

**THE OPPORTUNITIES AND  
CHALLENGES FOR CLIMATE CHANGE  
EDUCATION AT UNIVERSITIES IN THE  
AFRICAN CONTEXT**

**BY**

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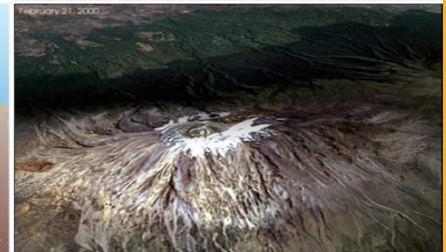
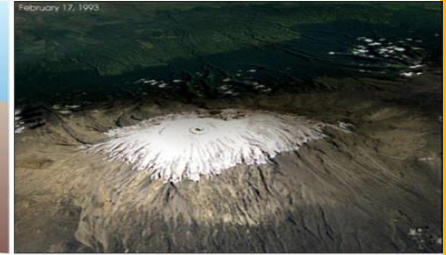
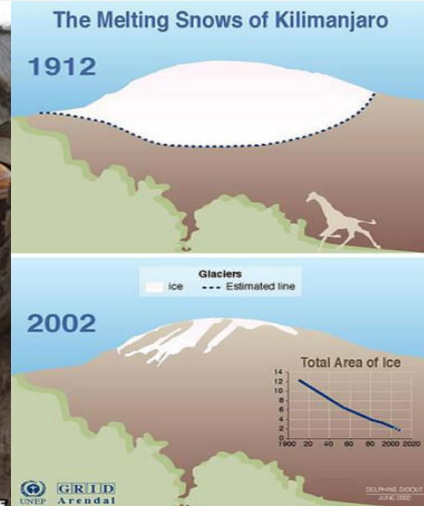
# OUTLINE OF THE PRESENTATION

1. Introduction
2. The state of the art and research gap
3. Theoretical framework
4. Research questions
5. Research design and Methodology
6. Key findings
7. Conclusions
8. Phd contribution
9. Recommendations
10. Limitations

# 1A. DEFINITIONS

- IPCC defines **Climate change**: as “a change in the state of the climate that can be identified (e.g., using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer” (Hegerl, 2007 p. 667)
- UNESCO (2011) described **Climate Change Education (CCE)** as “a programme that uses innovative education approaches to help a broad audience, understand, address, mitigate, and adapt to the impacts of climate change, encourage change in attitudes and behaviors needed to put our world on a more sustainable development path, and build a new generation of climate change-aware citizens” (p. 4).

# 1B. THE CLIMATE CHANGE PROBLEM



Source: [bbc.com](http://bbc.com)

# 1C. THE CLIMATE CHANGE PROBLEM

- **Climate change** remains the most inevitable and urgent challenge facing humanity ((IPCC, (2014); Hammil, (2009); Steffen, (2011); Stern, (2008); Farmer & Cook,(2013)).
- **Affects** agriculture, food security, livelihoods, water resources, human health, human settlements, human safety ((IPCC, (2014); A. Calzadilla, Zhu, Rehdanz, Tol, & Ringler, (2013); Morgan et al., (2017)).
- **Responsible for:** global warming, excessive floods, wild fires, hurricanes, rise in sea level, droughts, climate conflicts, and climate related infections ((P.V. Calzadilla, Mauger, & Plessis, (2018); Morad & Harry, (2013); Giugni et al., (2015); Tosam & Mbih, (2014); Hanna, (2011);

# 1D. POLITICAL AND EDUCATIONAL RESPONSES



## International legislation

- UNFCCC 1992,
- Kyoto protocol 1997
- Marrakesh Acord 2001, Copenhagen Accord 2009, Cancun Agreement 2010
- Doha Amendment 2012 and Paris Agreement 2015,



## National legislations and interventions

- National climate policy frameworks
- National and community based mitigation and adaptation interventions



## Educational responses

- Environmental education
- Sustainability education (ESD)
- Climate change education

# 1E. CLIMATE CHANGE EDUCATION

- Both UNFCCC 1992 and the recent Paris agreement 2015 provide for CCE
- UNESCO at the forefront of promoting CCE as part of ESD focusing on behaviour change for sustainability
- Fernandez, Thi, & Shaw, (2014) observed:
  - Education is a critical element in responding to climate change
  - Called for innovative approaches to provide learners with skills and knowledge to respond to effects of climate change.

# 2A. THE STATE OF THE ART AND RESEARCH GAP

## Overall situation

- The education sector is yet to be exploited (Lotz-Sisitka, 2010).
- Aspects of climate change are visible in curricula of secondary schools especially in science disciplines in a few countries (Boakye, 2015).
- Many university students still hold misconceptions about climate change (Paola Villavicencio et al., 2018).

**I. Training Interventions:** Universities in Europe, Australia and North America run more study programmes on climate change compared to African and Latin American universities (Fernandez et al, 2014; Lemons, 2011; Mochizuki, 2015; Filho, 2010; Davis et al, 2012; Boateng & Boateng, 2015).



# 2B.THE STATE OF THE ART AND RESEARCH GAP

**2. Research interventions:** A few universities in Africa are engaged in climate change research and mostly from South Africa. Less research outputs cited in scientific journals (Akimbami & Akimbami, 2017; Scheltinga & Greene, 2011; Mazvimazi, 2010).

A few universities in Africa established **climate change centres** e.g. Makerere University, UDSM, University of Cape Town (O’Keeffe, 2016; Nwankoala, 2015).

**3. Community interventions:** Universities in Africa have low level of engagement with local communities on climate change ( Lotz-Sisitka, 2010)

- **Research gap:** Limited Scholarly literature/research on climate change education interventions, the challenges faced and opportunities for universities, is limited or inadequately covered especially in African context.

# 3. THEORETICAL FRAMEWORK

I. Albert Bandura's Social Learning theory 1977, 2001

## Analyzing individuals and groups' behaviors

- Motivation or drivers
- Inter and multi- disciplinary
- Collaborative practices
- Reciprocal determinism

2b. Elinor Ostrom's Institutional Analysis and Development Framework 2011

## Institutional analysis

- Contextual realities
- Action situation
- Actors and roles
- Patterns of interaction

2a. Liisa Rohweder & Anne Vertanen's Model of learning for sustainable development 2009

## Analyzing sustainability education

- Systemic thinking
- Partnerships and collaborations
- University and community interactions
- Integration

Opportunities and challenges for Climate Change Education at universities in African context

# 4. RESEARCH QUESTIONS

1. What are the **current academic, research and community engagement Interventions** on climate change implemented by the universities in selected cases?

2. What are the **key challenges** faced by the implementing units in carrying out academic, research and community engagement interventions on climate change within the universities in selected cases?

3. What are the **success factors** that would support universities to adequately address climate change issues in their academic, research and community engagement interventions and what can be done to improve the situation?

# 5A. RESEARCH DESIGN AND METHODOLOGY

Paradigm	Interpretivism/ social constructivism
Research design	Multiple qualitative comparative case study design (Yin, 2009)
Sampling	Two cases, purposive sampling of 58 participants (Lecturers, Researchers, Administrators, Students)
Data generation methods	18 Semi-structured in-depth interviews, 5 Focus Group Discussions (FDGs) and document review
Data analysis	Thematic analysis based on V. Braun & V. Clarke (2006)

# 5B. CASES SELECTED

## MAKERERE UNIVERSITY



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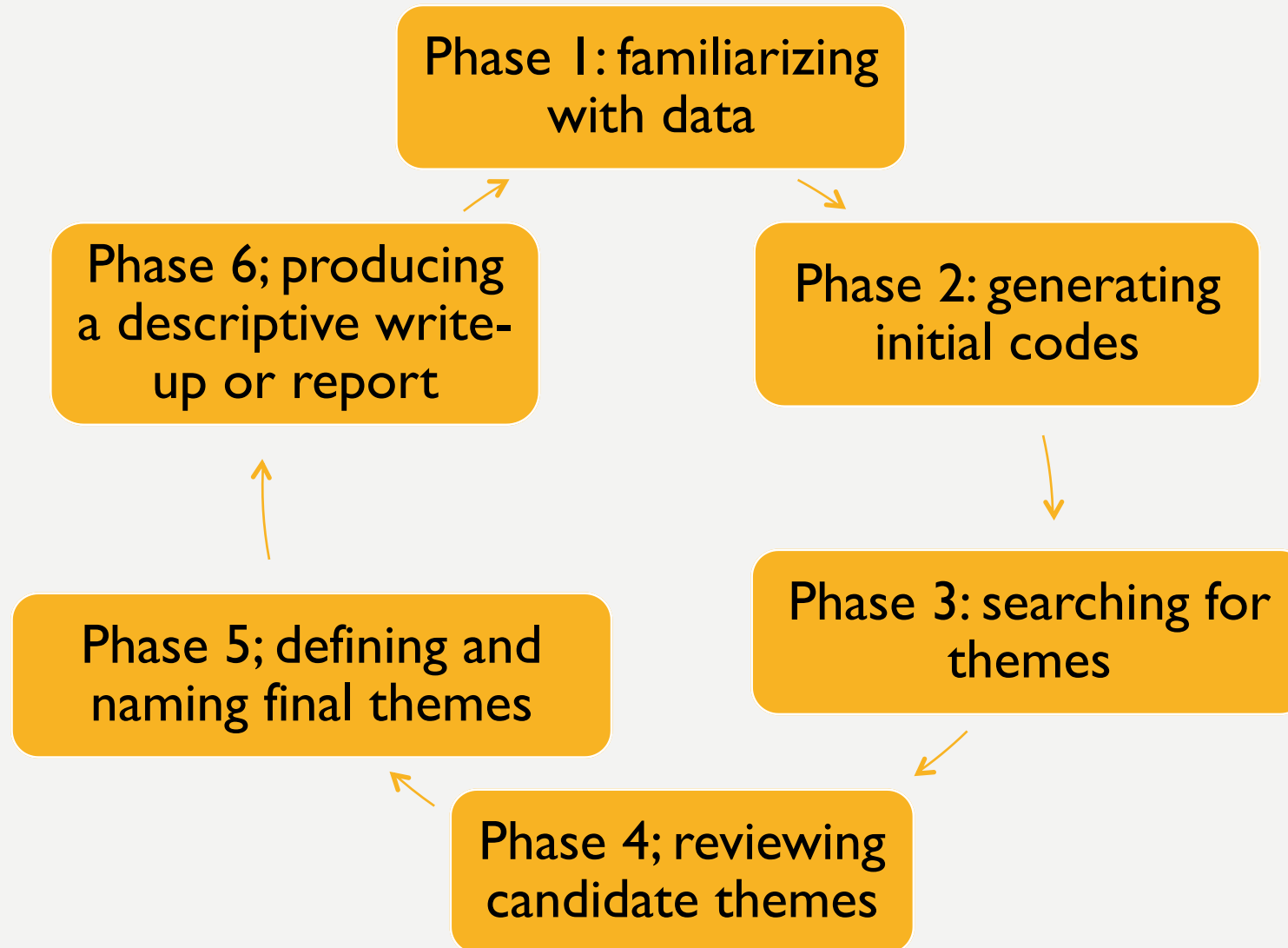
[www.mak.ac.ug](http://www.mak.ac.ug)

## UNIVERSITY OF DAR ES SALAAM



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# 5C. THEMATIC ANALYSIS: SOURCE; V. BRAUN & V. CLARKE (2006)



# 6. KEY FINDINGS



Theme 1: The role of the university and institutional support for climate change education interventions

Theme 2: University interventions on climate change

Theme 3: challenges faced by the university in implementing climate change education interventions

Theme 4: The key drivers and current opportunities for climate change education work

Theme 5: Strategies for improvement

# THEME 1A: THE ROLE OF THE UNIVERSITY AND INSTITUTIONAL SUPPORT FOR CLIMATE CHANGE EDUCATION INTERVENTIONS

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in views on roles

- Generating scientific knowledge
- Providing training and capacity building
- Sensitizations and policy guidance
- Knowledge generation
- A home for training and capacity building
- A source of information and policy guidance

### Differences in views on roles

- Advancing innovations and technological solutions
- Providing technical support to other actors
- A leader of action in communities

Generally, participants agree that African universities can play a significant role in climate change mitigation and adaptation



# **THEME 1B: THE ROLE OF THE UNIVERSITY AND INSTITUTIONAL SUPPORT FOR CLIMATE CHANGE EDUCATION INTERVENTIONS**

## **MAKERERE UNIVERSITY**

## **UNIVERSITY OF DAR ES SALAAM**

### **Similarities in views on institutional support**

- Establishment of MUCCRI
- Provision of facilities
- The plan to strengthen the climate change centre
- Providing facilities

### **Differences in views on institutional support**

- Climate change research is part of university research agenda
- Efficient management of finances for the interventions
- Supporting in approval of new programmes

Universities are very supportive of the interventions despite financial and other facility inadequacies.

# THEME 1C: INSTITUTIONAL SUPPORT

## MAKERERE UNIVERSITY

Climate change research is part of university research agenda:

*“Ahmm, when you look at the research priorities of the university, then climate change is among them”*

*[MUK PL22; Position: 29-29]*

## UNIVERSITY OF DAR ES SALAAM

Supporting in approval of new programmes:

*“hmm I think always the university management, they are very supportive in terms of if you want to establish for example a course or programme, they really support in terms of accepting the programme.”*

*[Interview L12; Position: 27-27]*

# THEME 2A: UNIVERSITY INTERVENTIONS ON CLIMATE CHANGE

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in training interventions

- Short courses and seminars
  - Long courses focusing on climate science, energy and weather processes
- Short courses and seminars
  - Long courses focusing on climate change and human adjustment, climatology

### Differences in training interventions

- Undergraduate programmes; i.e. BSc. Meteorology
  - Postgraduate programmes; i.e. Postgraduate Diploma in meteorology, proposed MSc. in climate change and sustainability and MSc. meteorology
- Postgraduate programmes; MSc. and PhD in climate change and sustainable development

Case universities are diverse in terms of training. Makerere focuses on meteorology while UDSM has postgraduate programmes on Climate Change and sustainability. This is a good start

# THEME 2B: UNIVERSITY INTERVENTIONS ON CLIMATE CHANGE

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in views on research interventions

- Climate change adaptation in agricultural sector;
- Adaptation research in semi arid areas and pastoral communities
- Effects of climate change on agriculture
- Impact of climate change on pastoral communities

### Differences in views on research interventions

- Vulnerability assessments for various sectors
- Weather forecasts and prediction
- Research on REDD+ (Reducing Emissions for Deforestation and forest Degradation in developing countries)
- Impact of climate change on coastal resources

Research projects across cases focused more on adaptation compared to mitigation. Possibly available funding is for adaptation. More needs to be done for mitigation research

# THEME 2C: UNIVERSITY INTERVENTIONS ON CLIMATE CHANGE

MAKERERE UNIVERSITY

UNIVERSITY OF DAR ES SALAAM

## Similarities in views on community interventions

- Annual festivals and meetings
- Local adaptation initiatives in semi-arid areas
- Annual festivals and meetings
- Local adaptation initiatives in semi-arid

## Differences in views on community interventions

- Identification and training of climate change champions in communities;
- Developing decision making tool for district officials and other actors;
- Developing adaptation plans for districts and villages

Case universities continue to come up with innovative community outreach activities mainly for adaptation. However, the outreaches are not comprehensively planned

# THEME 2D: COMMUNITY INTERVENTIONS

## MAKERERE UNIVERSITY

Identification and training  
of CC champions

*“...we identified champions who are linked with communities, influential members in the communities, especially those ones linked to agricultural sector. ”*

*[MUK PA22; Position: 77-77]*

## UNIVERSITY OF DAR ES SALAAM

Developing decision making  
tools for district officials

*“...we finally developed what we call a decision making tool that can help various stakeholders including district officials and extension officers to put in or peg in some variables and they get the results of what they should advise farmers if temperature and rainfall regimes changes” [Interview R11; Position: 21-21]*

# THEME 3A: CHALLENGES FACED BY THE UNIVERSITY IN UNDERTAKING CLIMATE CHANGE EDUCATION INTERVENTIONS

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in views on research interventions

- Donor driven funding
- Bureaucratic tendencies
- Inadequate funding support from government and local institutions
- High bureaucracy

### Differences in views on research interventions

- Limited access to quality climate data
- Failure to adopt climate friendly practices
- Drawing academics for political appointments
- The challenge of conceptualizing climate change

Case universities have diverse challenges. Respective university management needs to find ways of addressing the unique challenges given their contexts.

# THEME 3B: CHALLENGES

## MAKERERE UNIVERSITY

Limited access to quality climate data:

*“the challenge of data. Data, you could have all resources you need to collect data, but the data is a challenge. Getting good quality data say on agriculture, getting good data that span say 40-50 years of climate data, rainfall, temperatures and solar radiation is a huge challenge.” [MUK PL2 I; Position: 53-53]*

## UNIVERSITY OF DAR ES SALAAM

The challenge of conceptualizing climate change:

*“we conduct research but at a certain point you feel like you should have trained or provided like an overview of what climate change is, before maybe they really understand what you are talking about....” [Interview A12; Position: 40-40;]*



# THEME 4A: THE KEY DRIVERS AND CURRENT OPPORTUNITIES

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in views on key drivers

- Competent and dedicated staff
  - Strong partnerships and collaborations
  - Multi-disciplinary and interdisciplinary teams and approaches
- Competent and dedicated staff
  - Engaging staff from various disciplines
  - Strong partnerships and collaborations

### Differences in views on key drivers

- Strong African social and cultural systems like Ubuntu philosophy;
- Effective involvement of stakeholders

Case universities have strong key drivers for climate change education that need to be effectively utilized to enhance the existing interventions. These are good motivators for the interventions

# THEME 4B: THE KEY DRIVERS AND CURRENT OPPORTUNITIES

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in views on current opportunities

- Africa's high vulnerability to climate change
- Opportunity to partner and collaborate
- Africa is more vulnerable
- Opportunities for researchers to collaborate

### Differences in views on current opportunities

- Legislative backup;
- The provisions in the Paris agreement
- The possibility to extend climate change education to other levels of education
- The fact that climate change is cross cutting

The identified opportunities need to be tapped and exploited. They should be shared with other universities that are yet to start climate change education work.

# THEME 4D: OPPORTUNITIES

## MAKERERE UNIVERSITY

### Legislative backup

*“....Uganda is a party to UNFCCC, and it participates in the COPs. Uganda government is leading as far as addressing climate change is concerned. So with all these, and Makerere university is a premier university in Uganda.” [MUK PA2 I; Position: 47-47]*

## UNIVERSITY OF DAR ES SALAAM

The provisions in the Paris agreement to support universities

*“that Paris agreement has been, ...endorsed by all countries (...) but it was agreed that, developed countries should provide money to support universities so that they can actually run capacity building programmes in least developed countries. ” [Interview A1 I; Position: 33-33]*

# THEME 5A: STRATEGIES FOR IMPROVEMENT

## MAKERERE UNIVERSITY

## UNIVERSITY OF DAR ES SALAAM

### Similarities in views on strategies to improve

- Promote location specific research
- Encourage government to fund interventions
- Encourage practical training programmes
- Ensure research is relevant to local contexts;
- Provide practical training programmes
- Engage gov'ts and local institutions to support

### Differences in views on strategies to improve

- Have a comprehensive community approach
- Promote multi-disciplinary research teams
- Engage governments to desist from appointing academics
- Explore the role of indigenous knowledge

These proposed strategies are very useful for enhancing CCE work. Case universities need to carefully review them and find ways of improving their interventions

# THEME 5B. STRATEGIES

## MAKERERE UNIVERSITY

Promote multi-disciplinary and interdisciplinary research teams;

*“I think, we need to build interdisciplinary call it interdisciplinary, cross disciplinary research teams. Because some things [...], tend to be repeated. It is just getting a research agenda, a research scheme for climate change sciences in the university” [MUK PR21; Position: 59-59]*

## UNIVERSITY OF DAR ES SALAAM

Engage governments to desist from appointing professors and academics into political and administrative positions;

*“So, while we are thinking that it is important for the university to engage communities we still have to advise our governments that, they should not employ academics. For example in Tanzania within few months I think more than 20, 30 members of the academic staff have been moved to the government.” [Interview L12; Position: 103-107]*

# 7A. CONCLUSIONS

## **Research Question 1: Climate Change education Interventions**

- A few short and long term training programmes, research projects focus on adaptation and community outreaches not comprehensively planned.

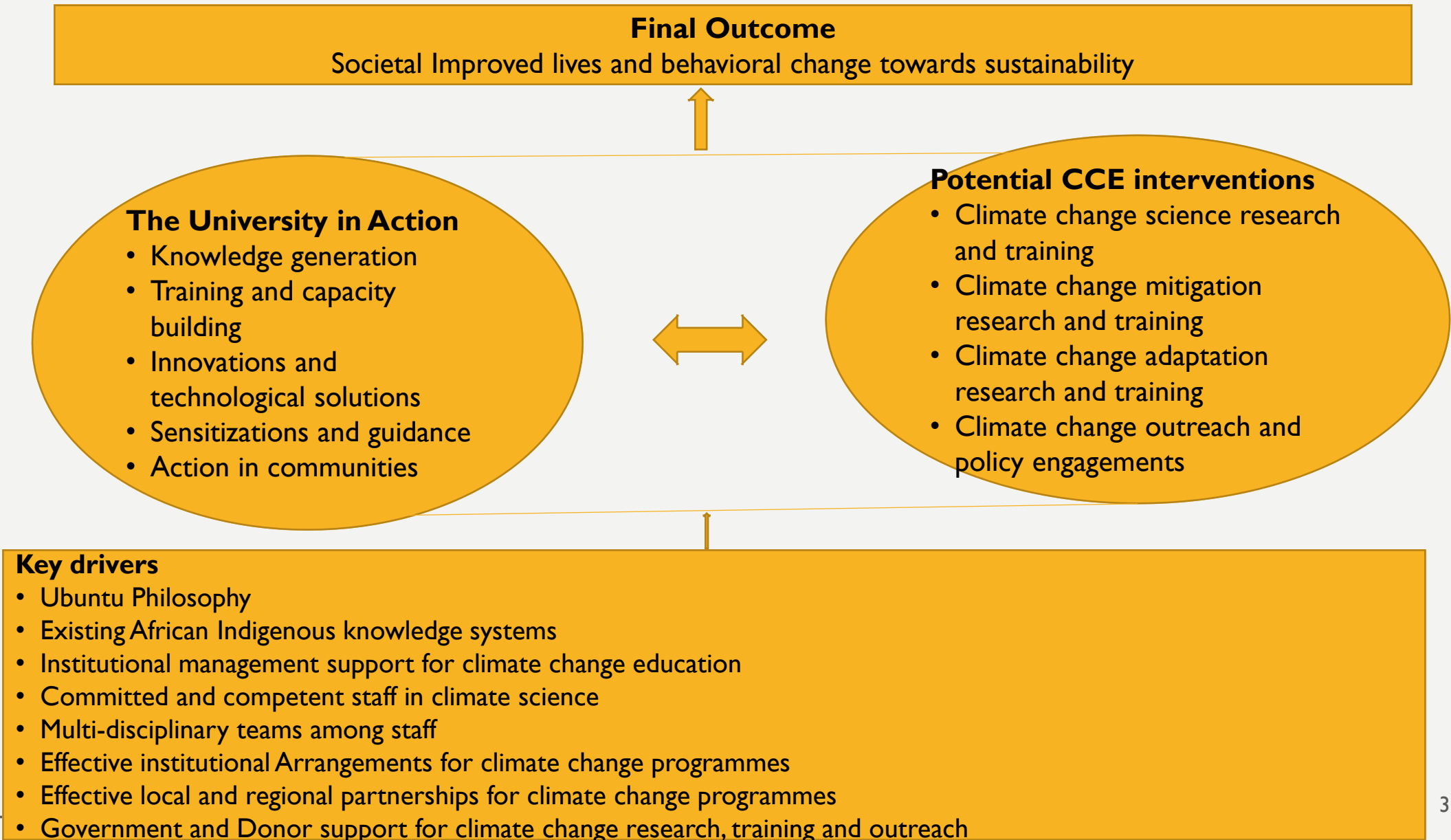
## **Research Question 2: Challenges faced**

- Cases face diverse challenges related to funding, access to data, human resources etc. Management should deal with these.

## **Research Question 3 : Success factors and opportunities**

- Several opportunities exist from legislations, existing partnerships, possibility to extend CCE through teacher training. Cases should tap these.

# 7B. CONCLUSION: THEORETICAL MODEL LINKING UNIVERSITY EDUCATION TO CLIMATE CHANGE IN THE AFRICAN CONTEXT



# 8. PHD CONTRIBUTION

## Empirical contribution

- Added to existing literature on
- Suggested areas for further research

## Contribution to policy and practice

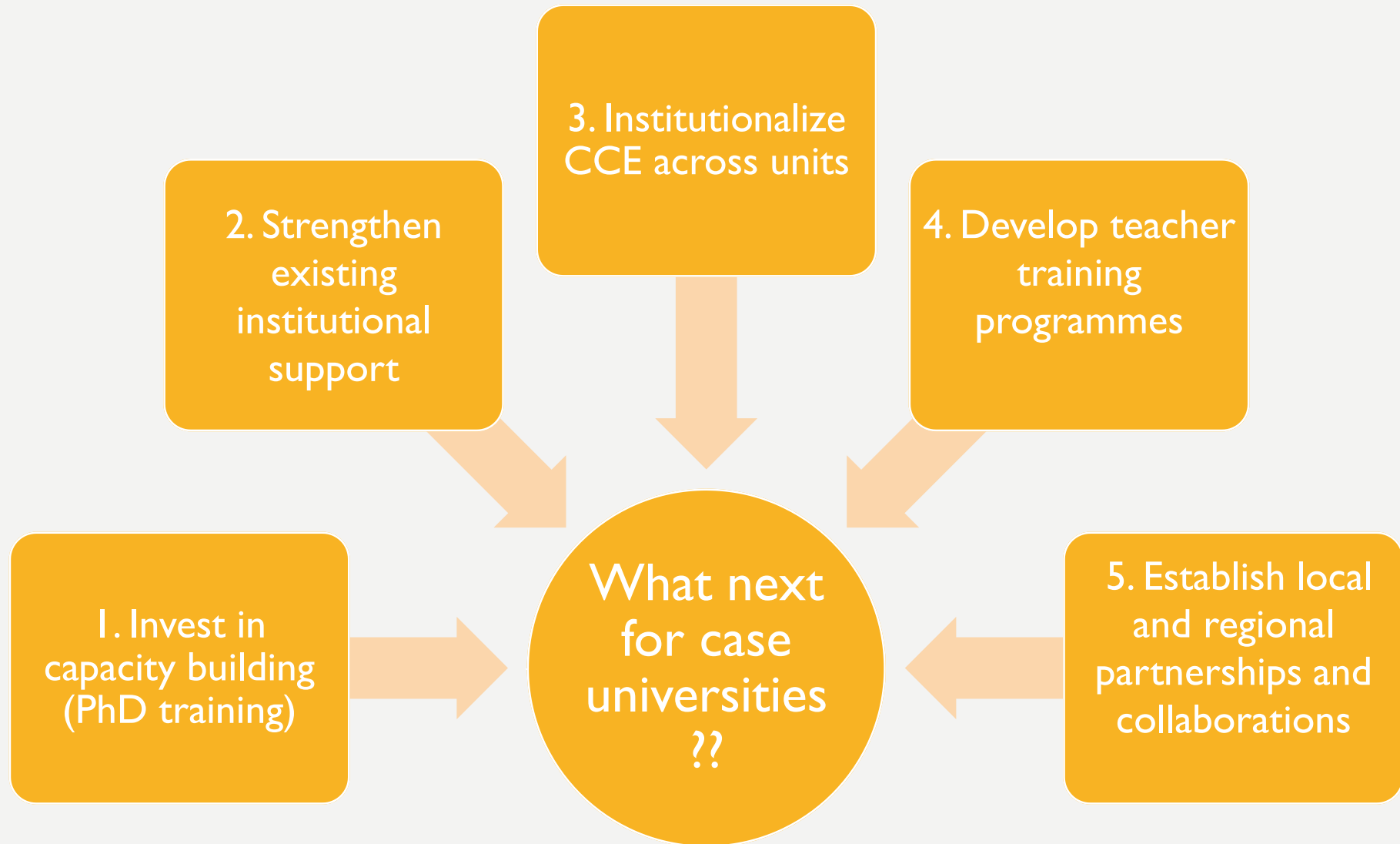
- Information for policy makers
- Raise awareness
- Motivation to other universities
- Opportunities to improve

## Theoretical contribution

- A theoretical model linking university education to climate change interventions in African context



# 9. KEY RECOMMENDATIONS



# 10. LIMITATIONS



Time and resource constraints

Limited scope of study  
in terms of coverage

Conclusions based on participant  
views and perspectives

The findings cannot be generalized  
to all universities in Africa

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# KEY CONCEPTS

## **Sustainability education/ learning for sustainability/ Education for sustainable development**

- Filho and Pace (2016) described ESD as: “the process of equipping students with the knowledge and understanding, skills and attributes needed to work and live in a way that safeguards their environment and economic wellbeing, both in the present and for future generations” (p. 2).
- Cloud Institute for sustainability education (2010) defines sustainability education as a transformative learning process that equips students, teachers and school systems with new knowledge and ways of thinking needed to achieve economic prosperity and responsible citizenship while restoring the health of the living systems upon which our lives depend.

# LEGAL PROVISIONS ON CCE

- Article 6(a) (iv) of UNFCCC 1992 provides that “parties shall promote and facilitate training of scientific, technical and managerial personnel to address climate change and its effects” (p. 10).
- Paris agreement 2015 article 12 provides that “parties shall cooperate in taking measures, as appropriate to enhance climate change education, training, public awareness, public participation and public access to information, recognising the importance of these steps with respect to enhancing actions under this agreement” (p. 16).

# SOCIAL LEARNING THEORY

SOURCE: MATTHIAS BARTH, (2015)

Albert Bandura  
(1977)

- Psychological perspective;
- learning process depends on social interaction
- Individuals model their behaviors on what is observed in others
- Imitation, apprenticeship or learning as scaffolding

Reed et al  
(2010)

- Learning as a change in understanding
- Learning in wider social units
- Learning through social interaction

Matthias Barth  
(2015)

- Based on social dimension of learning
- Individual learning in a group
- Learning as a group
- Learning as a larger social unit



# LIISA ROHWEDER & ANNE VIRTANEN'S MODEL OF LEARNING FOR SUSTAINABLE DEVELOPMENT 2009

Society and working life: future needs for sustainable development

## CONTEXT

Integration  
Spatiality  
Time perspective

## MENTAL ASPECTS

Value clarification  
Systemic thinking  
Critical reflection  
Motivation building

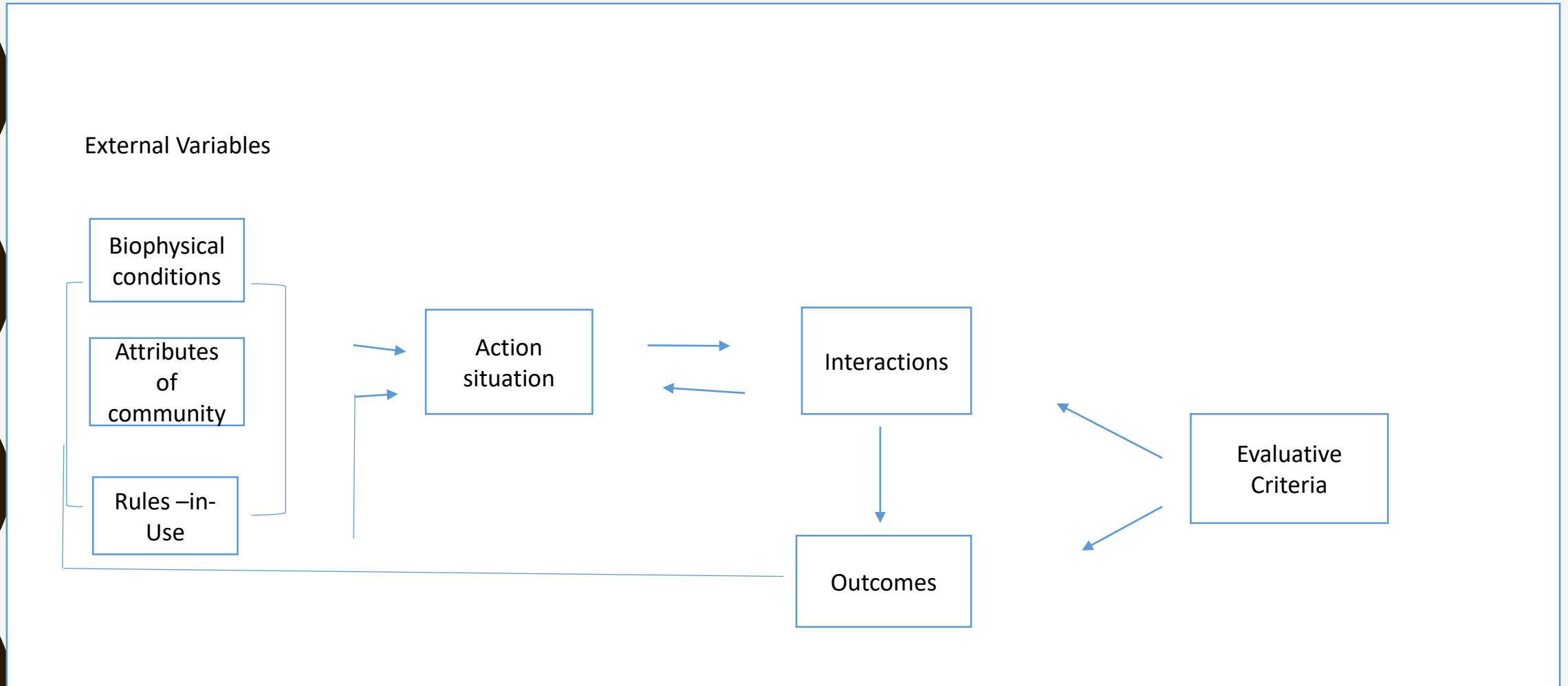
## ACTIVITIES

Partnerships  
Cooperation & communication  
Participation



Result of learning  
process:  
Competence  
building for  
sustainability

# OSTROM'S INSTITUTIONAL ANALYSIS AND DEVELOPMENT FRAMEWORK 2011



# RESEARCH PROCESS



# AREAS FOR FURTHER RESEARCH

- Explore the reasons why mitigation research and funding is less compared to adaptation in the case universities.
- Investigate the interface between the policy briefs produced by researchers and climate policy in the countries.
- Examine the extent to which institutional practices and organizational culture in the case universities contribute to climate change mitigation and adaptation.
- Explore effective ways and mechanisms for integrating African indigenous knowledge into climate change education interventions within case universities.