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Executive summary

Background

The Transforming southern African cities in a changing climate project is part of Leading Integrated Research in Africa (LIRA) 2030; a 5-year programme that seeks to increase the production of transdisciplinary research on global sustainability in Africa. The main objective of the project is to better understand the extent to which transformative climate adaptation has been envisioned or implemented in southern African cities, explore interventions that have transformative characteristics, as well as unpack how these might be more transformative in the future to promote equality, inclusiveness and justice. Using Durban (South Africa) and Harare (Zimbabwe) as cases, the project aims to contribute to understanding how theoretical ideas related to transformative adaptation play out in reality (if they do). Water resilience interventions will be used as case studies. The objective of the second learning lab was to provide feedback from these initial interviews, articulate and link ideas of TA across stakeholder groups, explore the extent to which climate change is considered in planning, as well as ways in which relevant climate change information might be better integrated.

Introductions, transdisciplinarity, and an overview of case studies

Alice introduced the team across the cities; presented the research framing; and gave an overview of the first engagement where stakeholders prioritized characteristics that were important for TA, and discussed cases of interventions/programmes that adhered to these characteristics. Alice reminded participants of their unique expertise, and that the LIRA team welcomes feedback, criticism and questions. She gave an overview of the outputs that have been developed already: the literature review, Durban- and Harare background reports, and the interviews with stakeholders from the cases that were selected at the first lab, namely Sihlanzimvelo, the Aller River Pilot Project, Palmiet Catchment Rehabilitation Project and Wise Wayz Water Care. Alice discussed Transdisciplinary (TD) research and the role of it in dealing with complex problems which can't be solved by a single line of thinking, discipline or method; and the need to integrate knowledge types to understand systemic aspects and potential solutions. A short video on the TD approach was shown. Thereafter participants co-created principles for TD research.

Collaborative exploration of the transformative landscape in Durban

The different case studies were introduced and discussed:

- Within **Sihlanzimvelo** responsiveness and flexibility is not very great. However, its rigidity contributes to the success and sustainability of the programme. It is a relatively top-down programme which is not as inclusive across hierarchies. Politics play a key role. Multiple on-the-ground benefits have been experienced. Proof of concept of the current version of Sihlanzimvelo has led to the opportunity to upscale, which will be transformative.
- The **Palmiet Catchment Rehabilitation Project** has a bottom-up, shared, participatory, inclusive governance approach. A Community of Innovators steers the project. Transdisciplinary knowledge production is adopted. The programme is considered transformative because it targets the entire catchment, integrates learning and flexibility

and encourages holistic, complex thinking. This project has successfully established a governance arena and built state-citizen relationships. Capacity building and empowerment is also evident.

- The interventions of the **Aller River Pilot Project** are participatory. Engagements and deliberations with the state and citizens has resulted in bottom-up knowledge production. The programme is flexible and participatory, encouraging multi-actor participation; therefore empowering and inclusive. Capacity, education and training of Eco-champs is a priority. Demonstrable benefits are multiple: clean streams, improved safety, environmental education activities, the building of state-citizen relationships, as well as the community taking ownership. Sustainability is an issue as funding is not ongoing.
- **Wize Ways Water Care** is funded by the private sector. The programme also focuses on inclusive, bottom-up approaches to empowering communities (and providing economic opportunities) through management of the waterways in the catchment. Participation by community members is voluntary, and capacity development and other forms of support are offered to develop and grow SMEs.

The overview sparked a plenary discussion about the cases, including issues such as the role of funding; Monitoring & Evaluation of the different projects to understand their transformative extent; the lack of awareness of the projects by citizens and stakeholders; and the absence of all the relevant people when we have these type of discussions.

The participants each selected a case study to explore and answer three questions:

1. What would your ideal landscape look like in 50 years' time?
2. What are the three priorities to get from the current landscape to this ideal?
3. How does your project contribute to these priorities?

The feedback on these points were captured as a 'transformed landscape', to which projects are contributing. Discussion points are captured in this report; the main points which are:

- Effective engagement with and effective coordination with all stakeholders.
- Consideration of land uses and actors for improved catchment biodiversity, processes and focus
- Creation of circular economies and new values
- Transformational leadership.
- Political support
- Effective land and system management
- Community involvement and ownership
- Reframing of the interconnected relationship between people and environment
- Collaborative governance
- Ongoing training, education, communication, monitoring and shared learning
- A meeting of top-down and bottom-up approaches.
- Innovative solutions for dealing with the problems

Integrating a forward-looking climate perspective

The Climate Projections and Risk Assessment tool was presented. Subsequent discussions included:

Opportunities and challenges to integrate this type of information into planning.

- Several technical terms and processes were discussed, which indicated the need from participants to understand the discourse around climate change science more.
- Wetland degradation in Durban (which has exacerbated flooding), and the need to explore innovative solutions to capture and store rainwater runoff like in Cape Town was discussed.
- Participants also discussed the intersection between urbanisation/population increase with climate-related impacts.
- The usefulness of climate information in different forms and at different scales - the tool as a great starting point to interrogate information needs, while also providing the opportunity for general awareness raising. Very specific information is needed for designing infrastructure, which is where the idea of “co-exploration” becomes important.

Reflections, closing and speaking about the next engagement

The next steps for LIRA would be the Harare learning lab. The next Durban LL will be in October, and will include field visits. Team members reflected on the day through an interactive exercise





Background

The *Transforming southern African cities in a changing climate* project is part of [Leading Integrated Research in Africa \(LIRA\) 2030](#); a 5-year programme that seeks to increase the production of high quality, transdisciplinary, solutions-oriented research on global sustainability by early career scientists in Africa. The knowledge will be used to address complex sustainability challenges in the region.

The main objective of the project is to better understand the extent to which transformative climate adaptation has been envisioned or implemented in southern African cities, explore interventions that have transformative characteristics, as well as unpack how these might be more transformative in the future to promote equality, inclusiveness and justice. Using Durban (South Africa) and Harare (Zimbabwe) as cases, the project aims to contribute to understanding how theoretical ideas related to transformative adaptation play out in reality (if they do). Considering both cities are faced with the challenge of managing water under changing climate conditions, water resilience interventions will be used as case studies.

The first engagement in Durban took place in November 2018. Through this engagement, participants reflected on the academic notions of Transformative Adaptation (TA) and offered their own ideas, rooted in practical experience. A discussion on potential case studies was also convened. Interviews were undertaken with stakeholders involved in potential cases of TA after this initial engagement; from February-May 2019. The objective of the second engagement (learning lab) was to provide feedback from these initial interviews, articulate and link ideas of TA across stakeholder groups, explore the extent to which climate change is considered in planning, as well as ways in which relevant climate change information might be better integrated

See Annex A for the meeting agenda and Annex B for a list of stakeholders who attended the meeting.

Slides from the meeting are attached separately.

Introductions

Alice welcomed everyone and provided an overview of the LIRA2030 programme, which aims to support “integrated (inter- and transdisciplinary), solutions-oriented research on global sustainability by early career scientists in Africa to address complex sustainability challenges in the region”. The project that is being implemented in Durban and Harare has the overarching objective to understand how theoretical ideas of TA play out in reality. It is hoped that findings from this research project contribute to climate change adaptation or decision making in southern African cities. The team also hopes to provide evidence to the academic literature with regards to the challenges and opportunities for implementing this approach in a southern African urban context. Alice introduced the team across the cities and presented the research framing.



Alice then reminded stakeholders that at the first learning lab, various stakeholders prioritized characteristics that they felt were important for TA in Durban and discussed cases of interventions or programmes that they thought adhered to these characteristics, or at least a few. Alice explained that since this first engagement, interviews were undertaken with stakeholders involved in these programmes to deeply explore their transformative nature, extent and potential. She explained that the objectives of the second lab were to:

- provide feedback from initial interviews with stakeholders who are involved in potential cases of transformative adaptation or have knowledge on these interventions;
- articulate and link ideas of transformative adaptation across stakeholder groups; and
- Explore together a landscape of transformation in water resource management for the future
- explore the extent to which climate change is considered in planning, and how relevant climate change information might be better integrated.

Alice reminded participants of the learning lab that they are the experts in this field and the LIRA2030 team welcomes feedback, criticism and questions. She provided an overview of progress since the first engagement, which included the development of three outputs (literature review, Durban background report and Harare background report) and above-mentioned interviews with stakeholders from cases that were selected at the first lab; Sihlanzimvelo, the Aller River Pilot Project (ARPP), Palmiet Catchment Rehabilitation Project (PCRP) and Wise Wayz Water Care (WWWC).

Alice then discussed the concept of Transdisciplinary (TD) research and reasons why this approach is important in the context of the complex problems with which we are faced: complex problems, such as those associated with climate change, can't be solved by a single line of thinking, discipline or method. Many knowledge types – including academic and non-academic – need to be integrated to better understand the systemic aspects of these problems, as well as potential solutions (Polk 2015). Transdisciplinarity insists that research is situated in context, and that research questions respond to societal problems (Polk 2015, Klein 2013). In this way, TD research aims to produce knowledge outputs that are socially robust and practically applicable.

[A short video on the TD approach](#) was shown, after which participants created a large circle outside and Alice suggested some principles for TD research. Those participants who agreed with the principles that Alice suggested took a step forward and additional principles were voiced by some participants. The principles offered by Alice and other participants are listed below.

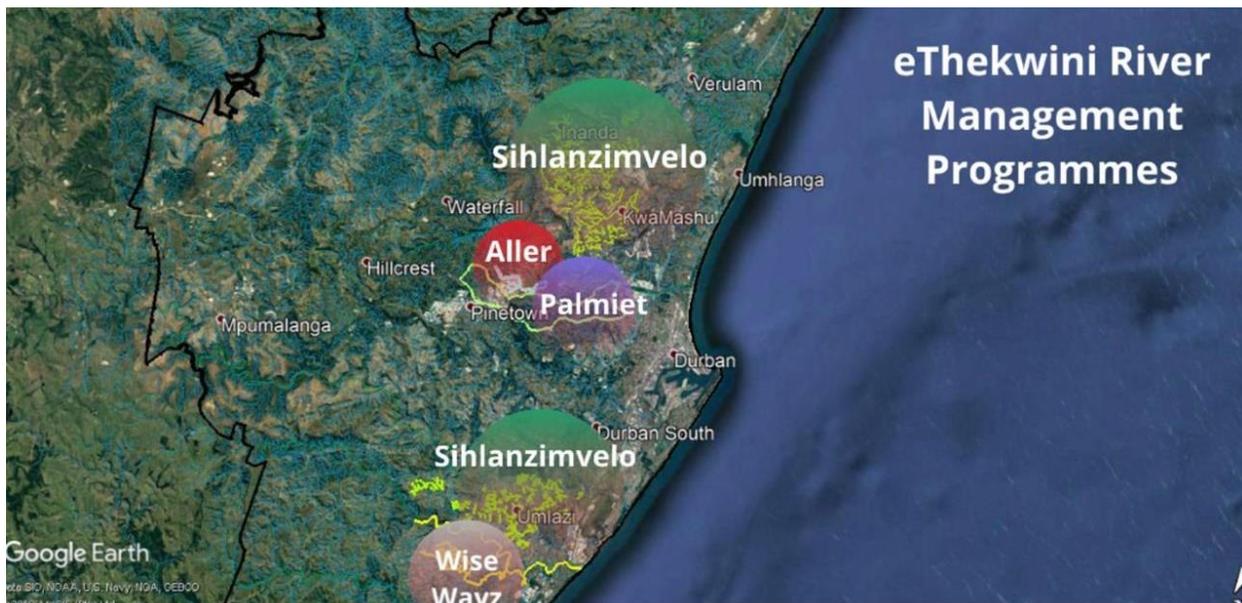
- We should try to use concepts that transcend disciplines and knowledge types.
- Respect one another.
- Try and listen and provide input.
- Be honest and transparent

- Tolerate and even welcome discomfort and unresolved tensions; they are often moments of learning.
- Understand that people have different perspectives.
- Respect nature

These suggestions sparked a discussion about those in the room and the need to invite private sector in the future. In particular, people from the Durban Chamber of Commerce and Industry should be invited to these labs.

Overview of case studies

Lulu introduced the different case studies for which interviews had been undertaken through LIRA2030 (see figure below), after which feedback on the information was welcomed.



The information on the programmes is summarized in the table below.

Origin	Funding	Implementation
Aller River Pilot Project		
Initiated in 2016 within 'Take-Back-Our-Rivers' of eThekweni Conservancies Forum with the Kloof Conservancy as the implementing agency	Various, including short-term funding (donations): phase 1 - EPCPD phase 2 - University of Cambridge phase 3 - lotto winner	The ARPP has a steering committee, responsible for project decision-making, and an operational team, including the project manager, community liaison officer and Eco-champs. The ARPP has built relationships with the state and citizens to promote

Origin	Funding	Implementation
		environmental care, responsibility and behavioural change through a diverse range of activities and interventions.
Palmiet Catchment Rehabilitation Project		
Proof of concept for the uMngeni Ecological Infrastructure Partnership (JEIP). Focuses on improving ecological infrastructure in the Palmiet Catchment to improve community resilience.	Development Bank of South Africa (DBSA) CLIMWAYS Research Project	Using bottom-up knowledge production processes, an Action Plan was co-produced for this project. A range of actors, with interests in this catchment, formed a Community of Innovation (COI), in order to oversee the implementation of the Action Plan. A service provider has been appointed to implement certain aspects of the Action Plan. The COI includes representatives from eThekweni Municipality, UKZN, Civil society, Local Vulnerable communities and concerned citizens.
Sihlanzimvelo (current)		
Implemented in Umlazi and KwaMashu Roads and Stormwater Maintenance Department, eThekweni Municipality to protect infrastructure from flooding.	Municipal: Roads and Stormwater Department	eThekweni Municipality hires consultants (team leaders and assessors), who work with the coops in communities to implement stream cleaning initiatives.
Wize Wayz Water Care		
Business initiative: AECl as a water user. They are investing in water quality issues through community empowerment, with the aim of delivering economic empowerment, service delivery and river health	AECl funds activities and the middleman (i4Water)	An NGO (i4Water) implements with SMMEs; various intervention groups. Community members initially joined as volunteers (half left after some time) but the rest have grown successful businesses.

Collaborative exploration of the transformative landscape in Durban (part 1)

Once the overview of programmes was presented, Alice and Lulu sparked the collaborative exploration of the transformative landscape in Durban by presenting some findings from interviews that had been undertaken thus far, namely the transformative characteristics of the



programmes. Alice reminded the group that characteristics had been prioritized in the first engagement. She explained that the project team had studied these characteristics and prioritized them further, to a shorter list of six (with a few sub-criteria) that would be used to assess data collected across the cities. The shorter list of characteristics is shown below.

Criteria

1. Fundamental/sustainable changes in thinking and doing
 - a. Capacity is developed for those involved to support this fundamental change
 - b. The fundamental changes must be permanent
2. Inclusive
 - a. Relationships across stakeholder groups support inclusivity
3. Challenges power asymmetries
4. Must be demonstrable in practice
5. Responsive and flexible
6. Holistic, complex systems thinking
 - a. Thereby addresses climate in combination with other things
 - b. Breaks down divisions between adaptation, mitigation and sustainable development

Initial findings from the data collected in Durban (i.e. pre-analysis) are presented below.

Sihlanzimvelo should be viewed through two lenses; the current version and the future upscaled version (i.e. the version included in the business plan that is being supported by C40 Cities Finance Facility). Responsiveness and flexibility is one of the characteristics presented above, and Sihlanzimvelo was noted in the interviews not to be very flexible in comparison to other river rehabilitation projects. However, Sihlanzimvelo’s rigidity contributes to the success and sustainability of the programme as it is easily rolled out over large areas with sustainable municipal funding. This does, however, mean that it is relatively top-down and not as inclusive across hierarchies as some of the other programmes described below. Councillors also play a key role in selecting co-ops that work within Sihlanzimvelo. Acknowledging the lengthy procurement processes involved in government interventions, flexibility is supported by a consultant as a ‘middleman’ between government and the co-operatives, which implements the programme. The programme has gained political support, especially at the moment with the focus from C40 Finance Facility. The proof of concept of the current version of Sihlanzimvelo has been successful and has therefore led to the opportunity to upscale. Multiple on-the-ground benefits have been experienced as a result of Sihlanzimvelo, mostly in terms of discovering and attending to damaged infrastructure but also creating employment for coops. The objectives of the upscaled Sihlanzimvelo programme are transformative, for example, the team involved are



keen to see the programme founded on holistic thinking. They also hope to create closed loop systems between waste and businesses.

The **Palmiet Catchment Rehabilitation Project** is very different to Sihlanzimvelo in terms of implementation model. A bottom-up, shared, participatory governance approach has been adopted through the project with multiple actors involved in the co-production of an Action Plan. In this way, the project developed organically and is very inclusive. A Community of Innovators (CoI) steers the project (see above), which means that multiple voices are represented and heard. Transdisciplinary knowledge production is adopted, bringing government, communities from informal settlements and academia together to learn from one another; UKZN is the bridge spanner in this work. The programme might also be considered transformative because it targets the entire catchment, integrates learning and flexibility and encourages holistic, complex thinking (e.g. the Action Plans cover governance, biophysical and social elements). This project has successfully established a governance arena and built state-citizen relationships. Capacity building and empowerment is also evident for the community mapmakers from Quarry Road West informal settlement.

The **Aller River Pilot Project** is quite similar to PCRPP. The interventions of the ARPP were initially developed by ECF, with project activities and processes being designed to be participatory. Over time, engagements and deliberations with the state and citizens has resulted in bottom-up knowledge production - which in turn has shaped the project's activities. The programme is flexible and participatory, encouraging multi-actor participation. It is therefore also empowering and inclusive. Being conceptualised as a pilot project, activities have evolved over time, based on stakeholder needs with youth eco-champs taking the lead on project interventions. Throughout the numerous phases of the ARPP, the building of capacity and educational training of the Eco-champs has always been a priority. Demonstrable benefits include cleanliness of areas around the streams, improved safety for children, environmental education activities, the building of state-citizen relationships, as well as the community taking ownership of the issues and challenges associated with the stream. Sustainability is an issue as funding is not ongoing.

Wize Ways Water Care is an interesting, different case study as it is funded by the private sector; in this case by a company called AECl, which produces chemicals for use in various sectors including mining, water, plant & animal health etc. The programme also focuses on inclusive, bottom-up approaches to empowering communities (and providing economic opportunities) through management of the waterways in the catchment. The model for implementation is comparable to Sihlanzimvelo as participation by community members is voluntary, after which capacity development and other forms of support are offered to develop and grow Small and Medium sized Enterprises (SMEs) or coops associated with the clean river. The programme also builds capacity and promotes the use of civil science for water quality



testing. Mostly socio-economic benefits have been observed, even though interventions target both socio-economic and environmental problems. This is because the project is located in the lower reaches of the Mbokodweni catchment, and the team cannot control upstream activities. In the near future, WWWC is planning on expanding into the upper reaches of this catchment.

After these presentations, a plenary discussion surfaced some comments and questions related to the different cases, which is recorded below:

- Dr Cathy Sutherland brought up the issue of funding, reminding everyone that it is important to think about how funding links to governance, as well as transformative potential.
- Alice asked a question about the implementation models of the different programmes; how stakeholders have been engaged and how this contributes to sustainability. Sihlanzemvelo has historically been implemented through by the Roads & Stormwater Maintenance Department of eThekweni Municipality through a top-down approach and has been running for eight years. The fact that it is planned for and funded by the government improves sustainability of the programme. The PCRP and ARPP have adopted more of a shared, participatory approach that supports bottom-up knowledge production. This approach is beneficial as community members who are involved feel ownership for the programmes, but sustainability is an issue as both programmes rely on donor funding. Although WWWC adopts a similar, bottom-up approach to PRCP and ARPP, it is funded by a private sector business and, through this connection to business, is provided opportunities to continue engaging business.
- Jo Douwes asked about Monitoring & Evaluation (M&E) of the different projects and how this might be connected to understanding their transformative extent, to which representatives from the different programmes had a chance to respond. Ntswaki Dithhale from WWWC stated that they implement M&E on different aspects of the programme (e.g. river health, socio-economic benefits, mindsets of the community etc.) and develop reports that show how lives in the community have been changed through WW. However, the impact of the project on the environment has been difficult to demonstrate as these benefits take longer to realise. It is also difficult to control what happens upstream of their site, as mentioned above. Geoff Tooley from Sihlanzimvelo explained that the programme supports ongoing M&E of the streams as members of the co-ops are responsible for keeping a stretch of the river clean and therefore patrol the rivers. These co-ops also look out for damaged infrastructure and waste blockages, which generally contribute to poor river health, such as sewage spillage into the streams through manholes. PCRP has not included a monitoring programme as a contractor has only been appointed recently to undertake this activity. Six years of data has, however, been collected for the river. The



representative from ARPP (Nick Swan) stated that their M&E is done using water testing kits, some of which were received 3 weeks ago from iWater in Bloemfontein. A bacteria colony has been found in the stream, along with chemical pollution in the water from factories. Alice mentioned that the idea for the third lab is to explore issues of M&E and learning, and how these link to TA.

- In the absence of municipal services or failure infrastructure, rivers absorb these costs. For example, grey infrastructure, such as wastewater treatment works are designed to 'fail' into rivers and the natural environment. So rivers absorb this cost. Catherine Sutherland mentioned this.
- A question was asked about the location of the ARPP; the reply was that it is the Aller River Catchment in upper New Germany.
- A representative from the eThekweni municipality mentioned that municipal workers have been greatly involved in the Sihlanzimvelo project and are therefore aware of the implementation and benefits, which results in more effective planning and governance. He suggested that the municipality needed to be more aware of all projects to contribute to this, but acknowledged that this might be difficult because of the extent of the area covered by these programmes. However, if the municipality is not informed of these projects, they are in danger of not receiving municipal budget.
- Geoff mentioned that we don't always have the right people in the room when we have discussions similar to those facilitated through LIRA2030; the Water & Sanitation Department should be included. He also called for innovative designs for sewage infrastructure as currently, this infrastructure follows the gradient, which is beneficial when the infrastructure is functional. However, when the infrastructure is blocked or damaged, it results in waste spilling into rivers.

Collaborative exploration of the transformative landscape in Durban (part 2)

After the plenary discussions described above, the participants each selected a case study that they were interested in exploring further and worked in groups to answer three questions as presented below.

1. What would your ideal landscape look like in 50 years' time? Describe this with one/two sentences (think of biophysical, social, governance, economic)
2. What are the three priorities to get from the current landscape to this ideal? How would you go about doing this? (i.e. concrete activities)
3. How does your project contribute to these priorities? If you see fit, how could the project adapt to better link to these priorities?

The groups were anchored by at least one representative from the projects that were being discussed. The feedback from these groups was captured as a 'transformed landscape', to



which all projects are contributing. Key discussion points, as presented by a representative of the groups, are presented below. These points do not specifically follow the order of the questions presented above. Photos of the flipcharts developed by groups are included in Annex C.

Aller River Pilot Project

Feedback from those who discussed ARPP emphasized the importance of effective engagement with stakeholders around river management, to identify issues and support effective coordination. The group stated that they would ideally like for municipal departments to include issues that ARPP is dealing with in their Integrated Development Plans (IDPs) in the future. They hope for improved catchment processes and focus, which could potentially link to the Sihlanzimvelo programme. To do this, all sorts of land uses and actors need to be considered, including industry. They emphasized the importance of extended producer responsibility, with a focus on landlords (e.g. restaurants and others in the formal sector). This means that producers should absorb the responsibility of impacts of their actions (e.g. development of waste) downstream. The ARPP group would like to see circular economies, as well as new values around caring and transformational leadership. They think such programmes need to be self-auditing, with effective monitoring and regulation. Champions, who have these skills and values, are currently being developed through ARPP.

Palmiet Catchment Rehabilitation Project

The PCRPP group expressed that they would like to see animal life (especially fish, amphibia and insects) return to the Palmiet Catchment in the next *five years*¹. Ideally, informal settlements would not exist (i.e. everyone would have access to housing) or they would be better managed for social, environmental and economic impacts. Since Ecological Infrastructure (EI) helps reduce impacts of climate-related events, they would like to see Durban Metropolitan Open Space System (D'MOSS) (or those implementing the programme - EPCPD) holding the line to support EI. Spatial planning would, in this instance, include green spaces and budget would be available for supporting and maintaining EI. Service delivery would be effectively run and TD research recommendations would be actioned by community stakeholders.

To get to the landscape described above, innovative solutions, especially for waste-water, need to be developed, as well as the circular economy. These innovations and economies would reduce our dependencies upon high infrastructure and centralised treatment works. Improved governance is also required; both top-down and bottom-up (e.g. associated with service delivery to collect solid waste). Policies, laws and regulations would need political

¹ The group felt that 5 years is a more manageable visioning perspective than 50 years.



support, land would need to be effectively managed and infrastructure would need to be upgraded. Opportunities to re-value waste through recycling and circular economy are needed, especially those that include big industry. Alien plants also need to be removed.

In terms of how PCRIP is contributing to these needs, the group reflected on the fact that the Community of Innovators (CoI) has limited reach into municipal line functions or the line functions have limited ability to make an impact. The government is funding the removal of invasive alien plants but not creating the circular economy. The group mentioned that CoI is all about governance of the programme, but it also connects with city governance structures. PCRIP is focused on improvements in how Quarry Road processes link to city processes. Innovative solutions, like eco-champs, might contribute to these objectives.

Sihlanzimvelo

The Sihlanzimvelo group explained how, in the future, they hope that waterways define eThekweni rivers and oceans (i.e. they are an important feature of the city landscape and design).

To meet this objective, the entire system needs to be planned and well managed. The community needs to be involved and take ownership, and quality of life for all needs to be improved. Alien invasive species should be implemented and restoration ecology implemented. The interconnected relationship between people and environment needs to be reframed and collaborative governance should be prioritized, community-based areas should be drawn and a shared vision articulated. Ongoing training should support this, as well as a transformed, multi-model, flexible and locally determined programmes.

Value associated with the rivers needs to be built; the aesthetics and use should be improved, infrastructure should protected, waste resources used innovatively, and livelihoods developed. All types of resources need to be mobilized; local community, private sector, as well as local government (service delivery & political). Service delivery should be improved through co-ops (e.g. bottom-up), education, communication, monitoring and shared learning. Knowledge also needs to be better managed; lessons should be collected on an ongoing basis so that key issues can be identified and resolved. This would both support and be supported by a systems approach.

All of these approaches would be underpinned by happy and healthy rivers, banks, spaces and people. Rivers would rehabilitated so that they benefit everyone; they would be used for property, value, sport, agriculture, recreation. Rivers would be clean and clear, beautiful, safe (biophysical and social) and useful.

Wise Wayz Water Care

The group discussing the Wise Wayz Water Care programme mentioned that their ‘transformed landscape’ would include proper/improved sanitation and water distribution in the majority of households. This requires collaboration between government and community stakeholders, as well as improved and more sustainable socio-economic status, as well as shared responsibility at all levels. WWWC is contributing to this by engaging industry, supporting community education, and bridging communication between the municipality and the community. The community themselves are also being empowered to raise awareness, as well as their own voices on issues.

The broader transformative landscape in Durban

The broader transformative landscape to which these various ideas and interventions contribute is presented below. All groups shared visions related to community involvement in managing waterways and contributing to other services; a meeting of top-down and bottom-up approaches. Most groups also emphasized the importance of innovative solutions for dealing with the problems that are encountered, including closing loops between waste and businesses.



Integrating a forward-looking climate perspective

After lunch, the group engaged in a discussion about integrating climate information into planning in Durban. Lulu presented a tool that has recently been developed for eThekweni municipality, the [Climate Projections and Risk Assessment](#) (please follow the hyperlink to access the tool). This platform allows users to explore the potential changes in climate and associated impacts on Durban and surrounding areas, including heat, drought, pluvial flood and coastal flood. Acknowledging the uncertainty associated with projections, information on predicted impacts is presented within two framings; i) the 'green' framing (i.e. lower emission scenario); and ii) the intensive industrial framing (i.e. higher emission scenario). Changes are compared with the current climate (figure below)



A plenary discussion about climate change information then followed, which included conversations about the opportunities and challenges for integrating this type of information into planning. Mark Tomlinson asked a question related to the differences in mitigation and resilience, to which Geoff answered that mitigation interventions aim to reduce the amount of carbon emitted, thereby working towards reducing further anthropogenic changes to the climate system, while resilience is about changing or reorganizing aspects of the 'system' (whether this is social, economic etc.) to adapt to the changes that are already being experienced. One of the participants also raised the question of difference in terms; mitigation, resilience, adaptation, transformative adaptation etc. Alice and others explained that these terms are sometimes used interchangeably but can also mean quite different things in different disciplines or fields of work. TA is about a process of fundamental change within the system while resilience refers to the state or characteristic of the 'city system'. TA interventions could contribute to resilience of the city



Lulu spoke about how climate change will likely exacerbate issues that we are already facing, so adaptation is also about addressing these. Climate change projections can help us understand the type and magnitude of potential changes to the climate and we can therefore think about the extent to which existing issues will be made worse, and then plan for responses to these.

A question was asked about the scale of carbon emissions and the climate system; are we all contributing to changes in the same system? Or are the emissions and changes localized? The answer was provided; the climate system of the whole world is connected, so responses need to be global to reduce potential impacts.

Geoff spoke about how wetland degradation in Durban, mostly because of development, has contributed to the challenges associated with extreme weather events, most notably flooding. Wetlands are natural filters and mitigators of floods as they hold large amounts of water. These days, water, on which Durban inhabitants depend, needs to be stored in man-made structures. He spoke about how Cape Town is exploring innovative solutions to capture and store rainwater runoff, such as groundwater recharge and storage under urban areas.

Suzanne asked if it would not be better to upgrade the stormwater infrastructure, to which Geoff responded that the infrastructure generally functions for a long period of time. Maintenance of infrastructure is adequate, instead of updating infrastructure completely. A comment was made that every flood has happened after a major drought, including the flood that happened recently and the older floods of 1989. Stormwater systems flush water away from the road, Geoff reminded everyone; the management of the surrounding areas also contributes to how well the infrastructure functions. For example, land and soil are not well managed and, as a result, veld fires occur. These fires lead to erosion and runoff into the stormwater drains, blocking the flow of water through these drains.

A question was asked about whether climate change might have a positive impact on Durban's catchment after the drought as the city is likely to receive more rain. Participants then discussed that fact that urbanisation and population increase intersect with climate-related impacts to lead to negative consequences, so we need to think about the consequences of all of these stressors.

Another discussion that was raised was about the usefulness of climate information in different forms and at different scales. The tool that was presented in the learning lab was acknowledged as a great starting point to interrogate information needs, while also providing the opportunity for general awareness raising. Geoff spoke about the need for very specific information for designing infrastructure, and the fact that information is not always provided in the right format by scientists. Alice alluded to the idea of "co-exploration", which is taking



place in the FRACTAL project; climate scientists and engineers have had ongoing conversations that have helped to connect the science, information needs and decision making. For example, climate scientists produced information about the expected change in number of days over 40°C for a particular city. Through co-exploration of and a discussion about the information that had been produced, the team realized that these thresholds are not useful for decision making in their case, and that the analysis should be re-run with different thresholds so that the outputs produced (information) are more useful.

Reflections, closing and speaking about the next engagement

Alice wrapped up the day by talking about next steps. She explained that she would be visiting Harare on 3 July to co-facilitate a learning lab, similar to the first lab in Durban.

The team is hoping to support field visits to the different programmes alongside the next Durban learning lab, as well as city-to-city exchanges that will facilitate learning between Durban and Harare. The next engagement in Durban is likely to take place in October 2019. The group at the lab decided that more information should be collected on some of the programmes after themes that emerged during the second lab.

Thereafter, team members reflected on the day through an interactive exercise of kicking the ball around and sharing aspects that they had enjoyed, or not enjoyed. These are recorded below.

- Enjoyed learning from all the experts.
- Really enjoyed the mixture of group discussions and feedback.
- Enjoyed getting out of the office to hear different perspectives.
- Very informative to know more about climate change.
- Collectivisation of solutions was great.
- Really new in to one of the projects; I never knew about the Sihlanzimvelo project and learned a lot today.
- Enjoyed the workshop not just as an employee of the city; it was interesting to know the bigger profile of the city as a resident of Durban.
- The engagement was very interesting and informative.
- Really liked meeting people that I've never met before, lots of knowledge possessed.
- Always love these kinds of engagements but next time we should reach out to stakeholders.
- Good to see a few more members from the municipality, we need to have industry which is absent at the moment... as they fund this.
- Enjoyed the openness of the discussion.



- Enjoyed learning and being exposed to the different water projects, but what happens to the data?
- Interesting as we are all working towards one goal; the day was very informative but again, how are we going to use the data collected?
- Amazing to find out what is going on in Durban.
- Coming from an environmentalist perspective it is nice to see an element of humanism involved.
- As a university student it was really awesome to gain first-hand knowledge on the river projects such as the Palmiet which we know of as we are forced to do academic reading on it and have some class discussions, it was really informative and I enjoyed, I feel more students should have access to this kind of learning.

References

Polk, M. 2015. Transdisciplinary co-production: Designing and testing a transdisciplinary research framework for societal problem solving. *Futures*, 65, 110-122.

Klein, J. T. 2013. The Transdisciplinary Moment(um) From Disciplinarity to Interdisciplinarity, 9(2).



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Annex A: Meeting agenda

Time	Session	Facilitator(s)
08h30-09h00	Coffee and registration	
09h00-09h30	Welcome, recap of LIRA2030 processes to date and setting the scene for the day	Alice
09h30-10h00	Introduction to case studies	Lulu
10h00-10h30	Collaborative exploration of the landscape of transformation in Durban session #1: what has the data revealed?	Alice, Lulu and Patrick
10h00-11h00	Tea	
11h00-13h00	Collaborative exploration of the landscape of transformation in Durban session #2: what more do we know?	Alice, Lulu and Patrick
13h00-14h00	Lunch	
14h00-15h30	Integrating a forward-looking climate perspective (with working tea)	Alice & Lulu
15h30-16h00	Reflections, closing and next steps	Alice
16h00	Coffee and departure	



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Annex B: Workshop attendee lists

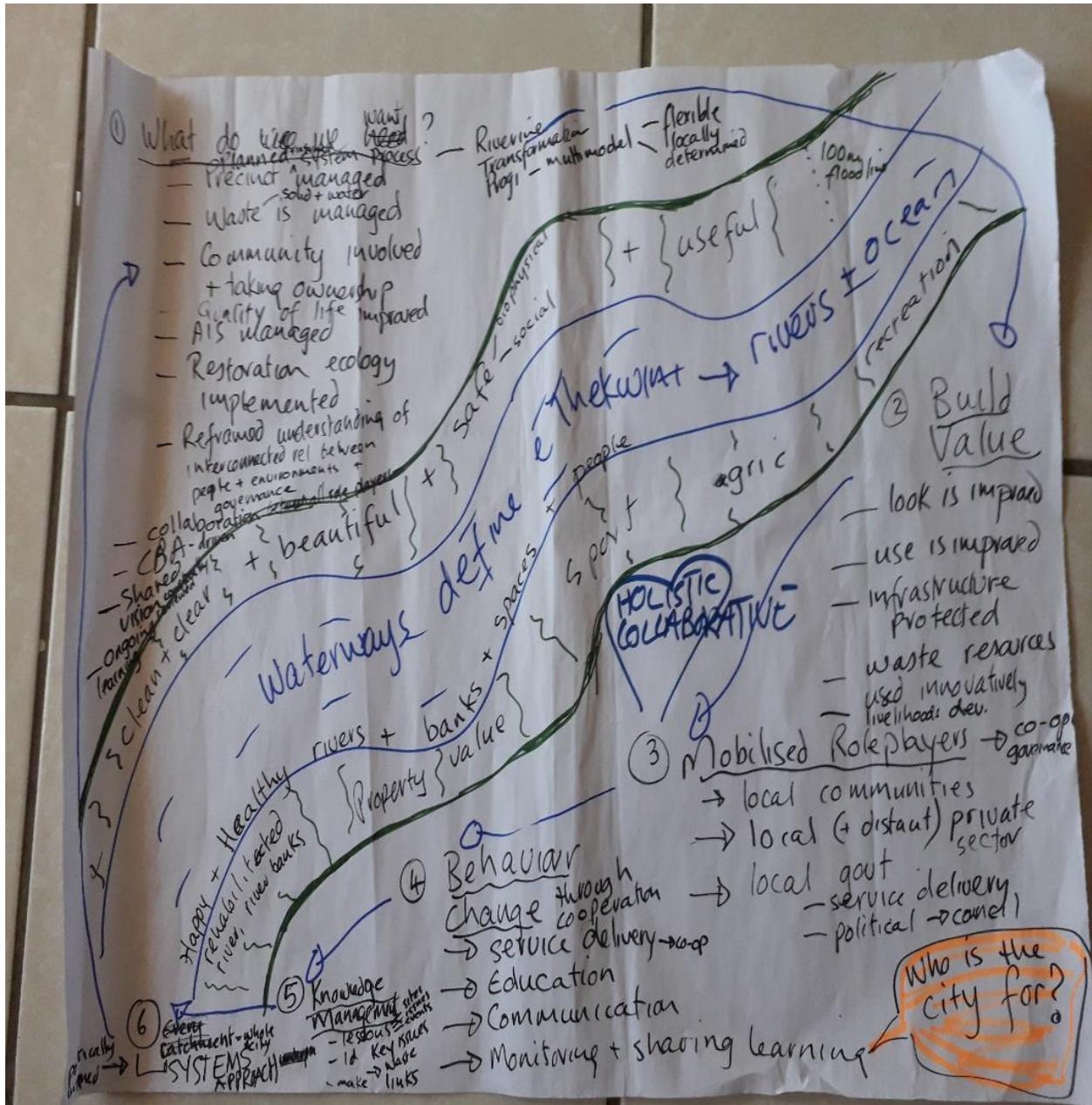
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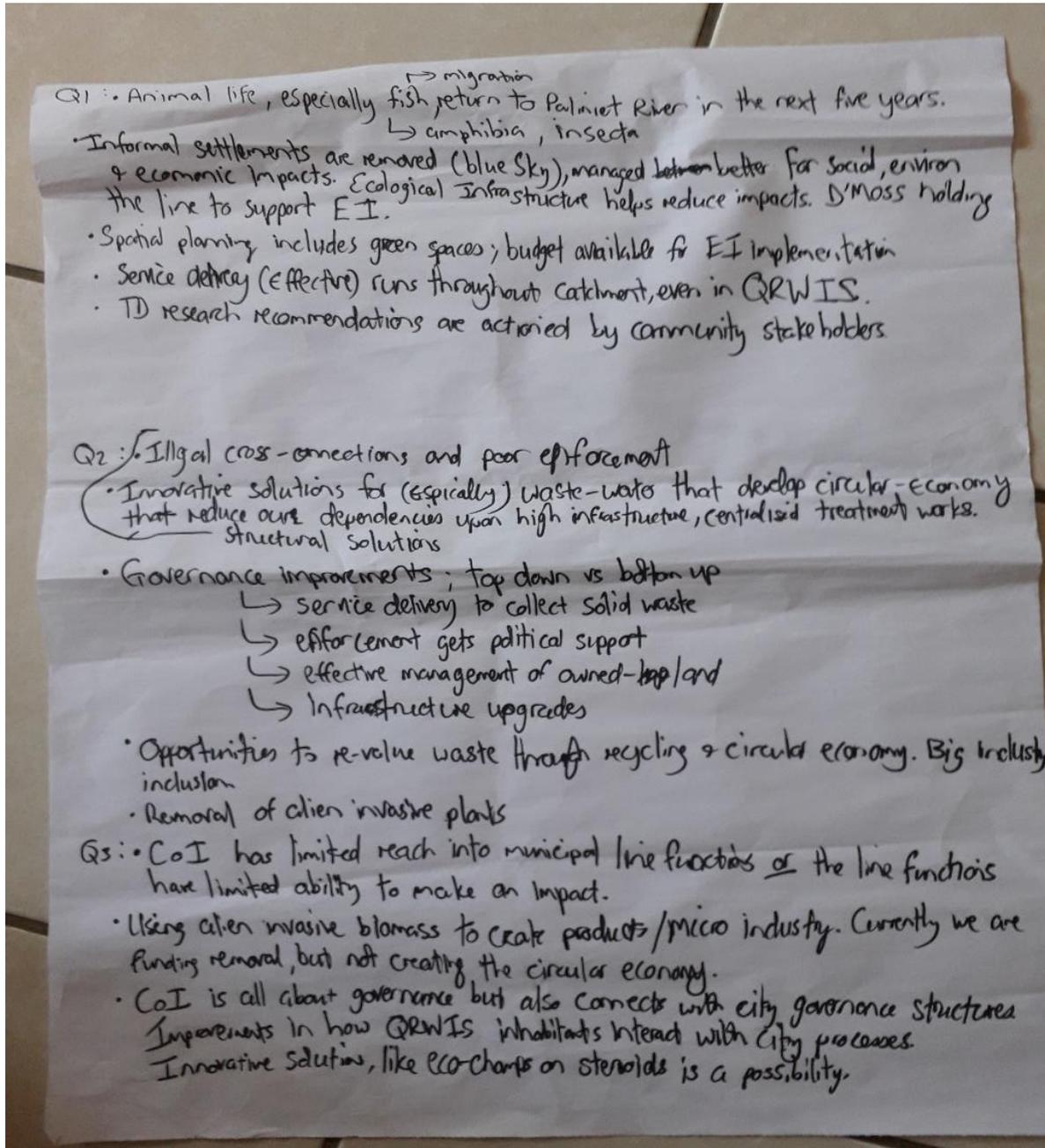
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Annex C: photos of flipcharts from breakout discussions

Sihlanzimvelo



Palmiet Catchment Rehabilitation Project



Aller River Pilot Project

