process more convenient."***

- "communication, I was under the impression that the participants had an option of choosing which session to attend between the 3 dates, was not aware that the course has 3 modules."
- "everything fine – good preparation"
- "Everything went well."
- "bring more expertise in the field of environment"
- "It would help to especially where you speak about using tools to determine the value of ecological infrastructure if one can work through an example together and perhaps apply it to a scenario. It is difficult to measure these values and it would be great to better understood this especially if you have to collaborate with different parties, i.e. farmers and communities that needs to get involved from not only physical contribution but also monetary contributions."
- It would be helpful if ecological infrastructure can be dealt with in a little deeper as well as to see how this relates to the management when you need to use hard infrastructure to maintain a system. It is understood that it would be best to maintain a system as ecologically functioning as possible, but the reality is that we have weirs, dams, sluices, erosion that is combated with gabion baskets, etc. as part of our system. So, if we deal with a development for example where a water users association wants to maintain a river system, how do we advise that natural maintenance need to be explored first if practice has shown that hard infrastructure is more practical."

- "There were too much presentations and less engagement of the participants, I think it would be great if the participants would be given more time to reflect on what is being presented and add their ideas and views on the topic at hand, also be allowed to be part of the conversation too."

- "I think we could just invite people of different communities in these conferences to come and learn more about water security by doing so people will start to learn more the importance of water in our lives and start to do what's best for our environments. "

2. ***"Thinking about the course, what did we do well?"***

● "interesting topics – good introduction – good working and examples for change projects, warm ups and shakes between the presentations – movement"
● "everything fine – good preparation"
● "Everything went well. Everything was done accordingly "
● "the sessions went well, very informative and engaging. Time managed was very good"
● "Facilitation "
● "The presenters know a lot about their fields of expertise and the course was presented well."
● "Prof. Mbatha was too deep"
● "The presentation from the participants on the work that they are doing within the catchment as a way of getting to know where everyone fits on the program was a great idea."
● "Also. the sharing of the documentaries of the success stories and in progress work, less Interaction with the attendees"
● "We learned more about water security and also the challenges the country faces regarding polluted water and we are one the countries has a scarcity of water."

3. ***"Thinking about the sessions, what did we not do well and can improve on?" "What other suggestions do you have that you have been thinking about regarding the short course? These are for helping us create a more interactive learning and collaboration space"***

- "I think we needed more time to unpack the course, there was still a lot to discuss."
- "These types of engagements are very useful and I suggest that the invitations to attend be circulated to a wider audience"
- "maybe you can organize the next time a room with sunlight, more clear power-point (depiction, illustration for connection, maps, ...) "
- "No suggestions. "
- "The venue was not conducive"
- "The content and objective of the course is good. More engagements from the experienced and experts in the field would add value"

- “The structure of the two days was good, even though at times I felt under pressure. The questions that were asked directly to people, I feel should be done voluntarily."
- "More advertisement and marketing of this course, to allow others (unemployed, students, etc.) to obtain this kind of knowledge."
- "This is a life changing course so I think maybe you guys can make it 3 days per session."
- "Nothing I can think of at the moment"
- "Actually, I haven't notice anything wrong in the session maybe I was overwhelmed by the session the only challenge for me is the fact that us citizen scientists we need to learn terminology that is used in the science and abbreviations."
- "Actually what I learned from this course you can actually create employment out of your environment you're living in more special people living in the catchments now I know economics is involve in science you start your own business in this industry it's not only base on water security but people can actually benefit from it."

Discussion of course expectations and reflections

The course team reflected on the social learning process during the entire course journey, because reflexivity is important for research purposes and it allows a constant state of focus and objectivity, and free from bias and apparent ignorance. Reflexivity was an important matter the course team had to engage with, as indicated by Mukute (2010) that formative intervention researchers need to give a lot of attention to reflexivity, meaning they need to carefully track and monitor their own role in the research, but also, they need to be able to contextualise and locate the research adequately in the field of study. Constant reflection is important in interventions and in projects which aid in transforming societal norms; hence reflection featured highly in the Xabisa Indalo course. As shared in Chapter 3, we undertook a careful reflection on the course and its implementation from our experience and perspective. The data from course participants above resonates to some extent with our experience and reflections on the course. And as indicated in Chapter 3, we developed the course in a manner that was most responsive to course participants and their experiences and expectations, in the time and space that was available.

Scaling tools and their application

We were not able to undertake a full analysis of scaling potential based on the MEL data, although the reflections from the AEN context indicate some directions for scaling of the different activities that were involved in advancing EI4WS in the case. In the Berg-Breede context, in performing an analysis of the reflection of the participants, there was evidence of potentially scaling the some of the change projects which the participants initiated in their different contexts. Some participants expressed a desire to scale their change projects to communities and to work with their existing networks to support this desire to scale.

The participants also expressed the desire to have the Xabisa Indalo for Water course scaled up in order to benefit communities, and to assist practitioners in order to work with communities and to be confident in addressing societal issues. Furthermore, the participants reflected on the fact that communities, leadership and other government, private sectors and NGOs should be involved in scaling up of the Xabisa Indalo for Water course.

Investment of ecological infrastructure – a core to the scaling of the social learning for EI4WS

Along with the expectations and reflections which relate to the course and for expanded social learning through it, there was a also a focus on reflecting on the economic aspect of EI4WS, because investment in ecological infrastructure was a key aspect discussed throughout the Xabisa Indalo for Water courses – in both pilots. In the AEN, as noted above, the call was for more sustainable investment in EI4WS, and for stronger partnerships, and the establishment of a Water Fund Institutional structure to manage the collaborative nature of investment needed for EI4WS in the uMngeni. And as noted above, some progress was made in this direction, although the employment frameworks for EI4WS involving youth remain hampered by short termism and the 'treadmill of stipend-based employment'.

In the Berg-Breede, participants offered a number of more detailed insights into the economic dimensions of EI4WS related to 1) benefit streams from the natural environment, 2) how the course advanced understandings of benefit streams, and 3) local level investments in EI4WS following the three questions below, with responses from participants included:

1. **Define benefit streams from the natural environment?**

- *In terms of maintenance plans the benefit that streams from the environment is that clean water provides water for drinking and sanitation purposes, it provides water for crops, livestock and industry that contribute to the local and national economy of the country, and it creates and sustains ecosystems on which all life depends*
- *I think it is in line with what we have been in doing in terms of water security projects*
- *For water resources it is known what the benefits are but there should be more effort to have practical examples of the benefits*
- *Benefit streams refer to the increased income (monetary or value, etc.), to beneficiaries within that natural environment*
- *Besides providing drinking water and irrigation for crops, rivers wash away waste, provide recreational services and can provide electricity through hydropower.*

2. **How has the course has affected your definition of these benefit streams?**

- *That when thinking of the benefits of a maintenance management plan, that not only direct benefits should be considered, but also the indirect benefits that comes from the implementation of such plan.*
- *We need to put more resources to water security*
- *It assisted with a deeper understanding of benefit streams*
- *The course definitely affected my definition, in terms of considering non-monetary attributes*

- *It has broadened my definition as one there is an indirect benefit to other people, wildlife, etc. as well linked to adopting a maintenance management plan for example.*

3. **Describe ways in which investments in natural infrastructure can be made by individuals or a community?**

- *"Yes, especially in the farming industry, sustainable agriculture practices can help build natural infrastructure, such as soil health and biodiversity. By using compost that help improve soil health instead of fertilizers that that is harmful for example. 2) individual and communities can contribute by planning indigenous trees. 3) Wetland protection: Wetlands are essential natural infrastructure that provide numerous benefits. 4) Maintenance plan adoption: to have a system in place that will contribute to overall health of a river system. 5) Sustainable urban design: Overall, investing in natural infrastructure can provide a range of benefits 6) "*
- *I believe more awareness needs to be put out in capacity building terms in communities.*
- *The big issue that is currently the problem with natural infrastructure is that it is difficult the mainstream the idea and get adoption, e.g. in local authorities since built infrastructure is still preferred by most local authorities for instance.*
- *There are different ways to invest in natural infrastructure. Adding value through effort, non-monetary aspects such as time and work.*
- *Individual and communities can come together to do strategic river maintenance plans from mountain to coast for a system. This will allow for a proper assessment and a true benefit scenario.*

Social learning, as put forward in the SLKMM is an important mechanism and process for advancing scaling of EI4WS processes. In the uMngeni context, a specific study was undertaken by Nkosi Sithole (2023) into social learning in the context of advancing monitoring activity in the AEN context. Her findings show that strengthening of relationships among diverse stakeholders is needed to scale social learning and more adequately support monitoring and management activity, and that a mix of informal and formal training helps individuals participate more effectively in the monitoring activity. Her study also showed that this has benefits beyond the immediate, and that social learning in communities of practice involved in monitoring activity is leading to taking initiative, changed understanding and practices as well as social diffusion in home and local community spheres. Importantly, her study also shows that it is commonly experienced issues related to EI4WS that create a shared domain (interest) and willingness for people to gather as a community of practice, and to develop a shared practice to address the issue. Her study also found that despite the community interest and benefits, and benefits for EI4WS, monitoring activity is hampered by the ongoing issue of unsustainable funding which implicates the functioning of all of those involved in the monitoring activity, and their social learning. Her research showed that this impacts on training, the social interaction of all of those involved in monitoring and social learning. Therefore, she recommended that, in order to upscale community-based monitoring

as an EI4WS activity in South Africa, more funding needs to be allocated within budgets at a municipal and government level in order to ensure that projects are more sustainable, and this should be combined with extended training and research into longer term green skills learning pathways, as also pointed to in Chapter 3 of this report.

In the Berg-Breede case, we asked participants to share their understanding of social learning in EI4WS. These are some of their responses:

- *That if the people that will benefit from a project is not well informed of the benefits and on how to use that benefits that their daily practices will not change. In terms of EI4WS it is important to be clear on the befits a clean a healthy ecosystem will have.*
- *Social learning shows that the process to get to answer is just as important is the final product itself. The course emphasized again how important is to establish trust with stakeholders before you start a project. I found the concept of deep listening also very informative.*
- *Social learning refers to non-formal education. Where people learn by observing others or just speaking to each other in a social way.*
- *social learning is the process of learning through collaboration, interaction, and observation of others in a social context. In my line of work understanding and interaction with different spheres of government is important to reduce red type in a project.*

And finally, the Xabisa for Indalo for Water course itself is an important tool for advancing social learning and scaling of EI4WS activity in the catchments. In the final reflections on the Berg-Breede pilot, participants responded as follows to a question on the course and how it could be improved:

What recommendations do you have with regards to the course – how it should be facilitated AND what ADDITIONAL content would be beneficial/relevant in such a course?

- *When you invite attendees ensure that they work on projects/ in a project driven field, so that their practice can contribute to the course.*
- *I think more focus was put on economical benefits/aspects which was foreign to some among us, resulting in loosing focus/interest, I would say the assumption from my side was more or news ways to strengthen water security. I felt more time was spent on economics.*
- *Would be better if the course is presented over 5 days as the different dates made it difficult to concentrate after a few weeks. Good venue was organised. A lot of data was shared which was good.*
- *I think the course was well structured. More field excursions would definitely help me. Seeing that I do not have as much experience as everyone else.*
- *It would be more beneficial to ensure that participants are people that work on projects instead like someone like me who work in a more regulatory function. I however enjoyed the course tremendously and broadened my knowledge on why some of the information is presented in development application.*

CHAPTER 5: CONCLUSIONS AND KEY RECOMMENDATIONS FOR TAKING THE COURSE FORWARD

5.1 Introduction

As can be seen from the Chapters above, this report reflects on an extensive process undertaken to a) identify training needs (TNA) and knowledge assets for EI4WS in the two EI3WS demonstration catchments, and b) to design, develop and pilot test a course for advancing EI4WS activity in the two catchments and c) develop MEL processes for reflecting on the piloting of the courses and for learning that could inform EI4WS in South Africa.

Chapter 2 of the report reflects on the TNA and knowledge assets review, identifying three types of activity that need to be advanced for EI4WS in South Africa, which then formed the basis of the course design. Chapter 3 reflects on the design of the course, using a change project, expansive social learning approach to activity development via the course processes. It reports on piloting streams of activity, focussing on monitoring activity in the uMngeni catchment with the Amanzi Ethu Nobuntu programme where the Xabisa Indalo for Water course (monitoring and management action activity stream) was developed in a 'live and emerging case of EI4WS being implemented at scale through job creation for youth) in which the Xabisa team joined forces with Ground Truth and DUCT to offer training to advance EI4WS monitoring activity, and through this, informed the course design and implementation process.

A second pilot, focussing on investment and policy activity was implemented in the Berg-Breede using a work away, work together approach around a change project, in which more attention was given to investment and economics of EI4WS. This was supported by Living Lands. Chapter 4 reflects on the M&E framework and data that we were able to generate and synthesise, while this Chapter (5) seeks to offer final perspectives that can inform the course going forward.

In the sections below, we reflect further on the core components of the course in order to inform the course and its further implementation.

5.2 REFLECTIONS ON THE TNA and KNOWLEDGE ASSETS REVIEW PROCESS AND ADAPTING TO OTHER CATCHMENTS

The situated approach adopted for the TNA which involved engaging with stakeholders in the catchments was vital to establish the most immediate training needs in these catchments, and then to use this to inform the design and development of the course. It also allowed the course to be more responsive to needs in the catchments, and informed key aspects of the course such as the types of activity to focus on, what to prioritise in which catchment, etc. The knowledge assets review process was also critical for understanding the field, and for helping to organise the knowledge resources available on EI4WS and the range of aspects that catchment participants were interested in (e.g. social learning). As indicated in Chapter 3, we collected over 100 knowledge resources from WG 1, 2 and 3 participants, which show that this is a dynamically developing knowledge field. One challenge was to work out how to arrange these knowledge resources, and the conceptual framework developed for the course helped with the organisation and management of these knowledge resources as reported on in Chapter 2. This offers a foundational tool that can be further developed by the WRC and SANBI to support ongoing social learning and access to relevant knowledge on EI4WS in South Africa. It was noted that much of this knowledge is new and emergent, so this would an important focus for ongoing work. This should form part of the ongoing SLKMM Strategy as Practice process in the WRC and SANBI.

However, the knowledge assets review was not confined to knowledge resources, and the team worked to pro-actively identify knowledgeable stakeholders who could inform the course and its development and implementation, and also to develop localised case studies of different EI4WS activity that could help to concretise the concept for course participants. As shown in the previous chapter, this is a practice that could continue through identifying those EI4WS practices that are well developed via participant's Change Projects and then

developing case studies on these for wider distribution and social learning. Dedicated capacity for this needs to be put in place as this is a substantive work to do. We were only able to develop six to eight of these case studies as 'demonstration cases' for the EI4WS social learning course.

Recommendation: The situated approach to TNA and knowledge assets reviewing should be continued. A more sustainable platform and a more refined organising system for knowledge resources should be put in place via the SLKMM Strategy as Practice process of the EI4WS programme. More capacity should be provided for case study development as these offer useful social learning tools.

5.3 Reflections on the course design and focus on three main types of EI4WS activity

As indicated in Chapter 3, we focussed the course around three main types of EI4WS activity. This provided a good framework around which to design the course, and we found that most participants could identify with at least one of the main types of EI4WS and then articulate the details thereof in their own contexts. This is therefore an important social learning tool for enabling access to the complex concept of EI4WS. Participants were able to elaborate and develop their practice around these starting points, and also were able to understand other's activity that was not their own, and the more experienced were able to relate all three types of activity to each other in advancing EI4WS. They were also able to identify relevant case materials related to their practice, and articulate how to advance these types of activity from their vantage point / experiential spheres.

We recommend that this 'types of activity' framework continue to be used.

5.4 Reflections on the course materials and their use

Course materials, involving 4 modules, a foundation text, and a number of case studies, were developed in support of the course processes, and a living 'course platform' was created using miro-board where all of the course materials, including the presentations, video materials, participant contributions and change projects were uploaded and made available to participants. This represents the 'live record' of the course materials in their full scope.

Concepts of ecological literacy, ecological infrastructure for water security.

Consideration needs to be made for participants who have no tertiary education or prior experience in EI4WS. What language should be used to conceptualize the text in a manner that makes sense? Course facilitation should consider the use of softer methods of introducing field-specific concepts. One suggestion was the indigenous knowledges in the co-learning on ecological infrastructure for water security would make a useful, foundational input in the ecological literacy component. In the particular context of KZN, the massive roll out of the envirochamps works entailed working with many without qualifications and many who have been working in this space. According to the graduates, who worked directly with the envirochamps, in order for the course to be meaningful in future, considering the work ECs do and how it links back to their communities would help to support gaining access to more complex concepts and approaches being introduced. This indicates that there is a need to know and plan for the context within which the course will be facilitated, and the approach developed for the TNA, namely a situated, engaged TNA approach should be advanced. Additionally, social learning components that involved others in the communities will be useful for complementing or extending the course to become more engaged. Even for the training of trainers. In the event that the use of indigenous knowledges does not apply, this input is still important from a science communication point of view – there should be flexibility in the way to deal with often technical, alien language for people who are not familiar with EI4WS or are not from an environmental background.

Time restrictions on exploring concepts related to investments into EI4WS

It goes without saying that both pilots were short in nature, thus undermining some of the learning processes. From the reflections, it was clear from participants in both contexts that the content required more time to digest, unpack, and even contextualize EI4WS for their varied practices. Longer time frames are necessary to work with some of the more field/sector specific concepts such as EI4WS, economic valuation and investments. For example, given the nature of context of the first pilot, we did not even go into the economics, investments into EI4WS in a practical sense with most participants, although we were working broadly with DUCT to develop the economic model for the practice. The focus was on training and implementation and this idea of investments was only addressed at a higher, managerial level, which had a lot of traction with the two strategic meetings held within AEN, mainly to develop a longer term, more sustainable funding structure. The economics of EI4WS should come down to a practical level. For example, two participants reflected on this in their journeys of change that they are able to see some links between planet, people and profit, and local

economic development and the course content provided a mediating space to think holistically in this way. Another participant indicated the qualitative value of social learning but limiting factor where metrics are involved and thus required more on valuation methods to offer metrics that quantify value that can be translated into economic interpretations.

Clarity on course roadmap, change projects and course links to bigger picture and course objectives

In social learning theory, there is often need to constantly go over the purpose of a course, reframing it repeatedly so that it becomes clearer to the participants. Reflection from both pilots indicate there were some participants who were not entirely sure what the course aimed to achieve. Especially with the change projects. This means the tools of reflections being used have to be more specific in triangulating what participants understand to be the purpose of a course they are in, and use that to reinforce or emphasize or bring clarity. However, as previously indicated, the short time frames, there was no luxury of time to work specifically on this.

In addition to this, there is a need to always draw links between course modules, the participants practice and the bigger or shared object of activity. This makes the course more practical and applicable in practices.

Support sessions co-facilitate processes of the learning and unpacking course content

Another related reflection is on the support provided to trainers. There were instances where contexts where they worked did not offer space to conduct practicals and there was no room for improvising and the training remained abstract. The regular feedback sessions between facilitator and to be trainers is necessary and can help design the process better. To echo this point more, reflections by participants indicate that the data management and monitoring activity were complex and required more time to understand how to use the data management plan, and to reflect on its usefulness or not having applied it over the entire pilot.

Group activities to facilitate learning

Stakeholder analysis/mapping was identified/mentioned as important in both pilots. This aspect of social learning can prove useful for identifying key and influential stakeholders in a collective effort. One participant identified this activity as a way to garner support from stakeholders. Assuming it is known who trainees or course participants will be engaging with,

training or working with, this process can offer insight if done earlier in the process. By knowing what the different partner organizations' mandates and roles are in the bigger picture, participants say it will make working with partners more effective. One participants highlighted that,

> *"the reality behind effective catchment management – challenging, discouraging, time consuming, necessary, still needs to happen and requires a lot of patience… it is challenging to bring together different stakeholders who have different interests to now come to one goal…" and in relation to working on a common goal they added that "…I would ensure there exists a mutual understanding between AEN and project partners. All our activities link to one common goal despite their differences. I would ensure that the work that NGOS are doing links to the bigger picture of river health and why projects incorporates river health monitoring to their daily tasks…"*

Part of the social learning process is to explore, investigate and understand the context. This is simply the first step that is completed but when adequately structured, each step of the way may or may not open up more or new understandings of context. Time remains a key factor in more or less all the reflections. The course content was offered to mediate the learning process yet, there are still processes that require either frequent interactions, or longer time frames for new learning to emerge. Here is one reflection this:

> *"…there is no time to understand root causes, e.g. why people litter. In the induction of DUCT ECs, one of the sessions focusses on understanding such issues. Training sessions, however, address this issue very superficially".*

One other suggestion which was offered which is relevant here is: having representatives of stakeholder groups form part of the training. It has been stated that their presence is the first step in developing working relationships with the community by creating a mediatory link to the context and offers more to the training in preparing trainers for the field.

Following reflections on the course, we have adapted Module 2 to be introductory of the EI4WS practices as identified in the knowledge assets review (Module 2 part A), and to include introductory materials which we found necessary to for deepening understanding of the economics of EI4WS (Module 2 Part B – piloted as 'foundational materials').

Recommendation: In running the course in future, course facilitators will need to especially consider the content and resources associated with Module 2, and adapt these for various applications (see suggestions in this regard below).

5.5 Reflections on how to adapt the course economic and financial concepts to different audiences and stakeholder groups

The presentation and understanding of economic and financial tools in the valuation of investments in EI4WS

As indicated in Chapter 3, a basic core text on economic measurements and valuations was provided to participants months in advance (the Module 2 'foundational text'). After getting a profile of the course attendants, however, the presentation of the course material was modified. Revised presentation slides for the group were created on the day before the first session. While the core text material was more general in the way that it presented topics on the pros and cons and the role of measurement in Economics, the first session discussion took a step back away from Economics concepts. ***We discussed generally the meanings of concepts like the act of investing in something, investments in general, including investments of effort, time and money.*** We then discussed the meanings of value to establish a common understanding of these meanings. This was done before discussions of what economic valuation or measurement or estimation meant. The reasons for doing this was to ensure that we all shared the same or similar understandings of these concepts. This was important to establish because participants came from different backgrounds and experiences. The term, investment, is at the core of the big project for water security. **Therefore more time and effort should be spent in the course, just on what the act of *investing* entails. More useful texts and examples on investments should be included in future courses.**

The second most confusing or debated term was *infrastructure*. It took time for participants to understand why this term, which is borrowed from the field of Civil Engineering, was used so prominently in the bigger project and this course. Reflecting on the feedback from the workshop in early March 2023 on the semi-final report on the course, **we suggest that perhaps the term infrastructure should be used alongside the more traditional terms in the environmental sustainability spaces, like ecosystems, natural resources, etc. to build stronger conceptual bridges.**

So, this introductory discussion was different to one that could be done with Economics students, where a lot of jargon would have been commonly shared before discussing topics in Environmental Resources Economics.

What the discussion of these concepts also did was open a window for placing economic valuation within a broader scientific discourse on sustainability. For example, the discussion of acts of investing efforts could be placed on efforts placed on saving or restoring or sustaining the environment and its related resources. This discussion happened organically. It was not planned. But it was also facilitated by the visual illustration of a living catchment with its ecological infrastructure in the presentation preceding by Prof. Lotz-Sisitka. Using the illustration, it was easier to speak about efforts to restore the infrastructure as an act of investment (through money or time or labour). This was something participants could easily imagine from having done themselves in their own work in the Breede River catchment. It was easier to then ask participants to relate and share stories of these investments efforts. The discussion allowed in a natural way a bridging of gaps between economic concepts and daily work. But it also required patience and more time from facilitators for everyone to reach to a common understanding of what investment (whether in terms of finances or time or labour) really means. I also think that the bridging could only happen because all facilitators were present in the room of different discussions and therefore obvious links could be made across the discussions.

But additionally, the presentation of the meanings of a living catchment also allowed and facilitated the discussion of the role of hard and natural sciences in acts of economic valuation of investment efforts. The common or similar understandings of living catchments allowed for us to discuss the role of scientific data in describing living or non-sustainable or unliveable catchments as well as the pros and cons of the scientific descriptions themselves. For example, scientific research and data play a role in determining whether (or not) a catchment is operating within sustainable levels with respect to self-restoring while living organism (including humans) are consuming and using its resources. Many variables go into the determining these sustainable levels, which are also *not static*. Over time a description of *what a living catchment is changes*. For instance, climate or population change would have an effect on what makes a catching sustainable. The implication is that useful scientific research must be conducted *continuously or at appropriate intervals*. We should therefore accept that there would not always be consensus among scientists on the description of a living catchment at a point in time.

The scientific description of a living catchment must include a description of sustainable communities within catchments. This means *both scientific and social data are required* in estimating the values of benefits derived from living catchments. In fact this data is the foundation upon which economic estimations are conducted (see Figure 1). The following are important points (were discussed more in-depth during sessions than in text) that often present

confusion and debates among non-economists about the meaning/s of (even the *direct*) value estimates of benefits (or costs) from natural resources.

a) Estimated economic values play an *instrumental role* in the preservation or restoration of natural resources into living catchments for example.

b) In their utilitarian sense, estimated economic values present a monetary number that *would encourage stakeholders to behave* in a manner that would preserve or restore catchments and their resources into *a liveable or sustainable* state.

c) It is in this sense that these values are used as public policy tools or measures, for instance in determining environmental taxes, user fees (like park entry prices), etc.

d) Therefore in estimating Willingness to Pay values, respondents must be both willing *and able* to pay prices they state they are willing to pay.

e) This is also the same reason why it is preferred whenever possible for such economic values to be estimated or determined from the observation of actions or behaviours of stakeholders.

f) Observed behaviours (e.g. records of paid fees) are more likely to present more accurately the level of willingness to pay by stakeholders in order to restore or preserve a living catchment.

g) Additionally, because they are estimated from non-static scientific and social data *they are always changing* within a dynamic social and natural environment.

h) Ultimately, this all means that estimated economic values of resources *are not* (and cannot be) the intrinsic values of resources in question. They are functional values.

It became very obvious in the initial sessional discussions during the course that participants had to have a common understanding of the definitions of estimated economic value we would be discussing. Economic students on the other hand do understand these points simply from the basic laws of Demand and Supply as well as the market price determination principles. Non economists, often struggle with understanding of such concepts, especially when applied into the natural environment. What this approach also did more clearly, and which was very important ideologically, was *present economics and its useful tools within a scientific and social paradigm, where the environment was the centre stage*. In this manner the course took an *Ecological Economics* approach to presenting economic tools of evaluating environmental benefits and costs. The course also removed some of the general myths surrounding the

meanings and potential uses of economic value estimates in general. In Figure 1, we present this type of scaffolding that evolved through the presentation of the course of mainly non-economist participants. Furthermore, the presentation of the course from an Ecological Economics perspective not only discussed the dynamic nature of scientific, social and economic data, but it also illustrated how all data are subject to uncertainty (and errors) because of our generally limited human understanding of nature, society and the economy. Because economic estimations required scientific and social data as the foundation, the uncertainty (and errors) associated with economic estimations would therefore be more amplified with bigger uncertainties found in scientific and social data. In this sense, economists cannot work alone in estimating (or valuating) the benefits (and costs) of environmental goods and problems like pollution. This interrelatedness and dependence are illustrated in Figure 1, which was not part of the original and typical economics text.

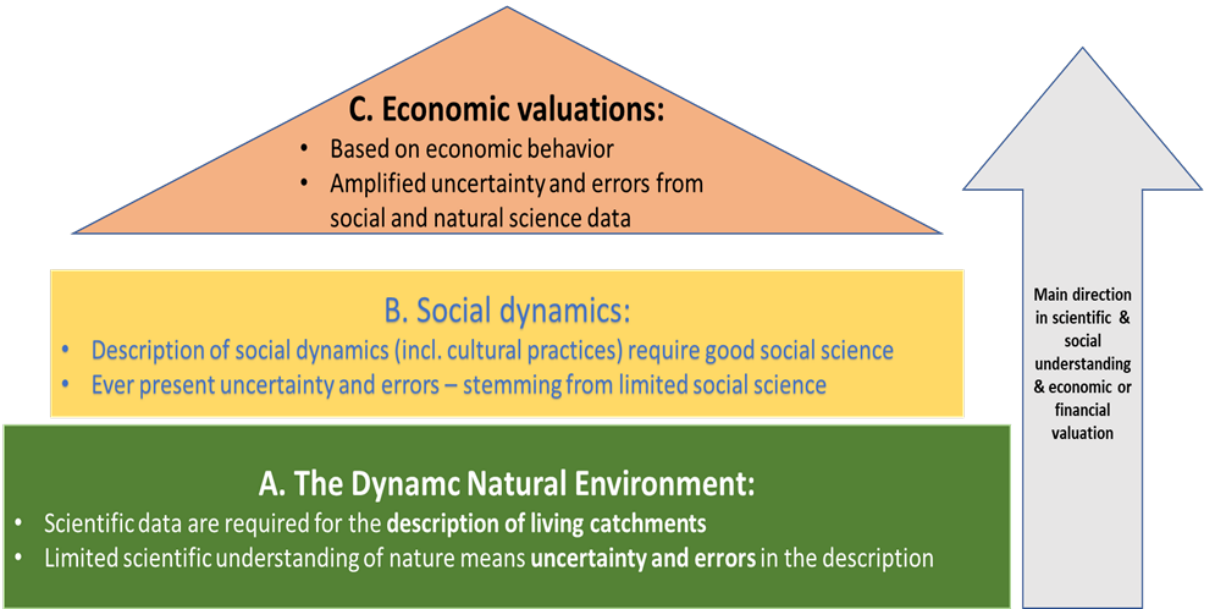


Figure 5.1: The interconnectedness of the natural environment, society and economic valuations

One of the implications for the course going forward is that an interdisciplinary team is always involved in the development and presentation of this course. It was stressed in sessions that for the economic valuation process, data inputs from an interdisciplinary team are required to present the most accurate estimates as illustrated in Figure 1.

Composition of group for the course in terms of experience, skills, and prior knowledge

About seventeen candidates joined the course from November 2022 to January 2023. The number of participants stayed almost the same until the last session in January 2023. This was great because to me it indicated a sustained interest in the course even though there was no fee payment required to join the course. From the registration data, the participants came from varied backgrounds. The biggest contingent was from government departments in the Western Cape province, then there were participants from NGOs (e.g. the Cape Winelands Biosphere and WWF). There also seemed to be spread in the demographic representations of race, age and experience. In terms of gender there were more female than male participants. All participants had at least a Matric qualification and 85% had a post Matric qualification. This wide representation, except in terms of gender and education, presented both opportunities and challenges for how the course would be presented or run.

The opportunities were clear in terms of cross learning from one another. Several real-life case studies were shared, especially by more experienced colleagues with respect to difficult stakeholder interactions in selected communities and policy implementation challenges by government department officials. These cases provided useful reference points for anchoring the discussions of concepts presented throughout the course. There were also new concepts presented in the course by participants themselves, for example the *concept and meaning of deep listening* in field work was discussed and adopted from participants and integrated in the course itself. But there were also observable challenges in terms of finding accessible references for some participants who did not have experiences in project budgeting from impact assessments. This is also reflected in the valuation of the course by participants, where some articulated their struggles with accessing and understanding some of the presented concepts (including financial concepts), while some reported to have had no problems in understanding the same concepts.

This point was illustrated more concretely when participants were asked to design, develop and present their own social learning change projects / cases based on concepts acquired throughout the course. In the final live session of feedback and reflections on the course, some participants indicated that they were happy with using cases from their own work environment to apply and illustrate the meanings of the concepts learned. But some indicated that it would have been better for them to develop new cases that would or might lead to the development of proposals for new or future projects with associated budgets. In this sense the cases developed would have more usefulness in their personal career growth.

These are some of the practical challenges for the course moving forward regarding who (in terms of demographics) forms part of each class or session. There are obvious trade-offs between having a homogenous versus heterogenous composition of class demographics. *It might make sense to run both types of classes, with their associated opportunities and shortcomings, and the information explicit to potential participants before joining the class.*

The parameters of course presentation

Period (length), frequency and spacing of sessions

The second pilot course had three face-to-face sessions, running over three months from early November 2022 to late January 2022. It also used online platforms including, the Miro Board, Google Drive and WhatsApp Group platform, where information was shared, instructions and guidance were provided, workshops and surveys were conducted, etc. Therefore, this was a hybrid course presented through online and face to face modes, which included a fieldtrip during the last session. The face-to-face session programmes were over two days (first day was a full day (8 hours) and second day would last until 1 pm (5 hours). At the first session a change project assignment was introduced as an assignment that would hold the whole course together

What worked?

- The total period of three months for the course seem to work well, even though parts of the course (take home project) run through the December holiday period.
- The WhatsApp Group platform in particular seemed to work well in keeping participants connected and engaged through the period.
- Navigating between the different platform seemed stimulating to all
- The two days allowed facilitators to reflect on the first day's activities to revise and revise or prepare new material (where required) from first day feedback
- Engagement over the Miro Board seemed lower, with many struggling to navigate the platform

What were the obvious challenges?

- Overall, because of the dense core text, there was time only for one fieldtrip. This was a short coming pointed out also by the participants.

- The complicated text seemed dense to digest in some days, especially at the beginning, but some of this was required for the change project to take off via Face to face and online engagements

Field trips

The field trip and its timing were some of the highlights of the course in many aspects. Although not anticipated from the start, it seemed to integrate very well many of the discussion elements the course in general. The field trip site integrated *theoretical training with application* very well in a sense that the experimental and innovative scientific investments from the Water-Hub in Franschhoek were designed in a manner that would be tested and applied with immediately observable results. But the challenge came with the fact that the Water-Hub could not share all of its financial data / reports given that it is a live donor funded project with contractual obligations. So, the discussion of the monetary financial data was not as robust, given the confidential nature of financial reports. I am not sure how this challenge would be avoided, if at all, in other projects though?

Assignment design (what worked and what did not work?)

Although the change project worked well in providing a cohesive thread throughout the course, I think participants struggled to get clear and precise understanding of the change project's final output. *Therefore, as facilitators I think we need to work more on making the change project simpler with more clearly defined milestones for presentation in each of the three face to face sessions of the course. This will require for facilitators to invest more time on collectively developing the project assignment for future courses.*

Integrating social learning methodology and the understandings of economic and financial tools: recommendations

The social learning concepts along-side the economic and financial concepts were insightful, and participants could discuss and link them to real life experiences, but we think there was still a challenge for most participants to link the concepts within and across the disciplines. In our assessment, ***identifying and developing the interdisciplinary links more deliberately among facilitators would be useful not only for the project but also for the course presentation overall. Some of the ways to do this would be to focus discussions of terms and concepts like investments and infrastructure as discussed above.***

There was a lot of background text that we did not or could not find the time to present in the given time frames. For example, there are discussions of other tools on the collective

management of common resources in the core text that we are not sure whether they contribute positively or negatively to having them included in the course. This we think also needs further discussion and deliberation among facilitators. ***In this sense, some of the concepts in the core text may have to be excluded going forward to eliminate potential confusion in terms of what needs to be prioritised.***

Given the high-cost constraints of running the course in the hybrid manner, we should think of adapting a useful but cheaper online version of the course as a whole, even if it is of a lesser quality, with some missing elements (e.g. a course without a fieldtrip).

We have learned many lessons from co-running the course. *Transdisciplinary courses are urgently needed in the space of sustainability.* These are useful not only for participants but also for facilitators' continued learning. We learned a lot of useful concepts not only from fellow facilitators but also from participants. Their experiences and discussions continuously informed our own presentations throughout the period of the course. Therefore ***a deliberate effort and space should be created in the running of the course to solicit contributions into the course from participants.***

5.6 Reflections on the change projects and what they show about EI4WS activity in the catchments

Change Projects are core for enabling applied learning: From the reporting in Chapter 3, and from the MEL reporting, it is clear that the Change Projects are an important focus to the courses as they allow for applied learning and give space for participants to consider the learning on the course and how it applies to their contexts. In the uMngeni pilot journeys of change revealed the personal learning and development of participants as it relates to their work. What we see in this context are participants who were able to clearly articulate in the form of reflections the knowledge acquired using references; and showing that learning and change occurred as a result of working in spaces that required collaboration.

In the Berg-Breede we see that the Change Projects allowed participants to start thinking about the work they do in relation to other practices and participants. From the very first session it was clear that there was little collaborative efforts amongst some of the participants who work in provincial and municipal offices of similar sectors. The 'silo mentality' as a common thing came up as one of the challenges that hinder collaboration. The change projects presentations have allowed us to see clearly the various aspects of EI4WS with which

participants work with and through an analysis can see the links to each other. In the reflection session at the end of the course, we asked participants to offer some advice to each other based on the individual progress updates on their change project developments: it was clear that some of the participants had gone through the same experiences and challenges specifically as they work in the same field. This indicated that there is a lot that colleagues can draw from each other's work and it was possible to identify potentially who to work with going forward.

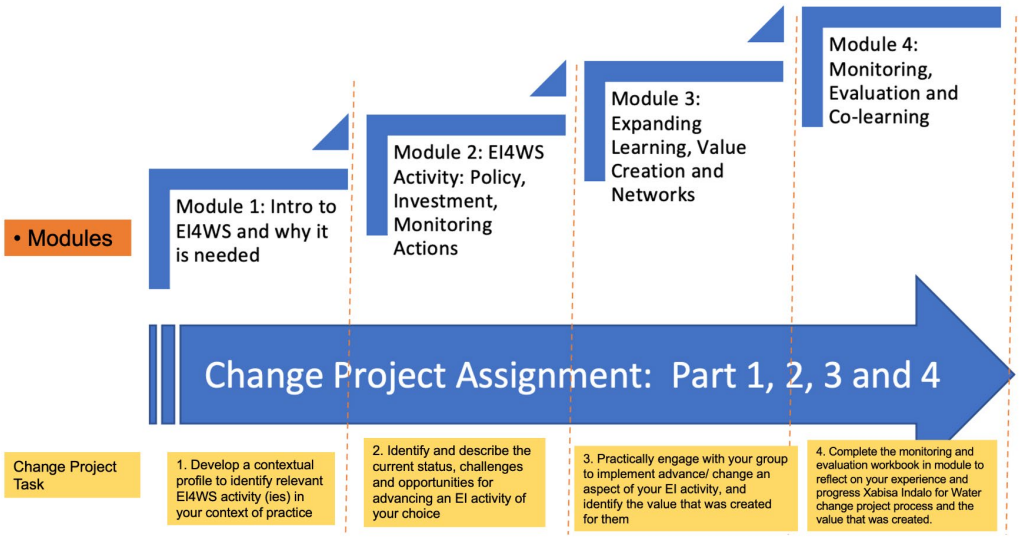
What is evident in this Berg-Breede pilot, where we have been working with practitioners [as opposed to graduates] is that with the short time frames of the course, many have used existing projects to formulate their change project. There is a sense that change project as an idea is appreciated but needs adequate time to be developed. From the reflections, there are a few participants who assert that they have been able to identify their change project activity in terms of the three EI activity introduced in the course.

From the stakeholder mapping activity in the second session participants highlighted the value of being exposed to such a process as it assisted them to visualize the extent to which their work reaches. What has been lacking in both contexts is the adequate use of case study examples in the form of site visits. Despite sharing multiple examples of cases of investments into EI4WS, it was not sufficient for participants to reflect on. However the need for field visits indicates that this is preferred over the content based examples. Many participants referred more to the field visits to highlight a learning point more so than the content based interactions. In other words case study examples offer learning during participation which is an effective learning type.

Change Projects need time and clear guidance and support: Another key finding is that more time needs to be given to the Change Project development – a finding from both pilots, and there is need for more support for Change Project development in situ, i.e. in the participants' work places. This also needs attention going forward as the Change Projects were recognised by all as being vital for the advancement of EI4WS. Unfortunately the time allocated to the scoping, course design and piloting was not enough to do all of this with the normal 'rigour' that is given to these processes in other RU courses of this nature.

Recommendation: Ideally the project would have benefitted from one more year of operation to allow for more extended work on the Change Projects and their development, especially also since the set up phase of the project was truncated due to late contracting agreements, and the COVID-19 pandemic conditions which hampered social interaction in the early stages

of the project, delaying key processes including the field set ups. Thus we recommend that each course pilot be planned for a six-eight month period if substantive work on Change Projects is to be done, and that enough time is given at the start of each course to develop a shared understanding of change projects, and that the change project become a core focus/ centrepiece of the programme as outlined in the diagram below. This allows participants to apply course content / learnings to their context, and is therefore vitally important for enabling situated and engaged forms of social learning for EI4WS. The diagram below illustrates this process framework.



5.7 Reflections on the MEL framework and its use

As a result of the challenges with time as reported on above, we were also not able to fully test and implement the MEL tools in the way in which we would have liked, and the way in which they were designed. Despite this, we were able to obtain some useful data from the tools, and to at least confirm their value for advancing EI4WS through social learning in the EI4WS programme context. However, again, ideally an additional year of working with partners to do proper reflection on the outcomes of both pilots would have allowed for more in-depth understanding that could also more substantively inform the SLKMM Strategy that has been designed for the EI4WS programme.

5.8 Final reflection

Perhaps the most important insight is that it takes substantive work and time to properly mediate a new concept such as EI4WS into contexts of practice in meaningful ways. Thus, as emphasised in the SLKMM Strategy it is not enough to just advance social learning as a

concept, or to develop knowledge management tools and approaches (e.g. the collection of knowledge assets/ resources) but the effort needs to go into **mediation** in the social learning process to advance both understanding and practice and through this to enable advancement of EI4WS in South Africa. However, for the mediation to be substantive and of high quality, effort to establish learning networks (which was achieved through the mix of course participants and partners involved) and social learning tools and approaches (achieved through the course design and change project model), there is also need to give attention to the knowledge resources and assets (new knowledge resources such as concepts and approaches to EI4WS (e.g. blended financing models), and foundational understandings of economics of natural resources management). In the piloting of the courses we learned that these should not be conflated, and both need attention in the mediation process. We also noted the importance of framing the latter within an ecological economics frame, and not a mainstream economics or environmental economics frame, indicating that there is subtlety to the EI4WS field that also needs to be appreciated and developed in the training programmes on offer. The social economy, and involvement and participation of communities was also recognised as being vital to the conceptualisation of 'investment' in EI4WS in South Africa, and our findings overall all point to giving more attention to a) sustainable funding of EI4WS which is ultimately a policy issue, and b) community engagement and participation involving all actors and sectors of society who have an interest in South Africa's water security.

5.9 Final recommendation

Our final recommendation would be that the WRC and SANBI consider allocating at least one or two extra years of resources to the Xabisa Indalo for Water Course development process to a) allow for more substantive reflection and evaluation and b) to re-design the course materials and tools for hybrid online and offline modality and to further test the course for specific audiences, and c) uptake by a ToT team that can offer the course in a range of contexts so that the investment in the three years of work (truncated to less than the full three years), can be fully realised.

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APPENDIX A: Onboarding Training Programme: Field-based training on Monitoring into management action activity

Day 1	Time	Topic(s)	Facilitators	Activity/Session	Estimated time needed
Monday					
	13:00-13:45	LUNCH			1 hr
	13:45-14:15	Introduction of Amanzi Ethu Team Introduction to mentoring activity	Michelle & Reuben	Tools for Mentoring (Reuben Narrate PPT) Mentoring booklets & toolkits – Michelle	1 hr
	14:15-14:45	River Rovers experience	Sindile/ Daliso	What are the roles of River Rovers & Data miners/ investigators?	30 min
	14:45-15:15	Why are you here, What you could a part of…	Faye & Andrew	Brief orientation to Amanzi Ethu (Faye & Andrew – background into to Amanzi Ethu) – the big picture	30 min
	Closure				

Day 2	Time	Topic(s)	Facilitators	Activity/Session	Estimated time needed
Tuesday	Ecological Literacies and Resonance				
	09:30-09:45	Reflections from the previous day.	Preven, Reuben	Overview of Day2 Choosing today's "wrap-it-up-teers"	15 min
	09:45-10:15	River Rovers experience	Sindile, Daliso	What are the roles of River Rovers & Data miners/ investigators? (presentation Daliso made in UIEP	30 min
	10:15-10:30	TEA Break (in filed)			15 min
	10:30-11:30	Introduction to "sense of place"	Preven	Walk down to the Pines Writing an Ahhhh-ku Nature Journaling experience Preven presentation)	1 hr
	11:30-13:00	Introduction to Ecology	Charlene	What do we understand by the word Ecology? (Charlene) Exploration of the ecotype "grasslands" – looking for Themeda Awns and observing their movement	1 hr
	13:00-13:30	LUNCH (back at venue)			45 min
	13:30-14:30	Introduction to Ecology	Charlene	Reading-for-meaning activity in groups Report back session	1 hr
	14:30-14:45	Wrap-it-up	Wrap-it-up-teers	Creative "out-of-the-box" report back Links with Change Project Task?	15 min

Day 3	Time	Topic(s)	Facilitators	Activity/Session	Estimated time needed
Wed	Ecological Literacies and Resonance				
	09:30-10:00	Reflections from the previous day & Change projects	Preven, Reuben, Charlene	Choosing today's "wrap-it-up-teers"	15 min
	10:00-10:30	River Ecology	Preven	Indoor lecture	30 min
	10:30-10:45	TEA Break			15 min
	Citizen Science Tools & Data Collection				
	10:45-11:15	miniSASS & habitats	Preven	Indoor lecture	30 min
	11:15-11:45	Introduce Filed App	Sindile/	Download Field Survey App	30 min
	11:45-13:00	Introduction to the Citizen Science Tools	Charlene, Ayanda, Preven	Walk down to the Shelter Falls Stream Demonstration of use of each tool – including site selection and sampling order Participants practice and collect one set of data (use the videos)	1 hr15 min
	13:00-13:30	LUNCH (Field)			30 min
	13:30-14:30	Using the data	Wandile, Martin, Charlene,	Data entered on field-survey app Full "pseudo-set" of data is viewed, and analysed in groups Groups work on "what story is this data telling us about this river system?"	1 hr
	14:30-14:45	Wrap-it-up-teers	Charlene, Preven, Reuben	Creative "out-of-the-box" report back Links with Change Project Task?	15 min

Day 4	Time	Topic(s)	Facilitators	Activity/Session	Estimated time needed
Thursday	Citizen Science Tools				
	10:00-10:30	TEA Break + walking to field			30 min
	10:30-10:45	Reflections in the Field	Preven & Reuben	Reflections from the previous day. Choosing today's "wrap-it-up-teers"	30 min
	10:45-12:30	Citizen Science Tools practice	Preven, Charlene	Practice with tools (upper cascades section below Pines) TASK: Make your own instructional video about one of the tools (in groups of 4-5)	1 hr 45 min
	12:30-13:15	LUNCH (+ walking back to venue)			30 min
	13:15-14:45	Working with "Data"	Wandile, Martin	Data Management exercise – Report back session from group work – "Tell us your river's story" Exploring the concept of River HEALTH Monitoring	1 hr 30 min
	14:45 15:00	Wrap-it-up	wrap-it-up-teers	Creative "out-of-the-box" report back	15 min

				Links with Change Project Task?	

Day 5	Time	Topic(s)	Facilitators	Activity/Session	Estimated time needed
Wed	Stakeholder Engagement, Learning Theory, Qualitative data				
	8:30-09:00	Reflections from the previous day.	Reuben, Wandile, Martin		30 min
	09:00-09:30	Introduction to learning-oriented Stakeholder Engagement processes	Reuben, Maletje, Nkosi	Learning for Change/ transformation Learning together & Teaching others Value creation interview Presentations	30 min
	09:30-10:30	Collecting & working with Qualitative Data	Reuben, Maletje, Nkosi	Group activity – Role-playing interviews Riverhealth stakeholder engagement scenario	1 hr
	10:30-10:45	TEA Break			15 min
	10:45-11:45	Creative Thinking for reporting	Sindile, Daliso	Group activity Instructions on how to develop social media report, key principles around communications	1 hr
	11:45-12:15	Reflections & Way forward (online engagements)	Reuben, Maletje	Overview of course curriculum process (presentation) Individual reflections + feedback (Content, process, coherence, personal dev, etc.)	30 min
	12:15-12:45	LUNCH			30 min
	14:15-14:45	Announcements & AOB	Sindile		30 min
	12:45-14:45	Work session – Training team	Reuben, Martin, Maletje, Wandile, Preven, Charlene…	Content Development	2 hr

APPENDIX B. Guidelines to class composition and material selection

Here are two lists of guidelines on possible ways to compose a cohort (or class) selecting the material for the social learning and participatory course on introductory economic tools and concepts for advancing EI4WS. These guideline lists are presented in the form of questions and possible responses in the decision-making process of facilitators intending to run the course. Before presenting the guidelines, we note that the pilot course from where the lists come was presented on a hybrid mode

a) for a group of 18 participants coming from government and NGO sectors, which was randomly selected from a call sent out widely for interested parties. This size group was only just manageable for the period of the course. We would then advise that a similar type of course is presented to a **minimum of about 10 participants but not more than 20 participants at a time.**

b) over a period of about three months, from November 2022 to January 2023,

c) with three contact sessions of presentations, discussions by facilitators and participants

d) with a field visit towards the end of the project

e) with a change project developed using the tools acquired throughout the course by each individual participant

f) in this sense the change project acted as both the platform to hold the course together cohesively and also as a monitoring and evaluative tool of the incremental level at which the tools were understood throughout the duration of the course

1. In this sense to compose a cohort we should ask the following questions:

a) What is the purpose of presenting the course?

b) Is it to present the skills (concepts and tools) to a community of practice in the water sector that is located across a national or provincial geographical space?

c) Is it to present skills to a community that resides near or around a particular water resource with a specific need to deal with an identified water challenge? (e.g. a village community in a particular catchment that is affected by a certain type of pollution)

For the pilot, the course was presented to a randomly selected group linked by their water practice. Selecting a group in this manner (through an Open Call) would mean that there

would be applicants with very different educational attainments and work experiences in the cohort. We could call these a less homogenous group. This type of cohort presents a bigger challenge in identifying the appropriate materials to be presented in the course, which we discuss later in these guidelines. **But it is also possible to reduce the course material selection challenge by further grouping the course participants into smaller but more homogenous sub-groups with more similar educational attainments and work related experiences**. However, this may only possible where there are enough applicants to form sub-groups of members between 10 and 20 each.

If the course is aimed at skilling a more homogenous group, for example, members of an identified village community who may be dealing with a particular water related challenge, it might be easier to select the course material to be presented. This, firstly, is because members of the same community are more likely to share similar educational (or skills) attributes and life (living) experiences and secondly, because members of the same village community would be face with the same water related challenge. The same challenge also means that the change project to hold the course together would also be the same for all members of the group. They would have a group project.

2. How to select course materials for two main groups identified above?

Firstly, the main types of concepts and tools presented and identified accordingly in the core economic text materials of this course are aimed at:

a) discussing the pros and cons as well as estimating of **the general size of the economy and some economic activity,** for example Gross Domestic Product (GDP), GNP, etc., or levels of un/employment,

b) discussing the pros and cons as well as estimating **the size of economic benefit/s or cost/s stemming from the consumption or use or preservation** of some environmental resource (e.g. Net Present Value, Cost-Benefit ratio, Contingent Valuation Methods (CVM), etc.)

c) discussing the pros and cons as well as estimating the size of economic benefit/s or cost/s stemming from some **public policy or private intervention in the management** or use or consumption of some environmental resource (e.g. Taxation, Subsidy, Quotas, etc.), and

d) discussing the possible tools to use in **managing possible community conflicts** in the management of public or common environmental resources (e.g. Game Theoretic tools)

The first three types of tools can be thought of as building blocks to a model or structure. The first group of tools can be thought of as a foundation for the model. In this sense for all types of class or cohort groups (whether they are more homogenous or more heterogenous) it would be very important to present and discuss with examples the first group of concepts and tools (i.e. relating to the general size of the economy and economic activity). This would present a more common understanding of the main language, rhetoric and jargon of Economics (as a discipline) and the Economy (as a social system) to course participants. The third group of tools of intervention (e.g. taxation and subsidies) can also be understood (but more vaguely) without group a) and b) tools. These tools are often discussed outside the field of environmental or ecological economics. In fact they form the core tools of Public Finances, which is a sub-discipline of Economics.

The fourth set of tools and concepts can be discussed as stand-alone tools as they can be understood (without the basic algebra) from academic disciplines or fields beyond Economics. Removing the basic algebraic representations, the tools and concepts can be understood as bargaining tools in politics.

In the piloted course, only the first two groups of tools a) and b) were discussed at length and we believe they formed a sufficient basis for developing and presenting or supporting the change projects submitted by participants for the course. From group b) **almost all the valuation methods** in the core test materials were discussed because the requirements of different change projects were (could be) varied.

In a village community dealing with a specific water challenge we would suggest first that this course is presented with many more contact sessions and more site visits. A useful course for such groups can have different aims including:

a) presenting and discussing the basic understandings of the economy and related economic activities for identifying potential public policy intervention tools that can solve the specified water related challenge. **This would be a basic course that presents and discusses only group a) and group c) tools and concepts,**

b) presenting the basic understanding of valuation methods would require the presentation of group a) and group b) tools and concepts**. But only the relevant methods (one or two)** for the water challenge/problem at hand would need to be identified and presented for a specific valuation or estimation goal/s by the community with the help of facilitators,

c) presenting the basic understanding of the economy and economic activity for negotiations would require the presentation of group a) and group d) tools and

concepts, which are aimed at facilitating the understanding of potential outcomes of decisions taken by individual members of a community. The presentation of these potential outcomes would then form the basis for bargaining processes that lead to trade-offs that members need to make. This type of course may not need to present and discuss tools and concepts from group b) and c).

It is clear from these guidelines that how a cohort is composed is dependent on, first, the aims of the course which is often linked to geography. Geography often determines the level of homogeneity of the group as well as the type/s of common challenge/s that the community would have. This challenge would be specific, and would require specific tools to deal or engage with or to solve. All these variables as suggested above would then determine which tools are more key to include in the course and which ones would be more peripheral.