CASCADE
Cascading Climate and Health Risks
in African Cities.

HARARE CITY LEARNING LAB 1

9th MAY 2024 | VENUE: Pamuzinda Safari Lodge

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Contents

Executive Summary

The Harare Learning Lab, hosted by the CASCADE team based in Harare, brought together a diverse team of city actors, CASCADE team members, and CASCADE fellows. To explore the burning climate and health issues experienced in the city of Harare individuals of various backgrounds came together. To do this, the Learning lab was designed to be location and context-driven, stimulating collaboration and fostering the co-creation of knowledge to address complex urban issues. This dynamic event was held on the 9th of May at the Pamuzinda Safari Lodge with the objective of introducing city actors to CASCADE, building a transdisciplinary network, and prioritizing burning issues that CASCADE will work on.

Key highlights
CASCADE's Principal Investigator (PI) Chris Jack provided a background of CASCADE, highlighting that the fellows are at the heart of the research taking place in CASCADE. Additionally, the burning issues that emerged from the Learning Lab will be explored by fellows to find ways to incorporate these issues into their research where this is possible, and, if the burning issues fall within the realms of CASCADE. The day proceeded with a presentation by a keynote speaker, Emily Matingo, from the Climate Change Management Department who discussed climate-related activities taking place within the city of Harare and the department's adaptation plans for the city of Harare. As well as a keynote speaker, Dr J. Manyara, from the City Health Department presented the key functions of the department and linkages to CASCADE.

The core of the Learning Lab consisted of hands-on activities where participants engaged in collaborative exercises during several sessions. The first was to explore health issues in the city of Harare. This was a group activity; groups reported their findings in plenary and health issues were clustered according to cross-cutting themes. These cross-cutting themes included i. drought and energy, ii. heat, iii. water access, iv. food security, v. flooding, and vi. epidemics. Groups proceeded to develop a systems map detailing the dimensions of the cross-cutting theme allocated to each group. This enabled groups to dive deep into each theme to determine the burning issues. This activity helped participants better understand possible areas for research. Furthermore, city actors were able to engage in topics that may not directly relate to their line of work but are nonetheless connected. After these exercises, a list of the priority research areas was identified, many of which overlapped with the fellow's research interests. The next steps included ongoing work by the fellows, with the possibility of fellows working on parts of their research through attachments with relevant departments. Fellows would additionally begin incorporating priority areas where this applies to their research interests.

Reflections
Reflections and space for discussions were key features of the Learning Lab, allowing participants to digest information and feedback to the wider group helped encourage learning, co-creation of knowledge, identification of burning issues, and plan actionable next steps. The Harare Learning Lab demonstrated the power of collaboration to creatively begin addressing urban climate health risks in the city of Harare. Furthermore, the Learning Lab reinforced the importance of a bottom-up approach to research, allowing conversations and key issues to emerge without being dictatorial. The insights generated by Learning Lab will influence much of the fellow's research and the design of future engagements.

Context and background

Cascading Climate and Health Risks in Cities (CASCADE) is a transdisciplinary project that aims to advance Africa's response to urban climate and health risks in African cities. CASCADE employs innovative research, capacity-building initiatives, and engagements with researchers, practitioners, government authorities, and members of civil society actively involved in learning and action within the urban-climate-health spaces in African cities. CASCADE brings together this array of stakeholders through various engagements, one being the Learning Lab. Learning Labs are powerful and useful engagements that are context and location-driven, they are designed to be inclusive, fostering equal participation. The goal of the transdisciplinary learning and engagement process is to co-produce knowledge amongst various actor groups in the city while addressing difficult urban issues. Learning Labs form an integral part of CASCADE as a platform for understanding diverse perspectives and discussing ways to "improve" complex issues.

Harare is one of five cities participating in CASCADE. On the 9th of May 2024, the first CASCADE Learning Lab was held at the tranquil Pamuzinda Safari Lodge, located outside Harare. Five or six persons were seated at tables in a semi-outdoor setting, which encouraged team bonding and easy mobility. A total of 38 individuals participated in the Learning Lab; this included city actors and members of CASCADE (see Annex 2). The open environment encouraged free-flowing discussions on the burning issues related to climate-health issues in the city of Harare.

The objectives of the Learning Lab were as follows:
- To start building a transdisciplinary learning network
- To sensitise people on CASCADE
- To collaboratively prioritise a burning issue on which CASCADE will work.

Learning Lab Preparation and Process

The Harare team was responsible for the logistical setup. This included securing the venue and catering for the learning lab event and the accommodation for all participants. City actors were accommodated at the Chengeta Safari Lodge on the night of the 8th of May and departed on the afternoon of the 9th of May after the lab. CASCADE team members were accommodated at the Pamuzinda Safari Lodge from the 8th of May to the 10th of May, factoring in international travel for some team members. City actors spanning various city departments and backgrounds and those who play an active role in the climate and health space in the city of Harare were identified and invited by the Harare team.

Figure 1: The revised Learning Lab agenda

A core team was set up to design the Learning Lab process. This team included CASCADE PI's and team leads from Chinhoyi University of Technology (CUT), University of Cape Town (UCT), Makerere University, University of Ghana, Red Cross Red Cresent Climate Centre (RCRCCC), and START International. The Project Coordinator based at UCT, a post-doctoral fellow based at UCT, and a post-doctoral fellow at CUT were also a part of the core team. Emails were largely used to share all communication including logistics. A shared document was created where team members contributed to the event programme, highlighting key aspects to be presented and/or explored (see Annex 1). A follow-up virtual meeting was held to discuss the agenda and make any necessary changes to the programme. On the 8th of May, the core team met to discuss and finalise the programme. Some changes to the programme were made, and the changes factored in possible time limitations and any anticipated challenges that may be encountered during the Learning Lab. Furthermore, the adjustments were also meant to accommodate the need for flexibility and adaptation during the learning lab. The Learning Lab event was implemented over one day. An open and safe environment was created through a mix of good facilitation and a team that was naturally willing to work together to unpack the day's programme in a relaxed yet productive manner. The Learning Lab activities and their progression throughout the day are covered in this report.

Session 1: Opening and Welcome

After Romyne welcomed everyone, an official opening and welcome were extended to all participants by Professor Chipo Mubaya. Professor Mubaya extended her gratitude to all participants and provided a brief background on CASCADE, highlighting when the programme commenced, and the aim of the Learning Lab. Participants were then introduced to Mr Lisben Chipfunde (Harare-City Environmental Management Unit) who acknowledged the city's role in the Learning Lab process and expressed his interest in the linkages between departments within the city of Harare. Mr Chipfunde highlighted some challenges of local authorities, such as time constraints for data collection which is key for decision-making. He went on to mention the importance of CASCADE and the impact it could have; he stated that every participant can play an important role in shaping the progress of the day. Once the presentation concluded, Bettina Koelle provided an overview of the day and briefed the participants on what to expect from the Learning Lab.

Session 2: Introductions

In this session, participants introduced themselves and shared a sentence or two on their work providing some context and background. Participants were then asked to approach someone unknown and talk about their background and what comes to mind when they hear about climate and health. This was an insightful session as participants began interacting with each other and getting to know about the work being done around climate and health in Harare. A notable point was the diversity of participants.

Session 3: About CASCADE

As a prelude to this session, Chris Jack creatively presented and talked about the development of El Nino in 2023 and the anticipation of drought. Chris illustrated how rainfall would decrease and the impacts on food security. Chris drew on multiple examples showing the devastation that climate change causes across African cities. The question that remains is what does this have to do with cities? Chris highlighted that the impacts of extreme weather events affect cities in several ways, e.g. prices of goods, service delivery, and people's nutrition, the damage to marginalized communities, etc. He emphasised that cities are becoming warmer which means that people need to act now.

What does this mean for health in cities? This question led to the overview of CASCADE, a programme within the broader Developing Excellence in Leadership, Training, and Science in Africa initiative aiming to build capacity to focus on challenges such as climate and health challenges in African cities. CASCADE focuses on climate and health risks in five partner cities, i.e. Harare, Cape Town, Kampala, Accra, and Johannesburg. Each city has a Principal Investigator (PI) leading the work in the city, and fellows driving the research and for priority climate and health issues in a particular city.

Chris explained that cities have been identified as a critical focus of opportunities and growing risks in the sense that cities can enable improved access to services but are also key for risks due to the complexity of cities and their systems. Therefore, CASCADE is strongly aligned with the need to develop an enhanced understanding of urban climate health in cities.

Figure 2: Chris Jack introducing CASCADE to the participants

CASCADE is also about the following:

- building future leaders who will address these challenges,
- maintain and encourage collaborative learning and iteration as the project moves along,
- building strong relationships with project partners and city actors to facilitate learning.

CASCADE aims to discover new things, productively have fun, and maintain a sense of learning. Therefore, the fellows and city actors are the heartbeat of CASCADE as they guide the process. As a guide to the research areas, Chris informally introduced the research questions[1]:
1. CASCADE wants to broaden the understanding of how climate affects health in cities and what the pathways are. For example, what is the pathway from the Pacific Ocean to El Nino to drought in the city? How do we understand the complex relationship between these pathways?
2. Understanding the pathways is important to create interventions. What is the point of understanding pathways? What do we put into place? What would be effective? What is being done? What can be done?
3. Lastly, how are city-level decisions made & who makes them? Additionally, how do communities make decisions?

Chris ended the session by reiterating that the fellows are the core of CASCADE; however, to inform their research, a space such as the Learning Lab is essential in identifying the burning issues within the city. Participants were then invited to ask questions, contribute, or comment on the session.

Feedback:

Question: What is the relationship between the city and fellows? At the local level, will fellows move to Department of Health?
Response: The city is part of the research, and the plan is to have some fellows attached to the city. Being attached to the city means that they understand the challenges the city faces. If a student wants to work with Department of Health, hopefully, this can be facilitated.

Question: In Zimbabwe, is there a city that is climate-aware?
Response 1: This is the challenge we try to work with. How can we make sure interventions are visible and sustainable.
Response 2: The city of Harare is the research site for the research. The fellows have different focus areas in the research. They are here to interact with the city people, civil society, various stakeholders and ask them questions that are in line with their different study disciplines.
Response 3: The city and city actors are also part of the research.

Question: There is a disconnect between science and governance. Who makes the decisions & who provides the science? Interventions must be systematic & visible.
Response: City and the communities are part of the research activities, not just students.
Response 2: Challenges in data collection at the city health department exist. A good recommendation would be web-based data collection methods so that there is more time for data analysis instead of time wasted on data collection.

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[1] Formal research questions:
1. What are the multiple risk pathways through which climate variability, extremes, and change lead to health risk in African cities?
2. What are effective and practical long-term interventions and health messages for reducing mortality and morbidity in African city contexts due to climate and health risks, and how can they be formulated to more effectively engage communities and inform decision-making related to urban climate and health risks?
3. What urban climate health governance modes are required to support the implementation of priority interventions, particularly considering developmental vulnerabilities and societal inequalities related to socio-economics, gender and marginalised groups that are prevalent in African urban contexts?

Recommendation: Mr Muriya from the Environmental Management Department recommended bringing infrastructure, green buildings, and governance (nature-based solutions) into the discussion. The discussion brought out interesting views that the project has the potential to solve the disconnect between science, interventions, and governance of climate and health risks.

The feedback session introduced some interesting perspectives, seamlessly transitioning the group into the next session.

Session 3: Exploring Health Issues in Harare

This session delved into the health issues in Harare, which focused on critical issues affecting Harare now or those that are likely to affect Harare in the future. The instructions for this individual and group exercise were:
1. Individually: Take a moment to think about the CASCADE program, and to think about the critical issues that are affecting Harare. Write 2-3 of these issues on the sticky notes.
2. In a group, discuss these issues while focusing on the following:
- What the issue is,
- Why is it a critical issue, and
- Who is most impacted by the issue.

After the individual reflection and group feedback, one group member from each group reported back to the plenary. The issues reported in plenary are detailed in the table below.

Group 1:	Group 2:
- Energy efficiency in the built environment for the city. What are the current structure's energy efficiency and implications on the environment; - Waste disposal in the built environment: nature of the architectural plan of the city e.g. refuse collection where everyone affected. - Emerging pollutants affecting water quality e.g. microbiomes are mutating and developing new patterns. More research should be conducted in this area; - Water scarcity due to recurrent droughts and polluting of water sources; - There is a lack of an operative health and management plan. We need a guideline to understand the nexus of health-environment-climate; - Weak water masterplan not integrated into other masterplans; - Loss and damage from weather extremes.	- Waste management, water availability, urban resilience, wetland destruction, and flooding; - Emergence of vector-borne and waterborne diseases resulting in concerns around WASH. - Patients who have never been out of Harare have been testing positive for malaria (high temperatures and new vectors); - Increased malnutrition due to droughts; - Increase in air pollution through industrial emissions. This affects everyone, especially children, the elderly and the immunocompromised; - Wetland invasion increases flooding and affects water quality. Therefore, there is the risk of contaminated water. This results in entire communities being affected.

Group 3:	**Group 4:**
- Outdated laws, - need for bylaws to focus on cholera, - caused by surface water but not groundwater (2018 outbreak caused by groundwater from boreholes), - Continued cluster housing allocation in the absence of water treatment works, - Competing priorities in the city in terms of service delivery, - Lack of funding to support implementation.	- Heat stress (no data on this), - Poor infrastructure development e.g. invasion of wetlands, - Water and sanitation, - Lack of preparedness in reacting to the concerns, - Lack of data, which is critical in policy formulation.

Group 5:	Group 6:
- Heatwaves and related diseases, heat islands with different signatures, - Waste management, - Portable water (is it safe, and is it available?), - Resilient infrastructure: (Is the infrastructure present and who does it service? How does population growth affect infrastructure?), - Illegal settlements: people allocating themselves to spaces. - Public awareness: engagement is not open with the city people, but is the case with NGO's, - Flooding and flash floods, - Poverty.	- Lack of preparedness in the areas of health, waste management and water treatment, - Need for service delivery, - The need for a platform for citizens to participate, - Do we have plans, and policies to deal with climate health? - Population growth versus the available infrastructure.

Group 7:	
"City of Harare is illegal" in the sense that they are operating without a budget, - Climate and health should be on in governance, - Cluster housing is an issue, e.g. bio-digestors, are they working or contaminating groundwater? - El Nino, - Outbreak of diseases, - Intervention mismatch, - Water cycle: Social scientists need to communicate about the water cycle to the communities, and the engineers agreed. Communities can be given clean wastewater if Lake Chivero water cannot be treated. Wastewater is easier to work with because the composition is known, however, lake water is broader and more complex. - There is a need for technology to remove all solids from the water. It is cheaper than what is currently used. The retention time is shorter.	

These points were highlighted on sticky notes and clustered according to overarching topics on the wall. A deep dive into these issues is addressed later in the report. During the tea break, Mary and a few other team members took care of grouping the burning issues in a methodical manner.

Figure 3: Clustering of burning issues

Session 4: Climate Change Management Department (CCMD) Activities in Harare

Emily Matingo from the CCMD presented on the climate-related activities taking place within the city of Harare. Emily provided background information on the functioning of the department. The department is at the national level, and at local levels, the ministry relies on other government structures for climate-related focus. The role of the CCMD is to coordinate all climate change programmes and adaptation planning and is mandated to mainstream climate change in all government policies and plans e.g. finance, research, capacity building, etc. The development of the mandate stems from the need to address climate impacts in Harare. The CCMD is in the process of developing the climate change bill to mainstream climate change into mandates of other units that do not deal directly with climate change issues; the initiative will help facilitate data sharing between units. The department is collaborating with institutions of higher learning (including CUT and UZ) for research and capacity building to mainstream climate change and conduct vulnerability assessments. Furthermore, the department is collaborating with the Ministry of Finance to develop a climate finance tool (tracking), and mainstream codes and standards for resilient infrastructure. Finally, the department is currently working to promote locally led adaptation activities. Some of these include green gardens, solar panels, and irrigation.

The CCMD have several priorities for adaptation. These include:
1. Climate change mainstreaming in plans and budgets;
2. Address issues of risk management emanating from climate change;
3. Development of early warning systems;
4. Promote climate-smart agriculture;
5. Integrate issues of health into climate change issues;
6. Human settlement integration into spatial planning/Increase climate health interventions into spatial planning.

Session 5: Recap and Exploration of Issues

After the presentation detailing the work of the CCMD, it was important to recap the burning issues that emerged during the third session and understand how issues have been clustered. This session came in at a reasonable time as the previous session highlighted some issues the CCMD proposes to address through the development of the mandate. As a recap, participants were asked to highlight burning issues on sticky notes clustered under relevant overarching topics Two cross-cutting topics emerged: i. Governance and ii. Infrastructure. Under these titles, several related issues were discussed. Discussions around the most prominent issues informed the city participant's choices of top priorities.

The following were the suggested burning themes that were cross-cutting:

- ***Drought and energy***
- ***Heat***
- ***Water access***
- ***Food security***
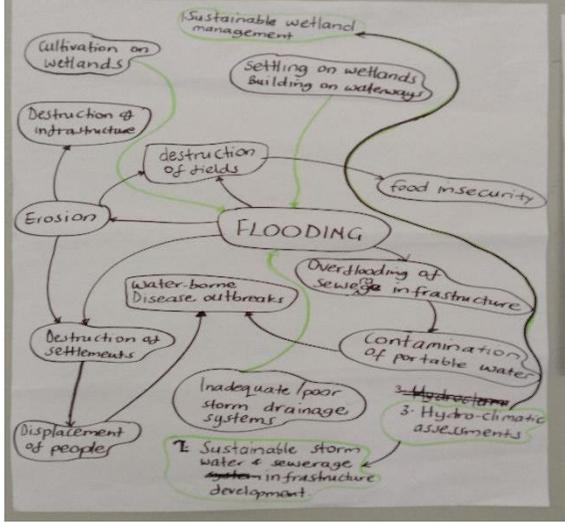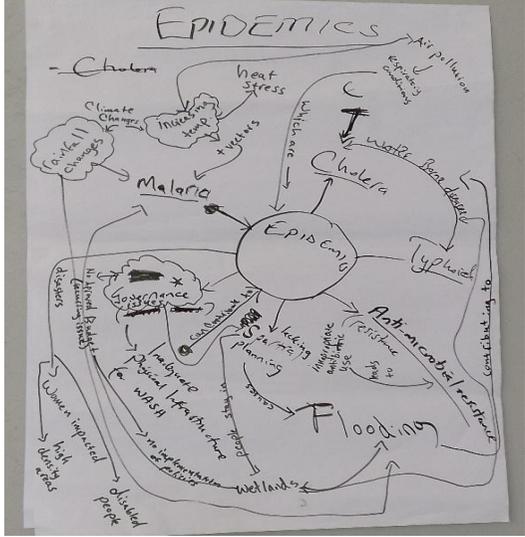- ***Flooding***
- ***Epidemics***

The session proceeded to a group activity where each group was given a theme from the above list. The groups were tasked to draw a systems map detailing the dimensions of the theme allocated to the group. For instance, group 1 was assigned to the food security theme, and one aspect of food security was the *"availability" of food*. *"Availability"* may be affected by droughts and floods and the impacts may be further affected by the political landscape. This activity was meant to spark ideas around the possible key areas for research and the action required.

Figure 4: Team members highlighting the main issues

Groups were given enough time to analyse the scope of the suggested themes and to discuss in detail the burning issues, their dimensions, and the cascading risks. What follows in the table below are illustrations of the systems map and highlights of each group's presentation.

Table 1: Highlights of the group discussions around burning issues

Group	Highlights	Illustration
1. Food security	Dimensions: *availability, agency, utilisation, stability, sustainability, access* - Droughts and floods affect food availability; therefore, nutrition is poor. - The political landscape could be positive or negative which has many impacts on food security, e.g. loans are made available to large-scale farmers, affecting households who depend on small-scale farmers (who receive little to no financial assistance). - Consumption of food and questions such as who determines food consumed, who farms the food, who prepares food, and who makes household decisions around food is important as this affects agency and utilisation. Many aspects are considered here, some examples include gender roles, individual perceptions, and culture and traditions around food. *The group placed the most emphasis on agency, availability and access.*	
2. Heat	A few key research areas were established for the Heat topic: - The impacts of heat result in foodborne illnesses, - More research focusing on greenhouse gas (GHG) emissions is required. This research should further inform the health department on how GHG emissions affect health, - There are concerns about how the city tackles energy scarcity: the city needs sources of renewable energy. - Destruction of wetlands is ongoing: the issue of heat further impacts wetland destruction.	

	- Increased temperature monitoring is required to push forward on research related to climate variability: fellows and schools can be involved in this, - Poor infrastructure is not conducive to high temperatures: the city requires more green spaces, *Cross-cutting issues included drought and policy standards.*	
3. Water Access	Critical issues around water access included the following: - Awareness around water is limited, - Catchment management is critical, - There is an absence of transboundary agreements with other countries, - There is a level of uncertainty around the source of: Does water come from Lake Chivero or is it underground water? - Financial issues regarding water "management" is unclear, are the finances adequate or not? - Pollution of underground and surface water is a challenge, - Wetland impact assessments are required: the health of wetlands is at stake, - Southern areas of Harare have access to water while the northern areas do not, - Who accesses water is important and requires research: this should include elements of gender and violence, - People have access to too little water (below the daily average). *Questions and concerns related to the number of people who access water versus the volume of water provided to the city were raised.*	

4. Flooding	The discussion on flooding was largely associated with past flooding events. Notable points were: - Floods caused cholera outbreak, - People consumed water from man-made wells (stagnant water = cholera), - The destruction of infrastructure led to the displacement of people, which further contributed to the risk of waterborne diseases, - Destruction of wetlands and illegal settlements along wetlands, *The discussion noted that sustainable wetland management, hydroclimatic assessments and sustainable stormwater infrastructure are critical areas for development.*	
5. Epidemics	Epidemics such as malaria, typhoid, cholera and heat stress can be attributed to: - a lack of spatial planning that does not consider climate extremes, - Many issues related to epidemics go back to governance and preparedness, - Increasing temperatures are increasing vector borne diseases such as malaria, - Rainfall patterns are changing: cases of malaria have been noted in areas where malaria was previously unknown to exist, - Antimicrobial resistance: there are concerns around climate and its effect on how bacteria and viruses may change over time and the response to treatment,	

	The above points are seen to converge and impact women, children, people with disabilities, and those living in highly dense areas.	
6. Energy	Factors affecting the energy supply in the city include: - Urbanisation, - Infrastructure, - Flooding, - Drought, - Deforestation, - Pollution.	

Mapping the dimensions of burning issues was crucial after investigating the city's burning issues problems. As a result, the participants were able to better understand the possible areas for research. Through this activity, city actors could interact with topics that may not directly relate to their line of work but are nonetheless connected.

Session 6: Linkages between CASCADE & The City Health Department

Head of the Environmental Health Services, Dr J. Manyara, presented the key functions of the City Health Department and the connections to CASCADE. Dr Manyara explained that the Health Department is mandated by by-laws to provide services to residents. The Health Department provides regulatory services to compliance on i. outbreak prevention and control; ii. development control; and iii. food and water quality monitoring to name a few.

Figure 5: Dr J. Manyara presented the key functions of the City Health

The department identified the top ten causes of morbidity and mortality in Harare:

Table 2: Top ten causes of morbidity and mortality in Harare

Morbidity	Mortality
- Acute Respiratory Infections - Skin diseases - Eye diseases - Injuries - Diarrhoea - Diabetes - Asthma - Hypertension - Arthritis - Mental illness	- HIV related. - Pneumonia - Prematurity - Cardiac failure - Renal failure - Tuberculosis - Asphyxia - Congenital anomaly - Sepsis/ cancers - Respiratory distress

Dr Manyara considers whether any of the above can be attributed to climate change and wonders about the linkages between climate and health associated with the above causes of morbidity and mortality in the city. However, Dr Manyara mentioned that some clear connections between climate and health were identified:

1. Increasing temperature: heat-related deaths, cardiovascular and respiratory diseases
2. Floods: cholera, drowning, typhoid
3. Food security: mental health issues, stress-related issues, food and waterborne diseases.

The presentation highlighted the need to establish the linkage between climate and waterborne diseases, along with the need to measure the effects of climate change on people and map vulnerable populations. The mainstreaming of climate change in health programming is essential. Some possible next steps for the department include:

1. Identify the severity of climate impacts,
2. Identify vulnerable communities/populations,
3. Use of clinical and disease surveillance,
4. Research: health effects of climate change, disease modelling, generation of climate change data, measuring the effects of greenhouse gas.

Feedback from city actors:
1. Investigate the leading causes of asthma
2. Is data accessible from COH to use for research?

Comment: The Public Health Act stands in the way of the engineers because it speaks contrary to the National Water policy, especially on issues of water recycling. Additionally, the Act does not sync with section 264 of Zimbabwe's constitution e.g. appointments of the city health director and limited autonomy to decide on health issues.

Response: Using the Namibian example of recycling wastewater into drinking water, Mr Chipfunde said the Public Health Act limits how far certain technologies/interventions can go.

Response 2: In terms of data availability, the city has some data but some may not be available. We have a paper-based system which is a challenge for the city.

Recommendations from the city actors included:

1. Students should be embedded in the city of Harare,
2. There is a need to focus on Budiriro and Glenview (prime suburbs for flooding and cholera cases),
3. There is a need to monitor the effects of air pollution on health,
4. There is a need to link with other students who are interested in research on the areas that CASCADE may not be able to cover.
5. There is a need for a systematic capturing of data.

Session 7: Summary of Priority Areas

A few members of the CASCADE team compiled and categorised the burning issues that were covered in previous sessions. In addition to providing feedback on the burning issues that were discussed but might not have the scope to pursue in CASCADE (highlighted in red), Prof. Mubaya provided feedback on burning issues that are within the scope of CASCADE.
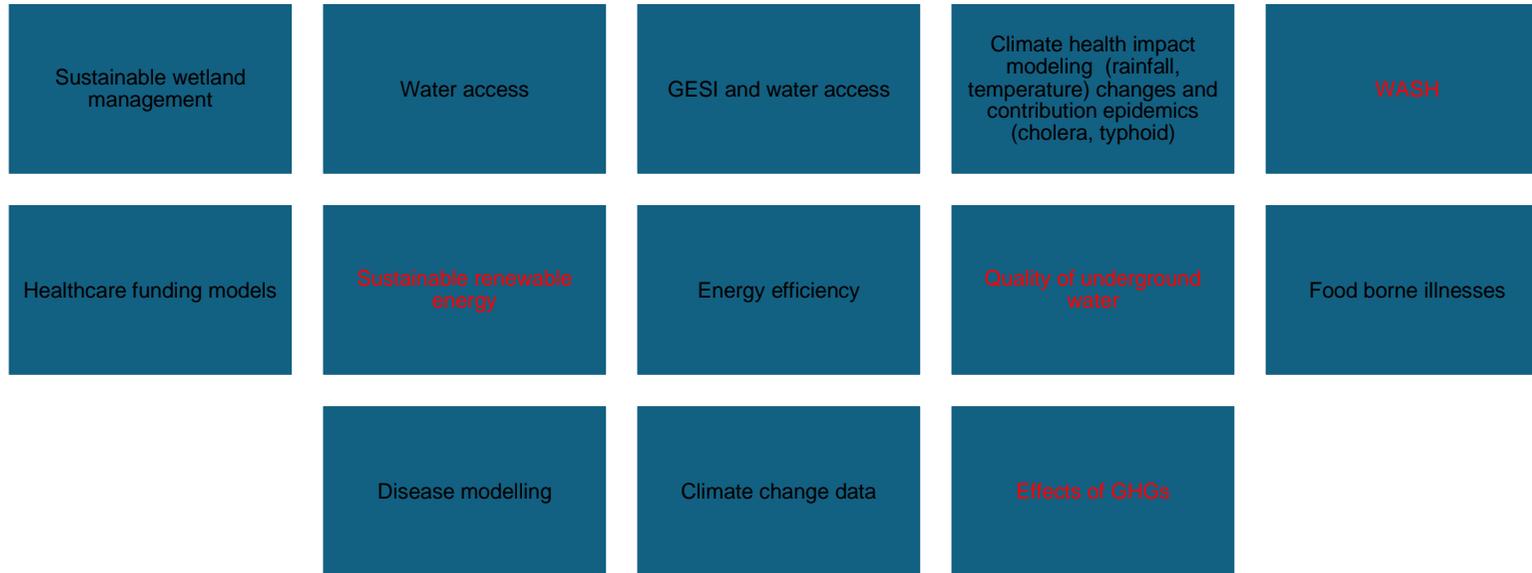

Figure 6: Summary of priority areas

The above figure summarises priority areas for research, most of which are within the interest areas of the fellow's research, and those highlighted in red may not be within the scope of CASCADE.

Feedback from participants:

Comment 1: WASH should be considered as a research area and the technologies to decongest solids in wastewater should be researched. When a pipe is clogged, there is anaerobic activity which means that this releases emissions. The enzymes need to be studied. We need local trials because these have been done elsewhere.
Response 1: Clogging also leads to sewage runoffs.
Response 2: Is it wise to dig (the traditional method currently used by the city) or use the enzymes? The major issue is the enzymes will end up in Lake Chivero (where Harare gets its portable water). We don't want to end up with a lake with a lot of health issues.
Response 3: This is an interesting area, and students should consider the possibility of linkages with other students researching WASH. The student attachment model might be useful to collaborate with other students at different universities.
Response 4: Students are currently aligning research areas for the city and their work within CASCADE. There might be scope for WASH as research areas are being aligned.
Comment 2: GESI, is an important area. We look at the communities and ask who is most impacted. Women are the most affected. They have the responsibility of the house chores including fetching water. There are reported cases of 3 girls raped at water points. How serious are the water issues now? Residents with 300 sqm of land are now drilling their own wells with side-by-side septic tanks which is dangerous. There are also issues with access to information. Do the communities know what climate change is and yet they are the most affected? Low-density suburbs with bigger yards can drill boreholes and get their water tested. What about those in high-density areas? Do communities have a connection with what the city is doing? The issue of water kiosks, are they economical?
Response 1: We need the monitoring of underground water quality. Environmental surveillance, which is wastewater based is key e.g. the UNICEF project is looking at poliovirus, salmonella, and other pathogens in 600+ boreholes in Harare.
Response 2: Does the city have data for those who want to do modelling or surveillance? Is it easy to get data?
Comment 3: The issue of green infrastructure should be on the agenda.
Question 1: Can we have short-term studies to influence design or interventions?
Response: We could partner for a shorter term; e.g. GESI but not consultancy.
Comment 4: We need to balance research and implementation.
Comment 5: Circular economy should be a part of the student's research.
Comment 6: People have a lot to share, and we need to further engage.

Session 8: Reflections

As the learning lab neared its close, participants used the open outdoor space to reflect on the learning lab.

Figure 7: Participants gathered in a circle to reflect on the day's activities and processes

The reflections are presented in the table below.

Table 3: Reflections

Words describing what participants enjoyed	Areas for improvement for the next Learning Lab
Active participation	Extend the Learning Lab process
Depth of information	Hear more from fellows
Commitment from leads	Someone senior should hammer on the issues
Relevance of topics	Skip tea break
Frankness	Others should be part of the facilitation
Opportunities that emerged	An invitation should be extended to the town clerk (Chipo Mubaya confirmed that the town clerk was invited)
Inspiring	There should be a presentation on water
Safe space	Female participants cannot stay over as they have kids at home

Collaboration	A field trip would be nice
Initiative to bring out hidden topics	Get to know more about how people can work together
Energy	More time for prioritization
Brilliant group	Representatives from other cities could be invited
Interesting	More participants: invite councillors, government officials, and media
Positive learning environment	Participants need to leave earlier as they will travel a distance
Interaction	
Inclusivity of the programme	
Differing backgrounds but common understanding	
Enjoyed the accommodation and safe space	
Local solutions	
Dynamic process	
Insistency	
Networking	
The energizers	
Having everyone together	

The reflection session solidified the impact of the Learning Lab, allowing participants to express their experiences. The insights gathered during the Learning Lab will help inform fellow's research areas and inform the structure of future Learning Labs. Several key points emerged throughout the day (in addition to the details of this report). Chris Jack discussed these key points:

1. Attaching fellows to relevant departments must be pushed forward,
2. Data access is closely related to the attachment of fellows as fellows can gain access to data through this attachment. Data is an important component of fellow's research,
3. Before the next Learning Lab, there will be thematic discussions;
4. Getting everyone's feedback on how the next Learning Lab is designed would be good.
5. It is important to stay involved with the participants and the participants should remain involved with us through communication and media such as LinkedIn,
6. Small Opportunity Grants are short-term, small pockets of funding allocated for the research of emerging issues,
7. The suggestions to involve individuals from national, provincial, and local levels were heard and will be taken into consideration,
8. Certificates of participation will be sent to participants.

Closing remarks
The Learning Lab ended at 16h00 and Chris Jack thanked everyone for their active participation and for making the day a success. Chris Jack reiterated that this is an ongoing process and staying in touch would benefit all.

End.

Next steps

- *Feedback and Reflection session:* A feedback and reflection session held on the 22nd of May and provided an overview of the Learning Lab process and feedback from the team that attended the Learning Lab. The session was also used as an opportunity for the wider team to ask questions about the Learning Lab. The session was recorded and is available to the CASCADE team via the shared Google Drive. The session is helpful in that it will aid in the planning processes of upcoming Learning Labs.
- *Communication and Public Engagement (CPE):* The Learning Lab is a key method of engagement within CASCADE as it informs and shapes research areas and creates a space for knowledge co-production. This is a bottom-up strategy that is very important to CPE activities within CASCADE. Therefore, two more Learning Labs will be planned for the city of Harare during the course of CASCADE.
- Fellows research: Fellows will continue working on refining their proposals, incorporating priority areas where applicable.

Annex 1: Process Plan

Time	Session	Process	Objective of session	Facilitator/presenter
08:00	**Registration**		Registration of all participants, name tags for participants	Chipo Dekesa
08:30	**1. Welcome Remarks**	*Welcome and introduction (Chipo)* *Note that some have travelled a distance to join this discussion* *Introduction of the speaker (Chipo)* *Opening remarks by Lisben Chipfunde.*	This ensures that HCC is taking ownership of the process right from the beginning. Lisben will bring in mention of the project and how everyone can play a role in the project	Lisben Chipfunde

08:45	**0. Introductions**	Introduction is table groups (to be mixed up) - When you think of climate and health what comes to mind - possible report back		Bettina Mzime
08:55	**0. About CASCADE**	*An outline of CASCADE and the project - introduce the fellows and postdoc* *(10 minutes and then questions)*	Sharing an outline (and limitations) of the CASCADE project	Stephen facilitating and Chris Jack providing input
09:15	**4. Exploring burning issues in Harare**	Mary and Chipo will give each table sticky notes (before or during the meeting). Mary will Give the following instructions for each table to follow. 　　　*1. Individually: Take a moment to think about what you've heard so far today about the CASCADE program, and to think about critical issues you know about that are affecting Harare now or are likely to in the future. Write 2-3 of these issues on the sticky notes. (3 min)* 　　　*2. Next, for 15 min +/- discuss these issues in your table groups focusing on:* 　　　*1. What the issue is?* 　　　*2. Why is it a critical issue?* 　　　*3. Who is most impacted by the issue?* *Then Chipo will guide the group through the group reporting and Mary (and Mzime?) will start clustering. (27 +/- minutes)* 0. Lastly, each group will choose one person to report back to the plenary on the group's discussion . The facilitating team will place the cards on the wall as the groups present, and begin clustering them on the wall as they relate to (or intersect across) the CASCADE research questions.	Surfacing issues Clustering issues and prioritising some issues	Mary Chipo Mubaya

10:00	*TEA BREAK*	*The team will continue to cluster the cards created in session 4. These can remain up for participants to peruse throughout the day.*		All
10:30	**(5) CCMD activities in Harare**	Introduction of speaker Formal input	To explore activities undertaken by CCMD and how linkages can be made to CASCADE project activities	Washington Zhakata
10:50	**(6) Recap and exploration of issues**		Understanding issues in the past and exploring future concerns and challenges in Harare Please consider: Understanding of climate change and what it means for the city in terms of experiences: has this changed over time? How? Extreme events noted, experienced? Perceived risks (non-climatic) Evidence/information: years?	Bettina Lilian Chipo (wing woman)
12:30	**(7) Energizer : 11 Fingers**	*Demonstration* *Groups of 3: achieve 11* *Reflection: What did you experience? How does this relate to your practice?*	Collaboration and the art of achieving adaptation	Linia/Romyne
12:40	**(8) City Health Department: activities and linkages to CASCADE**	Brief input from City Health Department around climate and heath, what they are doing at various levels and what to expect from HCC and CASCADE	Exploring linkages between CASCADE and City Health Department	City Health Department
13:00	*LUNCH BREAK*			

14.00	**(9) Energizer**		Exploring the importance of collaboration and co-production	Bettina
14:35	**(11) Summary of priority areas for CASCADE**	*How will we work together moving forward?* *What are our expectations going forward?* *What is the tentative timeline?*	Surfacing burning issues and how they relate to priority areas of CASCADE	Chipo
15.00	***(12) Reflection on the workshop***		Reflection on workshop process	Bettina
15:15	***(13) Closing remarks and next steps***		Charting next steps and pointing out a clear way forward	Chris
15.30	*ENDS*			