

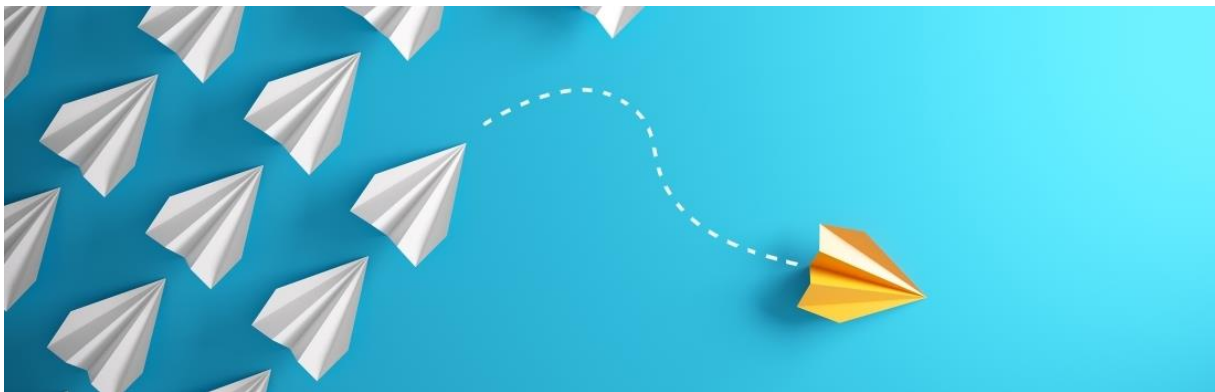


International  
Science Council



# Transforming southern African cities in a changing climate

Leading Integrated Research in Africa for Agenda 2030 in Africa (LIRA2030)  
Learning Lab 4



<https://chronovo.com/changing-course-on-your-msa-submission-policy-during-the-covid-19-crisis-and-the-role-of-structures/>

## Feedback on key learning themes (chosen by participants):

A deeper look into shifts towards Transformative Adaptation in southern African cities

Lessons about fundamental and demonstrable changes when considering Transformative Adaptation in southern African cities

Lessons about holistic and flexible approaches to promote Transformative Adaptation in southern African cities

21-24 July 2020

Zoom platform

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## Background to the Learning Lab

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 (TA) has been envisioned or implemented in southern African cities, explore interventions that have transformative characteristics, and unpack pathways towards this approach. Durban and Harare were selected as case study cities and the difference in maturity of their adaptation agendas (at the city level) has resulted in a lot of learning. Both cities are facing an increasing intensity of extreme events such as floods or droughts, which can potentially lead to shifting water availability and/or quality.

The first Learning Lab (LL) in Durban took place in November 2018. Through this engagement, participants reflected on the academic notions of TA, several of which are shared below

*Transformative Adaptation (TA): adaptation that changes the fundamental attributes of a system in response to climate and its effects (IPCC, 2014)*

*In the context of environmental change, conscious transformations to sustainability can be seen as integrated, holistic responses that challenge the status quo. In practice, this may involve questioning assumptions about power, interests, and identities, including our own (O'Brien, 2017)*

Participants also offered their own ideas of transformative approaches to climate adaptation, rooted in practical experience. This process culminated in six criteria of TA relevant to southern African cities being co-developed (see section on “framing of the studies”). A discussion on case studies was convened at this first lab and four cases were selected for further investigation, namely Sihlanzimvelo, Aller River Pilot Project (ARPP), the Palmiet Catchment Rehabilitation Project (PCRPP) and Wise Ways Water Care (WWWC) (see Appendix 1 for an overview of the LIRA2030 case studies). Interviews were undertaken with stakeholders involved in these cases from February-May 2019.

The second LL took place on 24 June 2019 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, and think about ways in which relevant climate change information might be better integrated. A ‘landscape of change’ for Durban was developed during this second event (see below).

It's the year 2040 and the landscape of Durban has transformed. People are working in collaboration (including government, communities and other organisations) with values of caring for ecosystems and other people at their core. The city has an effective mix of built and ecological infrastructure, which helps society deal with climate change, but also to derive other forms of services. Everyone contributes to and benefits from clear and healthy rivers and other green, leafy spaces within Durban; these include spiritual, recreational benefits for people across socio-economic classes and cultures. Clean water running through rivers supports animal life, such as fish, amphibia and insects, as well as the production of vegetables, fruits and other important commodities. Residents that were once vulnerable have built thriving Small- to Medium-Sized Enterprises that support a green economy. Businesses and industries also support this type of economy and acknowledge the importance of riverine areas for production; these larger corporations work hard to give back what the rivers give to them through strong relationships with government, civilians etc. Loops have been closed in production cycles so that

very little (no waste) is produced and everyone understands the economic value of river ecosystems.

The aim of the third LL (24 October 2019) was to collaboratively explore challenges, barriers, catalysts and opportunities on the pathway towards a transformed landscape. To ground some of the concepts that had been discussed in previous labs, a day was also set aside (before the LL) to visit the sites of cases that were being explored (23 October 2019).

The fourth learning lab in Durban was set to take place face-to-face on 20 and 21 March 2020. Considering the COVID-19 pandemic and limitations associated with travel and meeting in groups, as well as the health and safety of all participants, the lab was postponed and redesigned as a virtual event. This event took place in the form of three two-hour sessions and one one-hour session from 21-24 July 2020. These sessions were designed considering the requests from participants to focus on certain, useful learning themes that emerged from the research, each of which is described in the table below.

Date & time	Session theme & overview	Facilitator(s)
Tuesday 21 July 14h00-16h00 SAST	A deeper look into shifts towards Transformative Adaptation in southern African cities  One of the studies homed in on distinctive shifts of two case studies (one in Durban and one in Harare) on their pathways towards more transformative approaches to climate resilience. With a strong focus on Durban, the team shared some findings from this analysis and invited participants to share feedback and ideas.	Patrick Martel, Alice McClure & Lulu van Rooyen
Wednesday 22 July 14h00-16h00 SAST	Lessons about fundamental and demonstrable changes when considering Transformative Adaptation in southern African cities  This session focussed on two of the six criteria of transformative adaptation that were prioritised at the first learning lab in Durban: fundamental and demonstrable changes. The session unpacked ways in which these criteria are being fostered by cases across Durban and Harare, as well as how these on-the-ground activities might inform theory associated with transformative adaptation.	Anna Taylor & Alice McClure
Thursday 23 July 14h00-16h00 SAST	Lessons about holistic and flexible approaches to promote Transformative Adaptation in southern African cities  This session focussed on two of the six criteria of transformative adaptation that were prioritised at the first learning lab in Durban: holistic and flexible approaches. The session unpacked ways in which these criteria are being fostered by cases across Durban and Harare, as well as how on-the-ground activities might inform theory associated with transformative adaptation.	Alice McClure & Anna Taylor

Date & time	Session theme & overview	Facilitator(s)
Friday 24 July 13h00-14h00 SAST	<p>First time screening of the film “Changing course”, followed by a short discussion</p> <p>The “Changing course” documentary was shared, for the first time, with LL4 participants before it was shared more widely. Participants received a link to view the documentary from the comfort of their homes in real-time, after which a discussion was hosted</p>	Lulu van Rooyen & Alice McClure

Facilitators: Alice McClure (CSAG, UCT), Anna Taylor (UCT), Lulu Pretorius (UKZN) and Patrick Martel (UKZN)

The framing of the studies

Criteria of transformative adaptation for southern African cities that were developed based on the outcomes of the first labs in Durban and Harare have provided a conceptual framework for much of the work undertaken in the LIRA2030 project. The final framework consisted of six main criteria along with sub criteria, as described in the text box below.

- |   |
|---|
| <ol style="list-style-type: none"> <li>1. Fundamental/sustainable changes in thinking and doing <ul style="list-style-type: none"> <li>• Capacity is developed for those involved to support this fundamental change</li> <li>• The fundamental changes must be permanent</li> </ul> </li> <li>2. Inclusive <ul style="list-style-type: none"> <li>• Relationships across stakeholder groups to support inclusivity</li> </ul> </li> <li>3. Challenges power asymmetries</li> <li>4. Must be demonstrable in practice</li> <li>5. Responsive &amp; flexible</li> <li>6. Holistic, complex systems thinking <ul style="list-style-type: none"> <li>• Thereby addresses climate in combination with other things</li> <li>• Breaks down divisions between adaptation, mitigation and sustainable development</li> </ul> </li> </ol> |
|---|

The transdisciplinary research processes have informed two main academic analyses: i) exploring the interlinkages between the criteria, including synergies and trade-offs; and ii) unpacking pathways towards more transformative approaches, particularly moments of change. Findings from the second study were shared on day 1 of Learning Lab 4, while several findings from the first study were shared on days 2 and 3.

## Day 1: A deeper look into shifts towards Transformative Adaptation in southern African cities

### Introduction

Participants introduced themselves, after which Alice introduced the topic of the day: Identifying moments of change in relation to transformative adaptation and water projects in two southern African cities.

Patrick explained that two case studies (one in each city) had been analysed with a transformative adaptation lens: i) Sihlanzimvelo in Durban, a stream cleaning program – lessons from this project are being used to consider and design a Transformative Riverine Management Program (TRMP) for the whole of Durban; ii) the Harare Wetlands Advocacy Project (HWAP) in Harare. Patrick provided an overview of the analysis steps of the study, as depicted in the figure below.

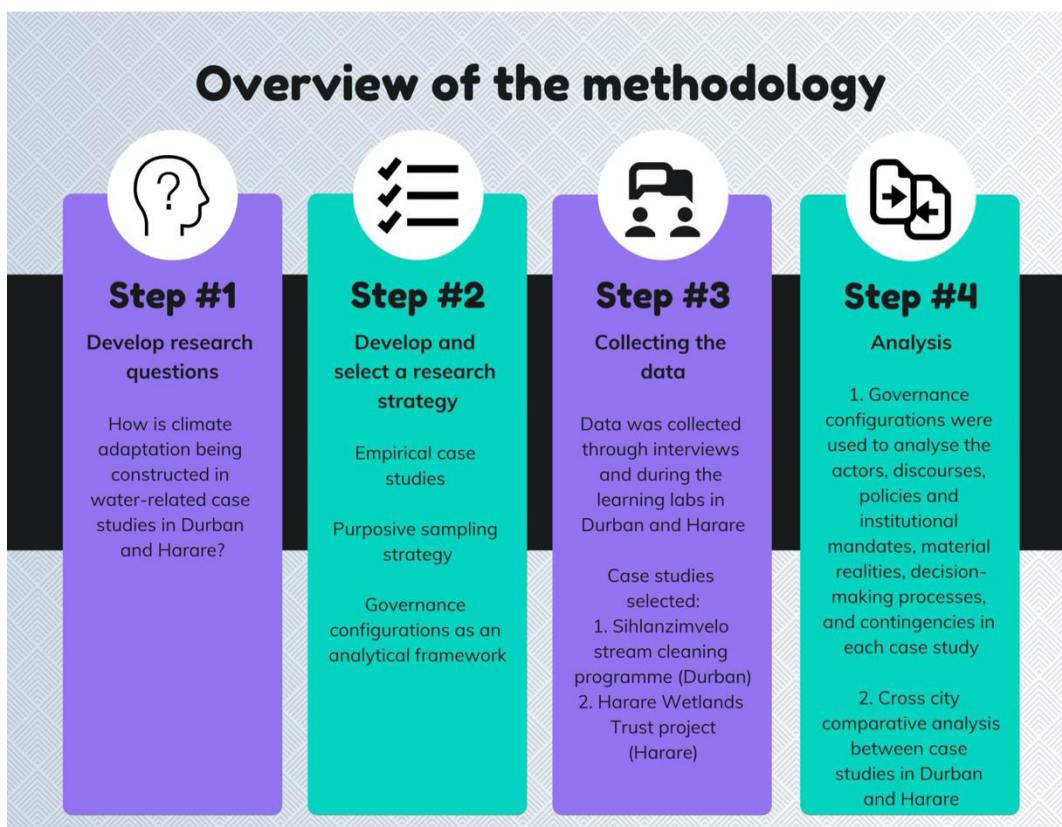


Figure 1. Graphic showing an overview of the study methodology

A governance configurations lens was used to understand the ensemble of social and material structures associated with the case studies, which are intimately entangled at a time and place, generating sets of decisions, interventions and outcomes for a given city. The governance configurations were applied to the data that were generated through interviews and learning labs, focusing on six dimensions, as described in the table below.

Table 1. Governance configurations elements

Governance element	Short description
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Actors	<ul style="list-style-type: none"> <li>● People involved in the process of creating, debating, finalising and implementing policy</li> <li>● Exercise / possess power</li> <li>● Networks of actors</li> </ul>
Discourses	<ul style="list-style-type: none"> <li>● "...an ensemble of ideas, concepts, and categories through which meaning is given to social and physical phenomena, and which is produced and reproduced through an identifiable set of practices"</li> <li>● Used to frame issues</li> <li>● Actors use discourses to argue for their interests</li> </ul>
Material reality	<ul style="list-style-type: none"> <li>● Physical spaces (e.g. steep topography; positioning of cities relative to their water sources)</li> <li>● Technologies (e.g. water management devices / flow restrictors)</li> <li>● Infrastructures (e.g. dams, pipelines and infrastructures)</li> </ul>
Policies and Institutional Mandates	<ul style="list-style-type: none"> <li>● Provide the architecture of a city's institutional arrangements by providing guidelines, norms and standards embedded in policy for decision-making</li> <li>● Cities may lack capacity to implement policies and mandates</li> </ul>
Decision-making	<ul style="list-style-type: none"> <li>● Formal decision-making</li> <li>● Informal decision-making</li> </ul>
Situation-dependent and site-specific contingencies	<ul style="list-style-type: none"> <li>● Outcomes are the result of intersecting chains of causal mechanisms and stochastic happenings, so there is no sense in which outcomes are predetermined or confidently predictable</li> <li>● Accidents or random events making a difference</li> <li>● Properties of social formations are relative to the properties of the individuals who constitute them</li> </ul>

Sources: Scott, 2017; Dryzek, 1997; Hajer, 1995

Patrick emphasized that the governance configurations lens has been used to explore relationships between these elements in the context of the two projects. This lens also allowed for cross city comparison.

Patrick highlighted that a moment of change is identified when there is a relational alteration to the dimensions of the governance configuration. Researchers involved in the LIRA study were particularly interested in changes towards more transformative approaches. For example, the considering and designing the TRMP represented something different in Durban's climate adaptation journey, notably an explicit climate change focus, large geographic scale, potential relations or relationships with other ongoing river rehabilitation projects in its quest for the most effective models.

### Findings from the study

#### *Durban (Sihlanzimvelo)*

Patrick explained that Sihlanzimvelo emerged in 2008 through the eThekweni municipality's Roads and Stormwater Maintenance Department. Although the program is rooted in a technical discourse that promotes the preventative maintenance of public waterway infrastructure to reduce blockages in waterways, thereby causing less damage to infrastructure, it is entangled with the job creation discourse. This is based on the national imperative of job creation and poverty alleviation. The focus on high-density, low-income areas also introduces a socio-spatial discourse.



The whole concept of Sihlanzimvelo was based on the realisation by the Roads and Stormwater Maintenance Department and the collaborating Coastal Stormwater and Catchment Management Department that no single function in the municipality was taking responsibility for man-made and natural streams in the city. Sihlanzimvelo aimed to reframe how streams were managed by scarce departmental resources. This was an atypical occurrence, where budgets and resources were planned to be shared.

In this initial planning phase of Sihlanzimvelo, the local councillors shaped the model that was selected, namely the community cooperative model. The negotiation of models took place between 2008 and 2010. Cooperatives were favoured due to their small business development potential with broader poverty alleviation benefits. The communities in Durban that engaged were: Umlazi, Inanda, Ntuzuma and KwaMashu. In 2011, eThekweni Municipality put out a call for an expression of interest, after which communities came together to form cooperatives and applied. At the same time, a contract was put out for consultants who would be required to employ or train assessors in the community.



Figure 2. Graphic representation of the governance configurations associated with the planning of Sihlanzimvelo

When Sihlanzimvelo was ready for implementation, several line functions failed to commit their pitched budget to the Roads and Stormwater Maintenance Department. As a result, the Roads and Stormwaters Department ended up funding Sihlanzimvelo from their operational budget, while the multiple line functions were able to provide other resources.

During implementation of Sihlanzimvelo, the project manager developed a web-based monitoring tool to identify the cause of blockages. Using this tool, they ascertained that 70% of blockages were caused by alien vegetation and 30% were caused by human generated waste. This helped to refine interventions further. The multiple benefits that were being generated by this programme also

created further impetus for the Roads and Stormwater Department project managers to geographically expand this programme to other spaces in the city. The programme's wider potential began to draw on increasing attention from other municipal departments on the benefits of the green economy.

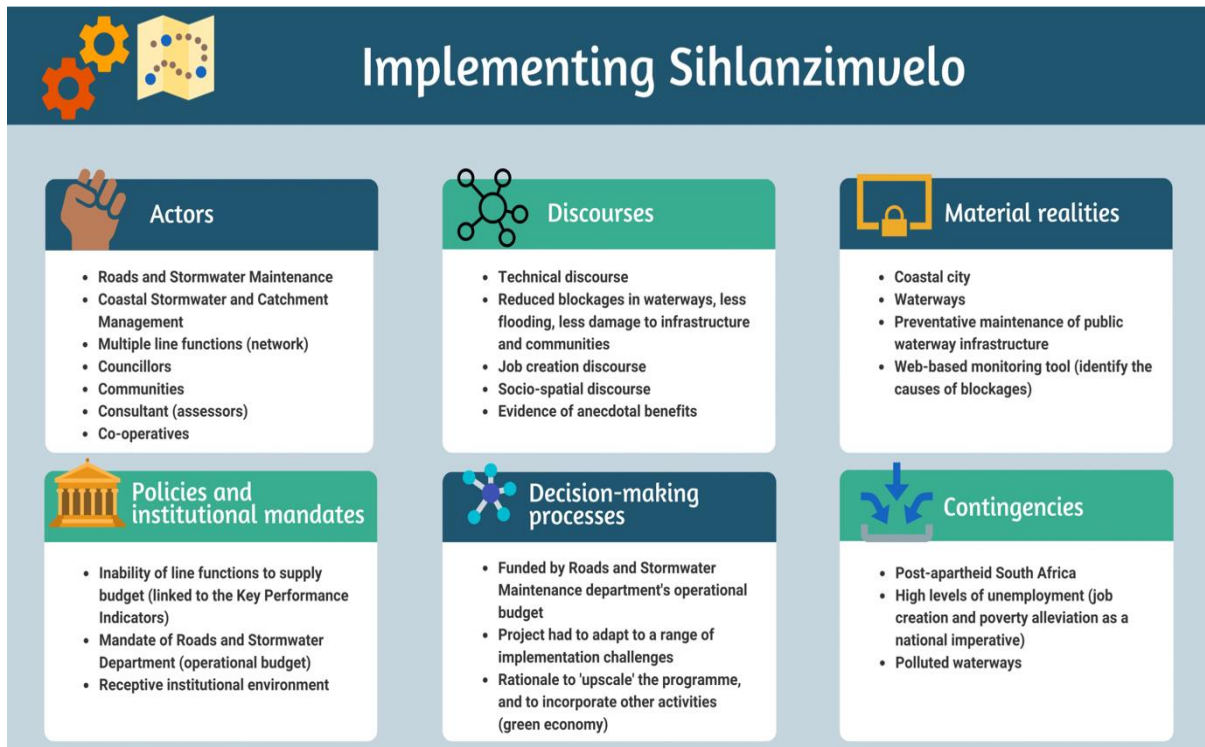


Figure 3. Graphic representation of the governance configurations associated with the implementation of Sihlanzimvelo

In 2015, The Roads and Stormwater Department teamed up with Environmental Planning and Climate Protection Branch (EPCPD) in eThekweni Municipality to respond to an international call from C40 Finance Facility (CFF) to design and implement transformative climate change resilience projects in cities through partnerships and knowledge sharing. These stakeholders were successful and the CFF partnered with eThekweni municipality to undertake cost benefit analysis, which can be considered a decision-making tool that provides evidence for decisions, and to investigate business cases to upscale similar riverine management processes to all rivers in the municipal area. The idea put forward was that money spent on riverine rehabilitation and riverine management would ultimately save eThekweni Municipality money. This process has since evolved into the Transformative Riverine Management Programme (TRMP).

Through this process the city has recognised the value of other water-related projects and how they can contribute to an overarching TRMP (e.g. Aller River Pilot project, Palmiet Catchments Rehabilitation Project and Wise-Ways), particularly in terms of lessons learned and governance configurations. A dominant theme which remains in TRMP is concerned with the green economy, as well as technologies and practises to close the loops, create circular economies and create value chains to be incorporated into TRMP. Overall, there's a strong partnership discourse embedded and reflected in TRMP.

### *Harare*

Alice provided an overview of the case study in Harare: the Harare Wetlands Advocacy Project (HWAP). This project can be seen as moving along the pathway towards transformative adaptation because it is becoming more inclusive and empowering citizens.

Wetlands were initially recognised by citizens of Harare as providing ecosystem services to contribute to water security. With Harare's water source being downstream of the city (Lake Chivero), the pollution that is produced in Harare influences the quality of Harare's water supply. Pollution is an issue for several reasons including the limited collection of solid waste in the city, old infrastructure and damages or bursts that lead to leakages. There is limited coordination between the central and local government with regards to who manages wetlands, as well as how this takes place. A combination of existing and ongoing developments in wetlands as well as streambank cultivation highlights the problem of land allocation. An outdated Master Plan for the city does not help matters.

Alice explained that the objective of the HWAP was to support an informed citizenry that could make better decisions about actions in and around wetlands, and to support institutions in implementing their mandate through the stewardship approach. Another initial intention was to identify gaps in the legislation relevant to wetlands that, once filled, would contribute to improved management. The project also sought to harmonise coordination/planning between the Regional Town and Country Act and the national legislation Environmental Management Act (EMA), (i.e. these two different scales of governance).

As citizens became more aware of the importance of wetlands and the legislation related to these areas, they started holding duty bearers accountable, particularly related to Section 97 in the EMA, which stipulates that construction or development in wetlands requires an Environmental Impact Assessment (EIA). Community-Based Organisations (CBOs) have taken developers to court with the help of the Harare Wetlands Trust. Awareness campaigns and knowledge sharing spaces have provided opportunities for learning about legislation, as well as the correct process for development (according to EMA). Unlike the Durban case (Sihlanzimvelo), the HWAP has been pushed forward by community members who have had to legitimise their activities.

In Harare, a technical discourse has dominated water management relevant to the state (i.e. pipes and hard infrastructure). Over time, discourses associated with community-based conservation and stewardship have been introduced through the HWAP, as well as empowerment. Some tensions have emerged during the project, particularly in terms of whether the HWAP should support conservation or preservation of wetlands (indicative of tensions between different groups involved in HWAP). HWAP has introduced a more collaborative approach to wetlands, as well as better coordination between relevant stakeholders. The review of legislation has integrated ideas of climate change.

Several important outcomes associated with the HWAP have been noted, namely application for Ramsar status of the wetlands by the municipality, integrating communities in management of wetlands, recognising the value of wetlands and ecological infrastructure (also by state actors), legislative review, and an ongoing process of gazetting a map of wetlands around Harare.

### *Comparison of the two cities*

Patrick provided some initial findings from comparing the two cities, which are shared below.

Table 2. Differences between Durban and Harare (with regards to moments of change)

Elements	Durban	Harare
Actors	State-led	Civil society led
Discourses	Complimentary discourses (at least at stage)	Conflicting and competing discourses (Citizens take local authority to court)
Policy and institutionalised mandates	Very different policy environments and capacities of local authorities to fulfil their mandates. Stronger capacity of the state in Durban to integrate vertically (e.g. with C40 network) and horizontally (e.g. cross-city exchanges)	
Material realities	Coastal city; use of cost-benefit analysis	City is upstream of its water source
Contingencies	Post-apartheid South Africa Polluted rivers	Conversion of wetlands Political challenges Enforcer-adherer relationship between state and civil society

The findings were then discussed according to three governance concepts: institutionalisation, integration and partnerships

#### Institutionalisation

- Tactics have been employed by the Environmental Planning and Climate Protection Department since the mid-2000s to mainstream climate concepts. Durban therefore has a technical and political acceptance of climate change and its associated impact. Ecosystem-based adaptation and community EbA are accepted discourses and practises in Durban. This history has created an enabling environment, which allowed Durban to receive climate action funding.
- Sihlanzimvelo (and TRMP) promotes job creation through the Green Economy, which is in line with the national imperative.
- TRMP has not encountered significant structural, political and institutional opposition.
- The actors in Durban explicitly refer to and draw on discourses of climate change in their programmes. In Harare the discourses are more hidden.

#### Integration

- eThekwini has a great ability to vertically and horizontally integrate, and representatives of the municipality have the capacity and capability to formulate innovative solutions in the absence of mandated national acts. There is strong capacity within the institution to respond to international funding calls eThekwini is considered to be a global leader in climate adaptation.
- eThekwini has a responsibility to share its learnings and its findings with adjacent local governments (CFF exchanges)
- Harare is just starting its climate adaptation journey and therefore lacks these institutional elements. There's been a lack of coordination between the mandated authorities at local and national levels.
- Wetland maps are still to be Gazetted and wetlands spatialised as a form of ecosystem-based adaptation. Civil society could use these to create stronger arguments to put forward their cause.

#### Partnerships

- eThekweni Municipality places emphasis on partnerships between state and non-state actors (community, civil society, private sector and academia). Partnerships have also been formed between different government departments (e.g. to respond to the C40 call). The municipality also has the ability to create synergies through network forms of governance for engagement and reflection. State/non-state partnerships related to climate change and water are just emerging in Harare.

## Discussion

Alice opened the floor to comments and questions.

A concern was raised about the framing of long-term success of Sihlanzimvelo-TRMP. The research team responded by stating that the TRMP process is currently being imagined. When Sihlanzimvelo went from the planning to the implementation, there were challenges. When (and if) the TRMP gets implemented, challenges and competing discourses are likely to emerge.

Another interesting turning point might also be considered the introduction of the climate change discourse to Sihlanzimvelo, which wasn't initially there. The research team explained that climate discourses didn't actually emerge during the interviews. It is unclear at which point the climate discussion came in, as it was a subtle introduction. There was some tension amongst interviewees related to whether it's an engineering project, an environmental project or a climate change project.

The participants then reflected on the introduction of the climate change discourse into the HWAP. A representative from Harare explained that initially, climate change adaptation was a part of the HWAP, but not explicitly. The project mainly focused on water challenges in Harare and these are not entirely climate related. The water challenges were mostly concerned with pollution and governance issues. After a while, climate change became more important and the team started focusing on how wetlands contribute to dealing with climate hazards such as flooding, as well as the purification of water. Issues to do with drought also emerged as the team realised that if the wetlands are kept intact, they might play a role in water purification.

Another participant reflected on the fact that in the past, actors within eThekweni have known little about climate change as something that impacts their work. A campaign was recommended within the municipality to educate people at all levels about climate change and how it impacts city governance and service delivery. There was a push to frame such projects as job creation projects to support more buy-in. Recently, people have become very receptive and open to the topic of climate change regardless of which department they represent. And this is not only seen in the environmental sectors but people in Solid Waste and Water and Sanitation. The impacts of climate change are becoming observable at an operational level regardless of which department one is in.

One of the research team members commented on the fact that the unemployment situation in South Africa is dire, so it makes sense to structure projects as fulfilling job creation objectives. On the topic of climate change, there's been more understanding but not everyone knows how to apply this understanding in planning.

A participant brought up the issue of land ownership: the spatial administration discourse is partly a land ownership issue but it's also just the fact that river models work differently in different levels of streams and rivers. Getting into the detail of the cost-benefit analysis, land ownership comes into play. The municipality has more agency in areas where they own the land, but the physical characteristics of rivers must also be considered. The Sihlanzimvelo project operates in a very particular kind of context and that limits the ability to transfer understanding of costs and benefits to a whole range of different river reaches

One of the participants reflected on the knowledge exchange mechanism, and how this is currently being applied. This is partly to showcase eThekweni's work with Sihlanzimvelo and other projects, but also to inspire other municipalities to formulate their own TRMPs.

A participant brought up the need to be sensitive to people's experience. With the COVID-19 outbreak, people have returned to cultivating out of hunger, which is similar to the scenario in Harare. People in Durban are ignoring by-laws and cultivating along rivers out of desperation. We should reflect on the language being used; perhaps 'trans-contextuality' is more helpful to practitioners than 'transdisciplinary'. As for 'transformative', interventions need to lead to permanent change and require being dynamic.

One of the research team members mentioned that the topic of 'identifying moments of change in relation to transformative adaptation' is more about conceptualised moments of change in a relational sense... not in terms of definitive moments. Also, while transformation and transformative adaptation might be buzzwords now, people were talking about transformation 40-50 years ago.

Alice concluded by pointing out that transformative adaptation, by definition and as explored within the LIRA2030 project, is a departure from the status quo, and challenges norms. The Sihlanzimvelo-TRMP and the HWAP are changing relations towards something that is different from the status quo and that is why they have been framed as transformative.

## Day 2: Lessons about fundamental and demonstrable changes when considering Transformative Adaptation in southern African cities

### Introduction and Icebreaker

Anna started the day by asking participants whether they had made any changes to their lives during the lockdown period that they are likely to maintain. Before answering the question, everyone introduced themselves and mentioned their affiliation and how they are involved/connected to the work/project. All participants seemed in agreement that the approach of meeting online is beneficial as it cuts costs and travel (also contributing to reduced carbon emissions). They also agreed that meetings appear to be more concise and they would all like to see this continue.

### Exploration of criteria (based on research findings)

Anna's presentation focused on two criteria of TA that were assessed during the LIRA2030 project: i) fundamental changes (i.e. something new) that persist over time); and ii) demonstrability of changes; practical things that people can see on the ground. The research team had applied these criteria to four case studies in Durban, and two in Harare (see Appendix 1). Before starting, Anna checked in on expectations for the day from participants.

Anna reminded everyone that TA is about making changes to manage climate risk. She was interested to explore (during the lab) how the two criteria (see above) might reduce climate risk by connecting these criteria to a recently published conceptual framing of climate risk (see [here for a summary](#) and [here for the full report](#)). Addressing the fundamental causes of climate risk (i.e. tackling some of those underlying structural and material inequalities and not just the symptoms of impacts) is an important feature of TA.

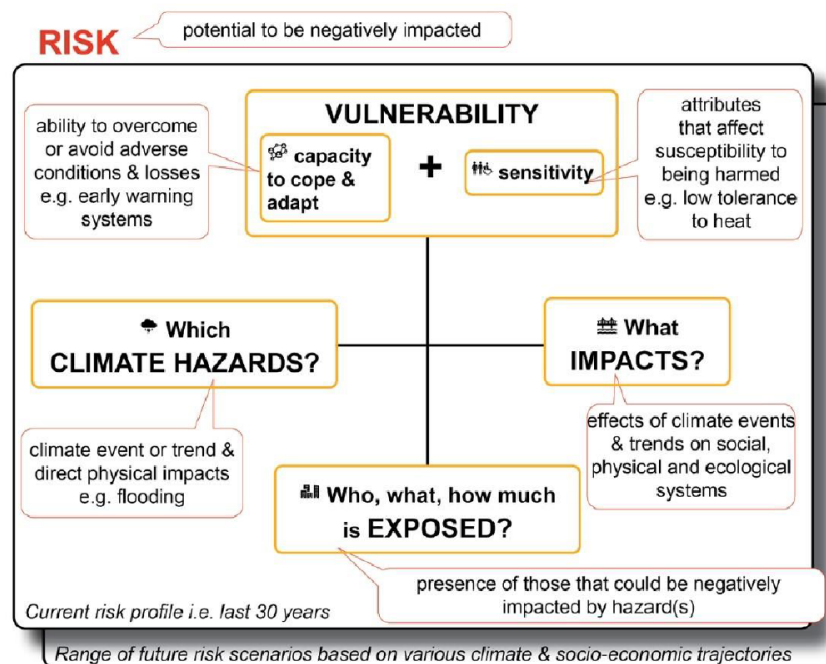


Figure 4. Climate risk framing (DEFF, 2020)

*Introducing the climate risk and impact chain framing to discuss fundamental and demonstrable changes*

Anna explored these criteria using the concept of an “impact chain” (GIZ and EURAC, 2017). The impact chain provides a way of understanding various components of climate risk, including the physical impacts that emerge from the climate signal, and the intermediate impacts that are experienced as a result of the physical impacts (i.e. who or what is exposed to those impacts?). Vulnerability is understood by looking at the ‘sensitivity’ of the people or objects experiencing impacts, as well as their ‘capacity’ to adapt (see [DEFF 2020](#) for more detail).

The example of the impact chain was illustrated by unpacking how flood risk might be experienced and addressed in Durban, with a focus on river/stream management to mitigate this risk because of the relevance to case studies. This example is explained below.

Many communities and objects (e.g. infrastructure and land) situated near watercourses in Durban are at risk of flood impacts. These impacts will likely become more frequent and severe under conditions of climate change unless adaptation measures are taken to reduce the risk. Heavy rainfall events are the primary climate hazard associated with flooding. During these events, lots of rainwater gushes in a short space of time down the watercourses that run through Durban. This has two direct impacts: one is damage to structures (homes, toilets etc.), bridges, roads, pipes and other infrastructure, the second is injury or death of people and livestock. There are also many other indirect impacts associated with these events. The municipality is trying to reduce these impacts through adaptation measures such as the TRMP. Communities, infrastructure and land nearest to these watercourses are experiencing these impacts. In Durban, there’s particular risk of flooding leading to erosion and slippage of riverbanks and landslides, which increases the potential for damage, especially when informal settlements are located in these areas.

The sensitivity of people or objects near watercourses to these impacts increases where there are blockages in the streams, rivers or culverts, which increases their vulnerability. A lot of the case studies that have been assessed in the LIRA2030 project focus on addressing this dimension of vulnerability, along with other dimensions. The vulnerability of people living near watercourses also increases where/when water quality is poor, which introduces health implications (e.g. stagnant water around homes). Adaptive capacity increases through several interventions, such as improving quality or location of housing, clearing the stream, and potentially reinforcing embankments. Increased adaptive capacity reduces overall vulnerability.



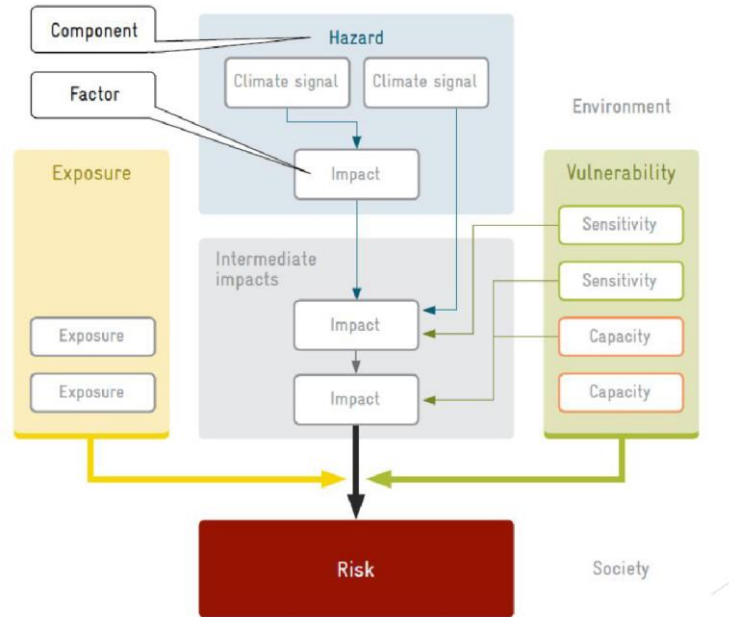


Figure 5. General impact chain framework (DEFF 2020)

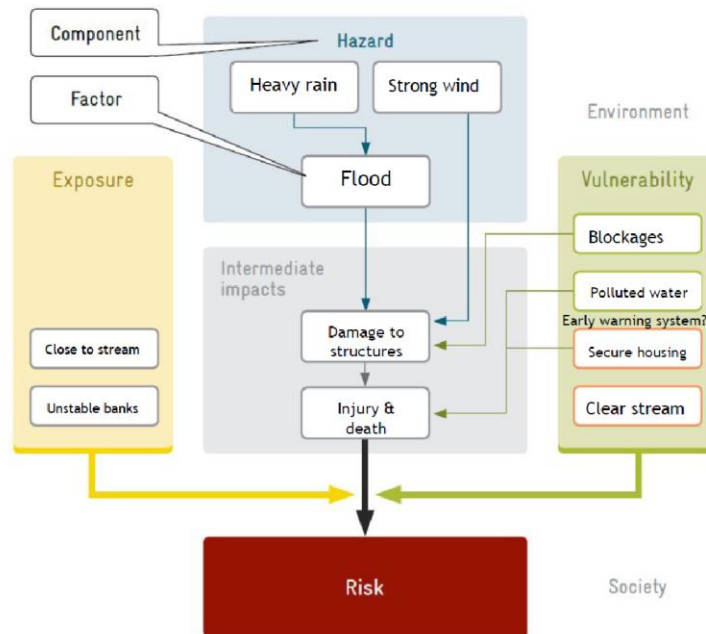


Figure 6. Impact chain framework applied to flood risks in Durban

The participants then reflected on the flood risk impact chain that had been presented. The following points were highlighted.

- ❖ Surfaces in the catchment influence sensitivity (vulnerability) (i.e. impermeable surfaces increase runoff). This relates to land use but also infrastructure that has been developed to support runoff. In the old days, infrastructure was designed to drain away water quickly whereas contemporary approaches slow the water down so that it can drain into the ground.

- ❖ Residents of informal settlements have less ability to absorb the financial costs incurred because of flood damage due to poverty.
- ❖ Governance (good or bad) contributes to sensitivity and/or adaptive capacity, which influences vulnerability. For example, if service delivery is good, there is likely to be less waste blocking water courses.
- ❖ Does the risk framing set the understanding/focus too wide in terms of sensitivities (e.g. surfaces)? Are these all relevant to Sihlanzimvelo-TRMP? Anna responded by saying that this framework should allow one to explore all the systemic aspects of risk, so that one can understand how their project is working alongside others to reduce the overall risk.
- ❖ Alien vegetation increases sensitivity in this context.

*Mapping fundamental changes onto the flood risk impact chain*

Anna then presented evidence of the fundamental changes that emerged through the case studies in Durban (i.e. innovative approaches to framing or tackling the problems). These fundamental changes were related back to the risk and impact chain framing to consider how they might be addressing some underlying drivers of risk (see below).

Table 3. Mapping fundamental changes onto the impact chain framing to consider how underlying drivers of risk might be addressed

Fundamental change	Driver of risk that is being tackled through this change
A reframing of flood risk, to integrate health, employment, safety & youth development	Difficult to map back onto the risk framing – perhaps the risk framing is too narrow?
Cleared banks being used for vegetables and kids playing, as well as indigenous revegetation	Reducing exposure to floods
Increasing engagement and planning to scale up, as well as ‘closing loops’ (stimulate green economy activities)	Unlocking finance for adaptation (increases adaptive capacity), removing waste for products (sensitivity)
Pushing for reclassification of ecological infrastructure as municipal assets	Unlocking finance for adaptation (increases adaptive capacity)
The use of the cooperative employment model (BUT low wages)	Increases employment/income (increases adaptive capacity/reduces sensitivity)
An explicit focus on experimentation and learning-by-doing	Difficult to map back onto risk framing but could link to good governance, which increases adaptive capacity
Using small catchments to work with multiple stakeholders; the issues in these catchments are representative of the city in some respects	
Investing time into relationship-building to foster joint decision-making (PCRPP)	
Focus on youth as environmental ambassadors	
Creating local solutions targeting disposal of nappies	
In one case, avoiding donor dependency by not paying stipends, and focusing instead on training and skills formalization	A different approach to stimulating employment/income (increases adaptive capacity/reduces sensitivity)

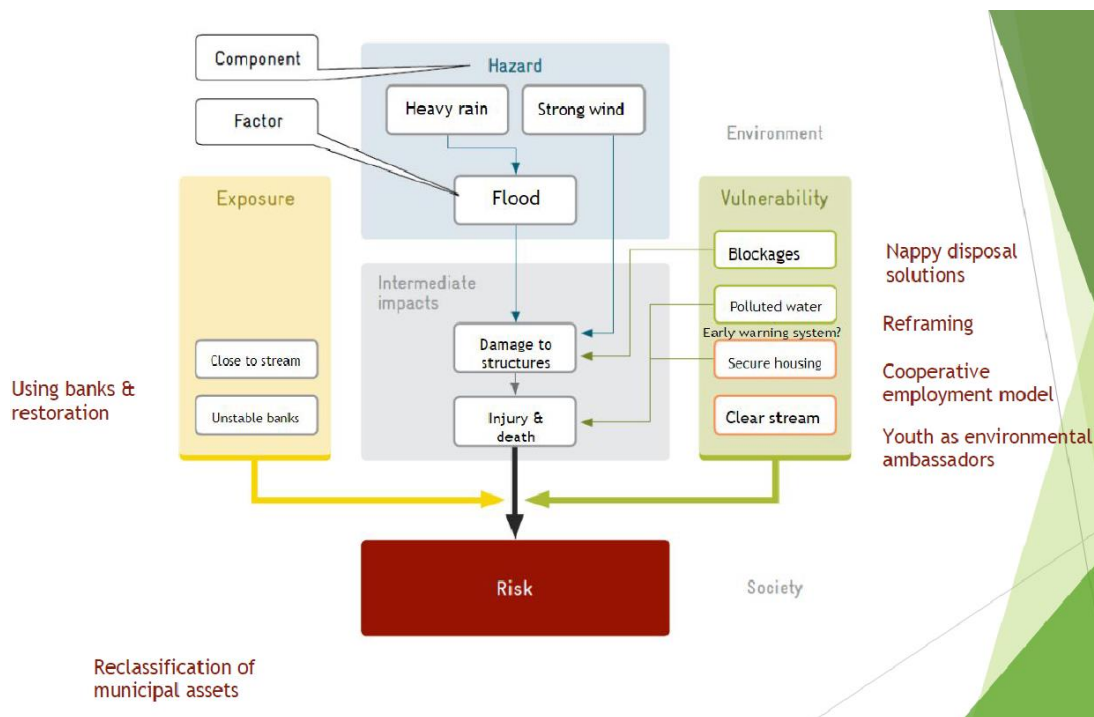


Figure 7. Fundamental changes supported by the four Durban case studies (identified through the LIRA2030 research process) mapped back onto the impact chain framework

*Mapping the demonstrable changes back onto the flood risk impact chain*

In terms of the demonstrable practices/benefits that emerged through the case studies in Durban, Anna noted the following.

Table 4. Mapping demonstrable changes onto the impact chain framing to consider how underlying drivers of risk might be addressed

Fundamental change	Driver of risk that is being tackled through this change
Work opportunities created and people are active in the streams doing clean-ups	Increases employment/income (increases adaptive capacity/reduces sensitivity)
Reduced extent and incidence of flooding	Reduced exposure to hazard
Reduced number of rats and snakes around settlements	Related to health and wellbeing, which is difficult to map back to the risk framing (could be linked to sensitivity)
Opening up spaces for planting vegetables and kids playing	Reduced exposure
Safety benefits of having people present and working in the streams	Safety aspect is difficult to map to the framing
The use of running water in the streams (used to be stagnant & polluted)	Reduced sensitivity
Quicker response times to fixing sewer leaks	Increased adaptive capacity
Reduced cost to the municipality of fixing infrastructure due to flood damage	Reduced exposure
Reduced littering	Reduced sensitivity
Planting indigenous trees and shrubs	Reduced sensitivity – linked to stable banks
Fewer reported sewer blockages per month	Reduced sensitivity

Fundamental change	Driver of risk that is being tackled through this change
Reduction in mosquitos	Related to health and wellbeing, which is difficult to map back to the risk framing (could be linked to sensitivity)
Safety of municipal officials going into previously hostile communities/informal settlements (PCRPs)	Safety aspect is difficult to map to the framing

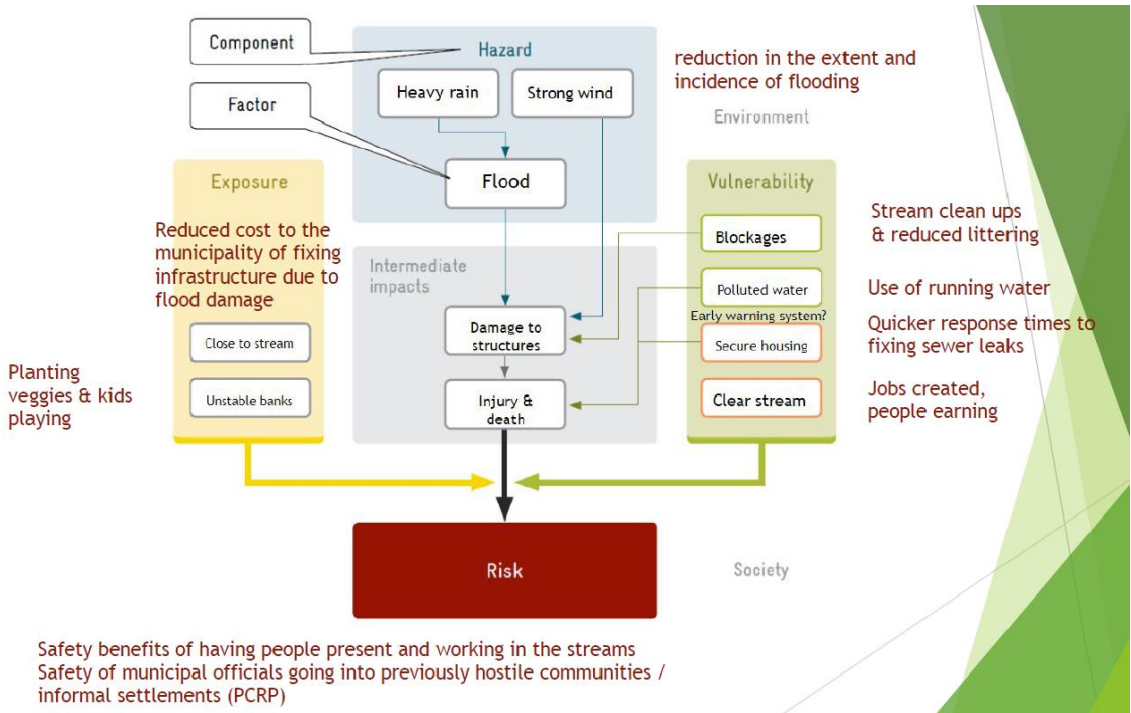


Figure 8. Demonstrable changes supported by the four Durban case studies (identified through the LIRA2030 research process) mapped back onto the impact chain framework

Anna highlighted that many of the fundamental and demonstrable benefits that surfaced through assessment of the cases are not easily mapped back onto the risk framing, which suggests that even this updated framing might be too narrow to adequately consider the range of systemic, complex, interconnected drivers of climate risk.

Anna then posed the question: are there any risks that aren't covered by these projects, suggesting that to tackle flood risk in its entirety in Durban we need other interventions to contribute to the 'transformed landscape' (i.e. are there gaps)? Responses related to inequality: even though many of the cases create opportunities for employment, people receive low wages, and few sustainable employment opportunities emerge. The objective to reduce inequality is therefore not being adequately met. For projects in Durban to be truly transformative, perhaps they need to expand to further tackle the root causes such as poverty? This is being looked at in the TRMP, through which the team hopes to unlock new opportunities and businesses for vulnerable communities.

Discussion, and Q&A session

A discussion was opened, and the following points were made.

Sometimes you need to match transformative approaches with more traditional interventions, such as fixing wastewater infrastructure. The pollution research group at UKZN are doing fantastic complimentary work around repurposing wastewater - either recycling or using human waste to create products for agriculture and through the black soldier fly project. There is a need to have several interventions running alongside each other addressing different aspects.

Industry is not necessarily changing their behaviour (e.g. Pinetown industrial zone).

Learnings from these projects, in terms of partnership-based engagement (e.g. ARPP and the municipality), are extremely important. UKZN is a critical partner as it has enabled lesson sharing between different groups of people and projects. In this way, they can shape one another and contribute to the collective transformative impact.

The failure of all these projects, except Wize Wayz, was their limited engagement of the private sector in a collaborative approach.

A question was posed: how can interventions that have single champions be sustainable? Anna emphasised that few champions and limited financing compromises sustainability, which is why institutionalisation is so important. This also relates to the challenges associated with scaling up and out, which also links to the point about partnerships and networks of people around the champion. Ideally, different groups of people within this network would share resources so that the intervention is not reliant on a single champion and single source of funding that can't be sustained.

On champions/agency: this approach also has to be mainstreamed, as does horizontal and vertical integration. There are always champions, with the ability to grow and build other champions around that person. Durban is a good case study where champions were developed throughout line functions.

The role of bridge organisations or intermediaries between different groups: e.g. communities and the state. In the case of the PCRPP, UKZN has performed an intermediary function. With ARPP, Eco-champs have been the bridge between the community and the state. It is also important to note that these partnerships don't involve a one-way flow of knowledge from the state to communities; knowledge flows back to the state. These collaborative learning approaches have also led to things like social cohesion.

Coastal specialists speak about retreat (e.g. in the Netherlands they have a concept called 'make room for the river'). Retreat is strongly advocated on the coast in terms of sea level. Should this approach be considered in the background? In terms of mitigating risk, can we retreat from hotspots of risk to release the pressure in those areas. It's a passive intervention as core issues are not being addressed, but it does help to move people or assets away from the risk. This comes up in Cape Town around revising flood lines, but it is very difficult and controversial to move people, and often unaffordable for the state to buy back privately owned land (as was done in the US after Hurricane Sandy for example). People have been given permission to develop, bought land etc., and now they're being told they're in a high-risk flood zone. Globally, there are some interesting discourses related to the liability of government, including retrospective liability, because they have been regulators. The planning authority then becomes responsible for the cost of either moving people or dealing with those risks.

A discussion has been had in Durban about the responsibility associated with the development of high-risk sites. This responsibility always rests with the property owner. When the authority

approves a development, it simply checks compliance with current legislation. The authority doesn't regulate the developers risk appetite: if a developer chooses to develop in a high-risk way and (s)he's complying with all the relevant legislation, (s)he is making that choice. The issue of retreat is important, but the authority can't enforce retreats on a private developer if they choose to live with the risk.

There are situations where informal settlements have been in place more than 20 years. People have lived there and grown up there. A resilience approach (e.g. UKZN in PCRFP) should support capacity development within communities – e.g. hazard mapping settlements. It's a combination of retreat and other interventions.

### Barriers and enablers of fundamental and demonstrable changes

Anna shared some insights related to barriers and enablers of fundamental and demonstrable changes based on the LIRA2030 research.

- ❖ Effective, committed leaders and intermediaries who are prepared to dedicate lots of energy, time and strategic thought are enablers of fundamental and demonstrable changes.
- ❖ Access to spending money in a way that allows for emergent activities (e.g. learning forums, buying the necessary equipment) enables fundamental and sustainable changes. If funding is secured in a sustained way, learning and adaptation can take place. If funding comes and goes, it is difficult to achieve this momentum.
- ❖ Lessons have been learned by working in relatively manageable catchments (that aren't too overwhelmingly big), but that are characterised by some of the complex problems of larger catchments.
- ❖ Local representatives (e.g. co-op leaders/eco-champions) who are active and visible within the community are important as they can have ongoing conversations with local people. These ongoing regular engagements, as well as visible evidence of interlinked issues and responses, are important for behaviour change. Gaps in funding forces projects to scale back or lose momentum, and it becomes difficult to pick up again.
- ❖ Often, we are heralded in South Africa for having progressive legislation but there are some aspects that make progressive projects difficult. For example, issues around municipal contracting and not being able to contract for longer than three years at a time, having to review contracts and change providers (which aims to reduce the risk of corruption). This makes it very difficult to build up partnerships, knowledge and skill sets that need to be sustained beyond three years.
- ❖ Low levels of pay make people reliant on programmes, which means they often can't get the 'leg up' they need to move out of poverty. Many of the cases are not sufficient to unlock real economic opportunities.
- ❖ The long lag times between spending the money and seeing benefits (e.g. improved water quality) can introduce challenges. Efforts need to be focused on sustaining and scaling activities despite some of the impacts being demonstrable down the line.

### Key lessons related to fundamental and demonstrable changes towards TA

Anna finished off the day by reflecting on a few key lessons related to fundamental and demonstrable changes, shared below.

1. Whether change can be considered 'fundamentally new' **depends on the starting point** (i.e. what you are measuring against). Change is a departure from the status quo (i.e. business as usual). Are we measuring these against other contemporary projects? or what was being

designed a year or two or three ago? Systemic fundamental change takes a long time (10-15-20 years). We are likely to do ourselves a disservice if we expect to be able to see fundamental changes over too short a time span. If one considers what was going 10-15 years ago, there have been radical changes in how things are being done. We need to evaluate fairly - not be over optimistic but also not overly critical about the scale of changes.

2. The **importance of transdisciplinary/co-production forums**: to co-learn, to show how activities are impacting root causes of risks and to join the dots. Mapping the linkages is critical. We need to acknowledge how much can (and can't) be done in one project and look for partnerships to link up with other transformers, producing a transformative landscape. Somebody does, however, need to keep a hold of the big picture: that is where the co-learning becomes critical. Different projects become incubators for how things can be done differently, multiplied and linked up to other initiatives.
3. A notable difference when comparing Durban and Harare is the **presence/input of the municipality**. Harare City Council is massively resource constrained. Many projects that are happening there are being pushed by civil society organisations and international partners, but unless a strong local government can play a support function, it's very difficult to embed project activities into systemic change. The local municipality needs to be a strong actor in the landscape of change.

## Final discussion

Points from the final discussion:

A participant asked: when there are collections of projects within a landscape of change, how might one coordinate different clusters? How might one understand and manage all the funds? Do we have capacity in the municipality to manage and implement something at large scale? How do we work across municipal boundaries? Money can be spent in neighbouring catchments to provide benefits downstream... but there are many challenges that come with upscaling. These different projects in KZN are doing great work but how do we coordinate between them to see changes at a much bigger scale? When one starts to connect across the projects, there's a whole layer of additional barriers and enablers that haven't been touched on in this session.

Another participant noted the importance of institutionalisation and argumentation (e.g. cost-benefit analysis as a way of mobilising municipal support, even cross departmental participation). If we can quantify benefits of riverine transformation in a way that makes real sense and if there was sufficient capacity within institutions (at local and regional level), institutionalisation of such activities would be promoted. They can't be sustainable unless they have some kind of credibility attached.

Sihlanzimvelo is an unusual project because it has a big Story behind it (C40 story). We must find a way of making this ordinary, for municipalities to take on such activities. This is their job - they are custodians of the spaces and ecological assets.

A participant noted that big projects are cumbersome and difficult to implement in terms of subcontracting to bring different partners on board. Resources need to be shared and models innovated. The financial administration of how these resources flow needs to change if these kinds of partnerships are going to be sustained. The smaller actors are unable to leverage the bigger money and intermediaries often need to step in but often intermediaries are very cumbersome organisations.

## Day 3: Lessons about holistic and flexible approaches to promote Transformative Adaptation in southern African cities

### Introduction

In keeping with the theme of holistic thinking, the day was introduced with a word association game, focusing on the word “system”, after which the next participant said a word that came to mind, and so on.

The ‘transformed landscape’ (2040) for Durban that was co-developed in LL3 was then revisited with all participants (see “background to the Learning Lab” section). The following points/questions were raised.

- ❖ What do we want to transform? Is this clear to us?
- ❖ This should be considered an ongoing process of change and not one particular outcome.
- ❖ Vulnerable people in different contexts should be able to access different kinds of enterprises and markets (not only poor communities). Transformative adaptation is a whole mindset/change and needs to change through all the different tiers of society.
- ❖ Having such a vision for the future is important; it supports new ideas and opportunities, and risks are acknowledged.

### Findings from the study

Alice reiterated that the two main criteria that were being explored on day 3 were: i) responsive and flexible approaches; and ii) holistic systems thinking.

#### *Responsive and flexible approaches*

In terms of evidence related to responsive and flexible approaches, a spectrum was noted across the case studies: **minimal feedback and adjustment TO highly reflexive and adaptive based on experience, new information, failing and new opportunities.**

Lessons emerging related to responsive and flexible approaches, when looking across the case studies were shared with participants, as described below.

- ❖ All case studies that were assessed indicate some level of evolution and responsiveness to the context.
- ❖ Bureaucracy, administration, procurement, finance structures and functions hinder flexibility (e.g. in the municipality). Strict mandates support effective implementation of work designed in advance, not emerging issues (e.g. expansion of nappy initiative).
- ❖ Both formal and informal flexibility is noted. For example, ‘formal’ flexibility might be designed into a project by including many stakeholders in the decision making process at different levels to learn about and capitalise on opportunities (PCRPP, ARPP), or by formally contracting a ‘go-between’ organisation that is flexible (e.g. Sihlanzimvelo contracting consultants). An example of informal elements that contribute to flexibility is good relationships. Contract and payment delays hinder such relationships.
- ❖ Spatial flexibility is influenced by political and land boundaries (e.g. wards & Ingonyama Trust).
- ❖ An overarching strategy and secure funding are important for flexibility e.g. WizeWayz has consistent funding, which allows for learning and changes as the project is implemented (i.e. adaptive management). ARPP and PCRPP have received different sources of funding over time, and this has been a bit more piecemeal.



- ❖ Learning processes (with a diversity of stakeholders) support flexibility (i.e. putting many heads together to identify new opportunities).
- ❖ Flexibility has strong synergies with inclusivity (evident in ARPP, PCRPP and WWWC) – see point above. A more distributed decision-making structure that emphasizes collaboration with clear goals, roles and responsibilities, is an enabler of flexibility, responsiveness and decentralized management.
- ❖ Silos and turf wars don't allow us to see benefits across different mandates.

Alice then referred to the flood impact chain framing that had been discussed the day before, considering how flexibility and responsiveness might map onto this. The group reflected on the fact that it is difficult to map flexibility and responsiveness onto this framing: aspects of good governance (adaptive capacity) need to be unpacked to dig into details related to flexibility.

Flexibility and responsiveness allow one to adapt to unknown conditions and circumstances, and to tweak activities to particular contexts. Perhaps the risk/impact chain framework is not adequate to grapple with social, cultural and human characteristics, and their role in risk and adaptation? The farming also presents a linear approach to understanding climate risk, while flexibility and holistic thinking is counter to 'linear thinking' (i.e. it is more relational).

#### *Holistic, complex systems thinking*

In terms of evidence related to holistic, complex systems thinking, the following spectrum was noted across the case studies: **Narrow, singular, simplistic problem identification TO understanding problems and interventions in context of interconnected systems and ability to translate joined up thinking into concerted action.**

All of the case studies acknowledged the links between environmental, social and economic problems. Although these case studies have different focuses, there is a common core focus of improving ecological infrastructure and management of water. These issues are further connected to other aspects across the different projects including *inter alia* waste management, alien and invasive management, employment and poverty reduction, vector and vermin control, crime reduction and safety, coastal management and tourism.

There are, however, challenges associated with translating 'joined up' thinking into action. The TRMP design process currently grapples with questions related to this.

It has been noted that holistic, complex systems thinking is both a criterion and an enabler of more transformative approaches – benefits can be noted across mandates by adopting a holistic perspective, loops can be closed and costs reduced, all of which contribute to increased benefits.

Holistic thinking also has synergies with inclusivity: bigger, more complex projects that span multiple mandates need to include more stakeholders. Lots of time is required to build relationships and trust across the various stakeholder groups. The governance, legislative and policy environments don't currently exist for managing in a holistic, complex systems way, which is why there is a need for experimentation, failure and learning, and cultures that enable this (e.g. within the municipality). Governing complexity is a challenge!

Stakeholders mentioned that individual mandates will generally be prioritised over those that are cross-cutting, unless one/teams can clearly see benefits connected to their own individual mandates in the broader, cross-cutting objectives. This links to the need for demonstrable benefits for various groups and line functions: evidence needs to be generated across the different goals.

Perhaps a modular design is appropriate? Whereby we start off relatively small with an initiative, and people and objectives are added over time.

The team reflected on the fact that it is also difficult to map holistic thinking onto the impact chain framing (i.e. considering how this might reduce climate impacts) unless one 'zooms into' the governance aspects. Anna noted that holistic, complex thinking is about connecting various drivers and risks, so perhaps it is 'back-to-front' to try and map this criteria onto the flood risk impact chain – this mindset/approach should allow one to consider how drivers of flood risk are linked to many different sectors etc. The team also reflected on the fact that projects/interventions can't tackle everything, but need to be aware of the bigger picture while designing and implementing activities. It is a balancing act to know where to draw the line (what to include/consider).

## Discussion

Alice posed a question related to how we might implement concrete activities to support flexibility and a more holistic approach to tackling climate risk.

The discussion kicked off with a reflection on the importance of a transversal approach to dealing with complex projects. This is being pushed forward, to some extent, within the municipality. A member of the research team reflected on the trade-offs that often need to be made, at least initially, to achieve demonstrable results (i.e. one needs to trade complexity for demonstrable results initially). Many people believe in keeping work simple so that it is achievable... Perhaps this is where transversality is important? Where different departments can work according to their 'simpler' mandates, but the sum (which is greater than the parts) can be understood by connecting outputs or outcomes across these (complementarity).

The Business Case Sub Committee (BCSC) in eThekweni Municipality includes officials who work across line functions. This tool has been specifically organised to deal with transformative river management programmes – it is basically a project steering committee. One might also compare it to the Durban Climate Change Strategy Technical Task Team. The Task Team includes senior heads of units in the city, while the sub-committee of (middle management) works together to implement activities.

Another concrete activity that was proposed is the development of an institutionalised platform (not controlled or driven by a specific institution). Universities are good places to undertake this work because they are tasked with learning. It was acknowledged that, in general, universities have a role to play in co-producing knowledge. The "critical friend" analogy was used; the university and government can be critical friends to one another because the municipality keeps the university research grounded, while the university provides reflections from an academic point of view for the municipality. Deborah Roberts has been a key champion in Durban, in terms of integrating academia into the functioning of the city.

Participants reflected on the difficulty of involving, and forming partnerships with, the private sector. Most of their learning is internal, and they are not always keen on sharing that. Finances are also locked in the private sector. It is important to provide a bottom line for businesses. There has been some success involving the private sector in terms of corporate and social investment initiatives. A major factor is the nature and size of industries and their location. The smaller industries located in areas such as Pinetown and New Germany lack capacity in terms of the appropriate environmental personnel to engage in projects. Whereas industries in the upper Umgeni catchment area are much larger in comparison and tend to have more capacity in this regard.

## The Harare Wetlands Advocacy Project and the Urban Resilience Project

Alice then briefly touched on the Harare case studies, one of which were discussed during the first day of the lab (see Appendix 1). Evolution over time has been noted in both cases – contextual needs have been acknowledged and responded to (to varying degrees). The inclusivity of the Harare Wetlands Advocacy Project is linked to inclusivity and empowerment. It has been important to integrate different stakeholders into the project to identify more opportunities. Spaces for learning and reflection have also been created.

In terms of the Urban Resilience Project in Harare, flexibility is somewhat constrained by the structures of the funders in government, though some is noted (e.g. responding to the cyclone).

Alice reiterated that true inclusivity is a fundamental enabler of both responsiveness and flexibility and having a holistic complex systems thinking approach is important. Alice touched on the point of this idea of a culture of experimentation, innovation. Failure is not always a negative aspect and people can learn from it

## Reflections, closing the next engagement

Alice mentioned some of the important points that came about during the discussion phase:

- ❖ Good relationships across departments and organisations is important. These relationships will take additional time and effort to develop.
- ❖ Experimentation and collaborative learning spaces are important.
- ❖ Projects can start off small and objectives and stakeholders can be added over time (a modular design).
- ❖ Demonstrable benefits need to be recognised before the project can move forward and grow into something bigger.

One of the participants reflected on the fact that projects need to be two-way flows of knowledge between citizens and the state.

Day 4: First time screening of the film “Changing course”, followed by a short discussion

## Introduction

A short introduction was provided, explaining the context of the “Changing course” documentary in the LIRA2030 project. Alice explained that the documentary is a result of one of a few processes that have occurred during the LIRA2030 project. She explained some of the others (see below).

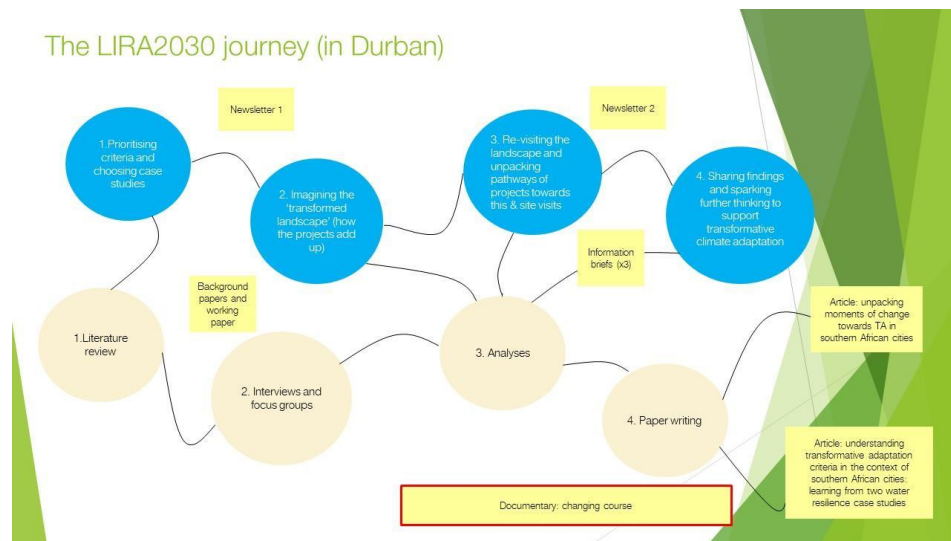


Figure 9. Overview of the LIRA2030 journey, showing where the documentary fits in

Transdisciplinary learning lab process: transdisciplinary research brings knowledge of academia and societal stakeholders together. It is an iterative process of mutual and shared learning. There have been four learning labs in total in Durban, alongside a research process. Knowledge co-produced in these labs has been integrated into the academic research process and vice versa.

Several outputs have been produced: three briefs leading up to the fourth learning lab, and two journal articles (in production). The documentary idea emerged sometime in 2019 to tell the story of the projects with which the LIRA2030 team has been working. It was meant to be a 4-minute video but evolved into something bigger and more ambitious.

A link was shared so that participants could watch the documentary:

[https://www.youtube.com/watch?v=LFdGIKaRuXE&t=133s&ab\\_channel=HansPretorius](https://www.youtube.com/watch?v=LFdGIKaRuXE&t=133s&ab_channel=HansPretorius)

## Discussion

Several points emerged during the discussion that followed the video screening, which are captured below.

Question 1: The projects mainly focus on cleaning rivers and streams and how to involve the local community (economic incentives, awareness, inclusion etc.). There was not much spoken about waste management. I can imagine sustainable waste management plans are key to make sure waste is not disposed of in the streams but other/better alternatives are provided. How was this addressed?

Responses

Lulu: It's quite a big question and it's explicit in the film that it's a massive problem. All the projects that were looked at have waste management as a component but the bigger waste management chain is a problem – not only cleaning waste out of the rivers but where it goes once it's taken out, why is it in the rivers in the first place. What wasn't explicit; many of the projects have mechanisms for awareness with community members and others to try and curb some of the waste. Some insight is shared towards the end, especially with the green corridors team, who are looking at innovative ways to close the loops – waste coming out of the river to produce outputs (e.g. pavers for the promenade). This is ongoing experimentation and looking at new ways to do things. Sihlanzimvelo is working with Green Corridors on this.

Geoff: This process (e.g. Sihlanzimvelo) is not to replace the waste management strategies of the city. It's in addition. DSW is involved in processes and are informed. This process has highlighted how we can bring the expertise and experience from different sectors and closing the loops. You're only seeing the river side of things, there is also waste collection that happens from properties. Because the community is becoming more aware of the value of the waste where co-ops are working, the residents are less likely to throw their waste into the rivers. They are making better use of the waste collection processes.

Question 2: were waste management processes in place?

Responses

Geoff: Waste management processes are in place but there's a fair amount of informality in the city, and waste management in those areas is not as good as in other areas. The solid waste collection is the waste that is placed in a black plastic bag and placed on the side of the road on the right day. It's not the waste that is thrown in other areas by residents and companies.

Lulu: These projects are often about partnerships to fill the gaps. As Geoff was saying, it's not the mandate of DSW to collect waste in certain areas (e.g. rivers). How do you still solve that problem using these type of programmes? They are not supposed to complement each other and not do the job of DSW.

Paulo (ARPP): One of the issues to bear in mind is that waste management is a big thing. It can become overwhelming if you try and solve it all. In the past year, we focused very much on nappies – trying to find a solution. The first aim was to get the waste out of the environment. Second prize is finding a place where it can go, which is sustainable, and not in landfills. The solution that came up with the community in ARPP was to provide a space for collection then to move them safely to landfill but the long-term goal is to re-route and send to a recycling plant. This is something that is being looked at by the city – looking for opportunities to build recycling plant because the technology is available for that and claims 100% recyclability. So that would be a fantastic example of a process that takes absorbent waste out of the environment and reuses those products. We focused on one aspects (nappies), others focus on other issues and are difficult to solve.

Lulu: The amount of resources required to focus on one element (e.g. the nappies)... the whole last phase of ARPP was nappies and that was one element of waste in the streams. That's one element but it takes a lot of resources to keep that one element going.

Anna: A few interviewees mentioned the challenges they have had trying to engage with Durban Solid Waste, who seem stretched thin and have an operational focus, so not much capacity to engage. But one silver lining is that it seems that some of the youth eco-champs and the co-op

leaders have made some progress creating communication linkages with the solid waste managers that service their area

Question 3: In the beginning of the video Dr. Cathy Sutherlands mentions reducing flood risk while cleaning your rivers and removing obstructions. Geoff Tooley talks about the cost-benefit analysis that is needed to explain to Treasury why investing in co-ops is important. It is important to also include the actual flood risk reduction in monetary terms which in essence is an annual saving. This is something we are going to do in Johannesburg in the coming months. Optimally, this needs to be complemented by societal and ecological benefits to get a comprehensive view on this and make this approach a no-brainer. Was the focus mostly on rehabilitating measures or also on ecological infrastructure (or nature-based solutions) to create climate resilient river systems?

Bella: Where can we read / learn more about the innovative products that “close the loops” eg. the pavers made from plastics / invasive plant material? LIRA team linked Bella with Geoff, who will link with Gary Cullinan

Question 3: With regards to the Education programme with schools, are there any specific measure used to understand the impact of the lessons with the learners? to measure the change in behaviour besides only observing?

Responses

Luci: part of our programme (ARPP) was community awareness building and it was quite a significant thing, primarily because we were so interested in behaviour change. We engaged the schools and our Eco-champs set up clubs in the schools and did presentations at schools around climate change, the impacts on rivers, and how people who are living in those areas (lower income) were affected. What we found was that the kids were highly responsive to the input, both in terms of content but also it triggered some enthusiasm in the youngsters to get active and do things. The parents were quite excited to have something to do with their kids, so we were getting a double hit – parents attending with kids. In the end, what we’ve thought about quite extensively is the fact that it is probably one of the most powerful tools – to work with the schools and the youngsters in these areas – building their understanding and knowledge, doing clean ups – not necessarily for the clean ups because it’s just as dirty the next day, but for the education factor, as well as the visibility – people in the community seeing others cleaning. Now the eco-champs, on their own bat, are setting themselves up as educators. They’re making themselves available to fill the gaps that are present in the schools.

Patrick: I led the external evaluation of phase 1 and 2 ARPP (associated with UKZN). We didn’t measure specific impact of lessons that were happening... it might have been an ethical issue from a research side of things, but we did chat with some of the teachers and always got positive feedback. What stands out – I was there on day 1 when the eco-champs got trained and it was nice to see how the eco-champs grew; confidence and passion. That for me was one of the most powerful things of the ARPP. Also, each of the projects has a different focus. For example, the ARPP has a catchment focus. It’s not captured fully in the video but PCRPP and ARPP both have catchment foci.

Brenda Moodley: One also has to consider the dissolved pollutants in the river. A lot of components from waste gets dissolved into the water which contributes to the poor quality of the water.

Question 4: having worked in KZN for many years, I need to ask several questions:

1. the upper areas of these catchments, to what extent have you guys looked at the rehabilitation of the sources of the rivers to try and create more of a buffer at the sources?
2. I hear a lot of emphasis on the river (a concentration on the channel) but what about the riparian zone? Surely that plays a huge role in restoring the system.
3. To what extent has town planning been involved? Because from previous experience in other cities, if town planning never places rivers in the 'backyard' of houses and there was a bigger emphasis of rivers, they would maybe be in a better state. All people like to live in a clean environment and that's unfortunately how the litter ends up in the river... the fallout land behind your house or behind the informal community ends up in the river. I think we should start talking to town planning about the big role the rivers play in our communities.

## Responses

The LIRA project cannot comment on the town planning side of things - it's a question that needs to be posed to town planning or municipality. In terms of the riparian corridor, now, the aim is to keep the riparian corridor open and clear – they work in a specific distance from the river. There are no actions yet to rehabilitate to a functional riparian ecosystem at the moment... It is something that is being discussed. Right now, it's about keeping the river clear.

Question 5: What is the buy in from the enforcement side of the metro regarding pollutant dumping? Physical litter is one problem, but effluents also contribute especially when it comes for instance to the regrow the of vegetation.

## Response

Geoff: The Pollution Control section as well as Environmental Health have been involved. They respond to reported incidences and attempt to trace the sources of the pollution. If it is from companies who have scheduled trade permits then these are dealt with through a formal process of warnings and fines. Other perpetrators, if they can be identified, are dealt with through other enforcement processes. The biggest problem with this type of pollution, is that by the time an event is reported the effluent has flowed downstream and dissipated and it is difficult to identify the source. However, the benefit of the program like Sihlanzimvelo, is that we have a daily presence on the stream and these are members who get to know the stream and stormwater outfalls well. Reporting of pollution is far quicker and patterns can be identified for proactive monitoring for future events and the identification of the perpetrators.

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## Appendix 1: Overview of case studies (Durban and Harare)

Cases	Description of the case
Aller River Pilot Project (ARPP) Durban	ARPP is part of the “Take Back Our Rivers initiative”, which is the flagship project of the eThekweni Conservancies Forum. This initiative seeks to restore the health of rivers across Durban through a process of hands-on river assessments, as well as rehabilitation and restoration strategies (e.g. clearing invasive alien species and mobilising communities). Using “Eco-champs” as a vehicle of change, this initiative adopts a partnership-based, practical and action orientated approach. The project has a particular focus on engaging communities from various economic backgrounds with the intention of encouraging co-responsibility of citizens with designated authorities for the health and resilience of rivers. The intervention is bottom-up, extremely flexible (thereby responding to context) and inclusive, and has resulted in a change in behaviour of some citizens.
Harare Wetlands Advocacy Project (HWAP) Harare	The objective of HWAP is to support citizens to make choices regarding activities in wetlands surrounding Harare from a more informed basis, as well as hold authorities in Harare to account for actions. This initiative was sparked by rapid degradation of wetlands surrounding Harare as development and expansion of the city increases. These wetlands provide functions related to water quality and quantity for residents living in the city, which will become increasingly important under changing climate conditions. HWAP also hopes to influence the review and implementation of law; specifically the Environmental Management Act; section 97 and sub-section 5, which requires that any building that will be constructed on a wetland should at least have an Environmental Impact Assessment (EIA) certificate issued by the Environmental Management Agency (EMA). Through inclusive HWAP activities, Harare residents are finding a voice to challenge decisions.
Palmiet Catchment Rehabilitation Project (PCRP) Durban	Adopting a participatory governance approach, the PCRP has brought together various role-players to develop an Action Plan (AP) for the Palmiet Catchment in Durban. The PCRP primarily focuses on conservation, rehabilitation & restoration of natural systems within the Palmiet Catchment to improve resilience of communities living nearby. A Community of Innovators (COI), which consists representatives from various organisations including the local community, government and civil society, forms the core working group to oversee the implementation of the AP. The AP includes activities in three spheres: governance, biophysical and social. PCRP adopts a bottom-up approach to co-develop APs and maps. The community near the bottom of the catchment (Quarry Road) has been integrally involved in these exercises and has been placed “on the map” for informal settlement upgrading by eThekweni Municipality.
Sihlanzimvelo (Durban)	eThekweni Municipality's Sihlanzimvelo programme aims to support community members who live next to water courses to better clean and manage these spaces for their benefit. Activities, implemented by “community co-operatives”, include removing alien invasive plants and solid waste, as well as managing and reporting minor erosion and clearing access to municipal infrastructure. Sihlanzimvelo will help the city cope with the increase in storms and heavy rainfall caused by climate change, significantly reducing the city’s vulnerability to extreme rainfall events, the severity of flooding and damages to municipal and residential infrastructure. The C40 Cities Finance Facility (CFF) is supporting eThekweni (Durban)'s Environmental Planning and Climate Protection Department to develop a business case for this

Cases	Description of the case
	<p>Programme that involves community-based management of thousands of kilometres of its watercourses, building on a successful pilot initiative in two areas in Durban. Sihlanzimvelo is implemented over relatively large areas and provides job opportunities. The plans for future Sihlanzimvelo, which will include much larger areas, involve 'closing loops' and introducing businesses associated with waste that is removed from the river.</p>
<p>Urban Resilience Project (URP) Harare</p>	<p>The URP is being implemented in partnership with UNDP, UNICEF and the Ministry of Local Government (Zimbabwe). It builds on an ongoing intervention (since 2012) known as the small towns Water, Sanitation and Hygiene (WASH) project. The small towns project looked at WASH infrastructure across 14 cities in Zimbabwe, focussing mostly on piped network rehabilitation. The project also supported the development of community health clubs with the objective of mobilizing communities around hygiene and health, extending into marketplaces. This mobilisation supported benefits including wellbeing of residents and income-generating activities, which led to the realisation by project implementors that an infrastructural approach to WASH is not enough. The resilience focus of URP adopts a more holistic approach to reduce cholera and typhoid risks, while supporting income-generating activities. URP is building skills for Small to Medium-sized Enterprises (SMEs) amongst citizens in Harare, acknowledging risk is driven by socio-economic status as well as climate hazards and infrastructural challenges.</p>
<p>Wize Wayz Water Care (WWWC) Durban</p>	<p>The WWWC project is funded by an industrial complex that relies on the Mbokodweni river in Durban's larger catchment for production of materials. WWWC develops skillsets and sustainable livelihoods of historically disadvantaged communities through a 'water stewardship' approach. Working with members of the Folweni and Ezimbokodweni communities in eThekweni, KwaZulu-Natal, WWWC keeps a 30 kilometre stretch of the Umbogintwini River clear of solid waste and invasive alien plants, and has rehabilitated the some of the Ezimbokodweni wetland area. The rehabilitated area is cared for and monitored by the community. The interventions are inclusive and contribute to developing skills, some of which can be used for growing businesses.</p>