CLIMATE CHANGE CURRICULA FOR LECTURERS IN AFRICA
Highlights and lessons from a workshop series

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ARUA-CD
Centre of Excellence
Climate and Development
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HIGHLIGHTS

Across Africa, postgraduate courses on climate change are in high demand.

Good learning outcomes typically emerge from curricula that include the following elements:

- Multidisciplinary or transdisciplinary teaching approaches, such as mixed-disciplined teaching teams, and the inclusion of non-academic and applied forms of knowledge.
- Student-centred and/or participatory teaching approaches.
- Problem-based and highly contextualised teaching. For example, field trips and the use of case studies and local climate data or information.
- The latest climate science and policy contextualised at a local or national level.

However, implementing curricula with these elements can be challenging because:

- Traditional university structures with siloed discipline structures that are often hierarchical, can complicate collaborative efforts.
- Traditional university cultures do not value non-academic forms of knowledge or new ways of teaching.
- It can be difficult to access resources, particularly climate data.
- Many lecturers find it difficult to teach climate modelling.
- New curricula plans can be halted at the review stage on account of the expense of bringing diverse reviewer groups together, conflicting views amongst lecturers of different disciplines, and the complicated and often-lengthy bureaucracy of accreditation. Curriculum review in 2021 was particularly difficult on account of the general disruptions of the COVID-19 pandemic.

Lecturers suggested using these actions to overcome these challenges:

- Universities create platforms that facilitate connections across sectors.
- Lecturers work together to develop and share methods for reaching common views in diverse teams.
- Lecturers share curricula, syllabus outlines and case studies.

Graduates suggested that, in addition to existing topics, climate change curricula should:

- Focus on proactive actions that individuals can take, such as harnessing emerging entrepreneurial and commercial opportunities associated with climate change.
- Have a stronger focus on climate modelling.
- Help students develop key skills, such as project management.

The findings from the workshop series will be developed into an information brief that lecturers can use in engagements with senior and mid-level leadership when seeking support for university-level change, or when working to develop robust and effective climate change curricula.
BACKGROUND

The field of climate change is relatively recent and rapidly changing. Developments in climate science and climate impacts research, new findings on the intersection of climate change with various Sustainable Development Goals (SDGs), changes in how we conceptualise climate change and development, and shifts in the policy landscape, all pose challenges for lecturers to keep the content of their curricula current. However, new teaching tools and approaches are emerging as lecturers grapple with these and other challenges in higher education across Africa.

AIM

We worked to build the capacity of lecturers in Southern, West and East Africa to review their climate change Masters curricula and incorporate new developments in climate change research and curriculum innovation.

Through a multi-step workshop process, we aimed to support lecturers to learn from one another’s experiences of teaching climate change and provide tools (once-off and continuous) to review climate change curricula.

The workshop series was run as part of the African Research Universities Alliance Centre of Excellence in Climate and Development (ARUA-CD), with funds provided through UK Research and Innovation for Strengthening Projects and Networks (SPAN).

OBJECTIVES

Equip lecturers with the tools for reviewing their Masters curricula and keeping them current in the rapidly-changing fields of climate change and the SDGs.

Support lecturers to return to their institutions and run curriculum review processes, whether through a continuous or once-off review.

Collate lessons learnt from curriculum review processes and produce relevant outputs (e.g., a guide to keeping African climate change curricula up to date).

FORMAT

Part 1  
We held an online 4-day workshop (27 May to 1 June, 2021) with approximately 30 lecturers from southern, western and eastern African institutions. This workshop introduced key tools and concepts for reviewing and updating climate change Masters curricula in Africa.

Part 2  
Participating lecturers convened smaller workshops in their own institutions to review and update their own curricula according to their own needs.

Part 3  
We reconvened the original group of lecturers during a 2-day online workshop (29-30 September, 2021) to share the outcomes and reflections from their curriculum review processes.
WORKSHOP 1: MAIN FINDINGS

The needs of lecturers teaching climate change in Africa

*Lecturers were asked via MentiMetre about their reasons for joining the workshop.*

- The responses included: the need for transformation; to expand networks and interact with experts in the field; tips for breaking down university silos; how to make climate change cool, exciting and applicable and to give students voice and agency; how to incorporate African indigenous knowledge systems into curricula; and how to keep climate change curricula current and using the latest teaching approaches.
- In addition, many participants were in the process of, or had planned to, undertake curriculum reviews and sought tools for how to go about doing this, as well as for insights into the latest content (e.g., pedagogy, trends in thinking and theory, climate science and policy).

What is working well

*In group discussions lecturers described aspects of their curricula that were working well.*

- Generally, adopting a multidisciplinary or transdisciplinary approach was appreciated by students.
- Some institutions had positive experiences of establishing their curricula: undertaking a gap analysis, running participatory approaches with stakeholders, receiving exemplary commitment and energy from their founders, and facing little resistance in approvals from the Senate, Academic Board or equivalent.
- Lecturers reported climate change courses were popular and topical, with many students wanting to enrol. The rich variety of disciplines and bringing in experts from other fields was seen as enriching. Some reported that theoretical and practical components were well-integrated in their curricula.

What is not working well

*In group discussions lecturers raised aspects that were not working well in their curricula.*

- Many expressed disdain for the lack of monitoring data and case studies to support the theory, especially country-specific or local examples.
- The heavy bureaucracy of reviews was also a common challenge as these processes could be lengthy (i.e., multiple steps and stages of approval). Similarly the multidisciplinary nature of climate change could make reviews expensive and complicated, by bringing together numerous experts from different fields. Despite these challenges, regular reviews are necessary for the changing field.
- The broad scope of the field was also logistically demanding for course conveners. Often there is limited capacity in a single institution to teach all the necessary content, and external experts need to be brought in.
- Some felt there was a disconnect between the course content and the policy space. In teaching about Nationally Determined Contributions (NDCs), for example, lecturers did not consciously bring real-time case studies into their teaching.
- Some reported that it is hard to meet the needs of a diverse student cohort from different sectors.
- As a relatively new topic there was also some institutional hesitancy and lack of confidence amongst lecturers to teach the subject.

Challenges of integrating climate change and SDGs

*In looking at the latest trends and policies around climate change and sustainable development, lecturers had group discussions about the challenges they faced in integrating the SDGs into their teaching on climate change.*

- Some lecturers reported the seeming contradictions in development and sustainability in African contexts as being a challenge.
- Others found that courses were market-driven, not SDG-driven. For example, students aspire for white-collar jobs, whereas achieving the SDGs requires more on-the-ground work.
- The SDGs were seen as part of government and NGO agendas, and not within the scope of academia. As the university tends to be structured for mono-disciplinary teaching, it is not suited to the scope and interconnectedness of the SDGs.
- The multidisciplinary nature of the SDGs was also made challenging to teach as there are biases of specialisation / hierarchy of disciplines in universities, combined with a lack of confidence to teach a subject that is not one’s core field.
Challenges and benefits of transdisciplinary approaches to teaching and learning

In groups, lecturers discussed the benefits and challenges of transdisciplinary teaching and learning and described the support they needed.

- Lecturers described aspects that were working well such as allowing students to identify supervisors from different sectors or departments, giving flexibility to tutors on how they structure courses, summer schools for postgraduates, and introducing transdisciplinary in undergrad courses.
- Lecturers identified many barriers to good transdisciplinary teaching, such as the lack of expertise around real-life problems, the financial barrier of bringing together lots of people and for conducting field work, the time-consuming nature of good transdisciplinary processes (e.g., of iterative engagement), and not being sure how to effectively assess transdisciplinary assignments or research.

Innovations in climate change curricula in Africa

In groups, lecturers discussed any innovations that they had brought into their curricula.

- Owing to the context of COVID-19 lockdowns, many lecturers used the space to reflect on their experiences of transitioning to online teaching and learning. Online teaching saw some welcome surprises, such as improved ease of marking and of bringing in guest lecturers, higher attendance for proposal presentations, raised alertness to issues of plagiarism (as it is easier to copy and paste when working entirely online).
- The transition to online learning also encouraged the use of a flipped classroom (i.e., pre-recording the lecture and allowing students to watch that asynchronously, and using synchronous class time for richer discussions).
- Some downsides of online teaching were that lecturers had never met many of their students, and some students had access issues.
- Some lecturers reported the successful use of storytelling in their teaching.
- Another successful innovation was to incorporate visits to places such as ICPAC (East African climate centre) and meteorological centres.

Network parameters

With the view of exploring the possibility of establishing a network of support for lecturers teaching climate change in Africa, lecturers discussed what networks they have been involved in and what has made those networks successful and unsuccessful.

- Success factors included being adequately resourced or funded (e.g., to convene regularly), having permanent staff running the network for continuity and commitment, positive attitudes, a shared vision and objectives.
- A common pitfall in networks was the shift in the leaders who may have held the vision, and not having clear network objectives.
- The implications of the COVID-19 pandemic for mobility and the effects this would have on maintaining strong networks remains to be seen.
- Lecturers were asked what resources would be most useful for a network of climate change lecturers, and the top-ranked response was for shared curricula / syllabus outlines, followed by case studies and climate information / data.
WORKSHOP 2: MAIN FINDINGS

Implementing transdisciplinary changes to curricula

Lecturers reported many successes of integrating transdisciplinarity into teaching curricula:

- Competency-based, learner-centred and problem-based teaching were seen as valuable approaches for developing the necessary skills in graduates.
- Many lecturers had set up interdisciplinary teaching teams and established interactions with stakeholders.

Lecturers also faced many challenges:

- Developing a common understanding amongst teaching teams was difficult, especially when climate change topics were being taught for the first time, and when senior academics were reluctant to change the way they teach.
- Lecturers also experienced slow and hesitant university systems despite the demand from students for climate change courses.
- A lack of respect by academics for non-academics, especially members of society, hindered true transdisciplinary practice.

Using innovative teaching activities

Lecturers described a variety of novel teaching and learning activities to help students fully engage with climate change content. These included:

- Asking students to use the latest IPCC reports to identify pieces of information that are relevant to their own countries, and to use this information to determine context-specific climate-change challenges and solutions. This information is then presented back to the lecturer and the class verbally.
- Taking students into the field to see adaptation in action, and linking this back to the content covered in class.
- Using existing policy briefs to introduce students to the practical and political complexities associated with climate change mitigation and adaptation.
Using IPCC reports

In their presentations, Prof Mark New, Dr Nick Simpson and Dr Christopher Trisos recommended lecturers regularly update their curricula with references to the latest IPCC reports for the latest climate science, notably the Special Reports and the Assessment Reports.

Policy makers see these reports as being the most robust and reliable sources of information, as they contain very stringent reviews of all of the latest scientific evidence on climate change. The Sixth Assessment Report (AR6), and all other reports, is available here.

Prof Mark New provided guidance and tips on how to use these reports when teaching climate change.

Teaching transdisciplinarity

In her presentation, Prof Sheona Shackleton provided references for explaining conceptual frameworks related to transdisciplinarity.


2) The blog site ‘Integration and Implementation Insights’ contains transdisciplinary researcher tips, insights and lessons on common challenges.

3) Utrchet University has an online Transdisciplinary Field Guide.

What students want to know about climate change

Graduates from the ARUA-CD network shared their perspectives on topics that should be included in climate change curricula in all African universities. These included:

- Inspirational stories of people taking mitigation, adaptation, and entrepreneurial action.
- Climate change policy formulation and development.
- Project management.
- Proposal writing.
- Guidance for accessing climate finance.
- Climate change modelling.
- Practical ways of commercialising the climate change field so as to generate an income while simultaneously driving positive action.
- Climate change measurement (providing adequate access to equipment and laboratories).
- Clean energy systems and the circular economy.

Read more graduate perspectives on the document above, or watch the students share their perspectives first-hand in the video below.

Designing Teaching, Learning & Assessment

Dr Melanie Skead outlined the DeLTA cycle for Designing Teaching, Learning and Assessment.

The DeLTA cycle is an ongoing curriculum review process that considers the curriculum context, graduate outcomes, assessment, design for learning, and reflection.

The DeLTA cycle incorporates the principle of constructive alignment (ensuring that the intended outcomes, assessment and teaching and learning activities all speak to one another. Biggs, 1996).

Read more here.

Masters curriculum on Climate Change & Sustainable Development

A consortium of southern African universities, led by ACDI, has developed a Master’s curriculum in Climate Change and Sustainable Development.

The curriculum is available to SARUA member universities to adapt and deliver, either as a self-standing Master’s level course, or as part of an existing course that wishes to bring in strong climate change components. The associated online platform publishes new research in the southern African region, enabling knowledge sharing and supporting a community of practice in the field of climate change and sustainable development.

Read more here.
Ernest Aryeetey

Ernest Aryeetey is the foundation Secretary-General of the African Research Universities Alliance (ARUA), a network of 16 of Africa’s flagship universities. He is a Professor of Economics and former Vice Chancellor of the University of Ghana (2010-2016). He was also previously the Director of the Institute of Statistical, Social and Economic Research (ISSER; 2003-2010) at the University of Ghana and the first Director of the Africa Growth Initiative of Brookings Institution in Washington D.C.

Leigh Cobban

Leigh Cobban is an independent consultant and associate of the ACDI, where she worked as Manager of the Education & Capacity Development Portfolio. Leigh’s work includes a mix of educational research, formal and professional course development, early career researcher development, and building our understanding of best practice in climate change education in Africa. During her four years at ACDI, she has worked on or developed over a dozen projects in these areas, including a scientific capacity development study to inform capacity development in the Future Climate for Africa (FCA) project, and the development of an innovative Masters curriculum in Climate Change and Sustainable Development for Southern Africa. In the ARUA-CD, Leigh leads the Curriculum Working Group. [Link to presentation]

Sunita Facknath

Sunita Facknath, BSc, MSc, PhD (UK), PhD (Mauritius) is a Professor in Sustainable Agriculture and the Dean of the Faculty of Agriculture, University of Mauritius. She has expertise in the field of sustainable agriculture, indigenous knowledge systems, and climate change, and has also worked in the areas of aquaculture and sustainable forestry.

Christopher Gordon

Chris Gordon is the former Director of the Institute of Environment and Sanitation Studies and is the current CDKN Country Engagement Lead for Ghana. He is an environmental scientist with special interests in the biodiversity and functioning of coastal, wetland and freshwater systems, and has many years of experience as a limnologist and aquatic resource management advisor. Over the past three decades he has been involved in developing environmental and natural resource policies in Ghana. He serves on the UNEP World Adaptation Science Programme and is an Earth Commissioner. [Link to presentation]

Christopher Jack

Christopher Jack has a background in computer science and ocean/atmospheric science with particular expertise in high performance computing and computing platforms, and dynamical and statistical modeling and analysis. Over the past 10 years Christopher has also had extensive experience in science-society engagement and communications, and more recently, decision making under uncertainty and multi/trans-disciplinary research. This experience has been developed through a mix of consulting/advisory activities as well as academic research activities in partnerships with a wide network of collaborators across the region and internationally. [Link to presentation]

Marieke Norton

Marieke Norton joined the ACDI as Masters Convener in January 2017. She has a background in Social Anthropology, with a focus on environmental anthropology. Her personal and research interests are on the interactions between humanity and the environment, and the relations between these spheres that sustain shape and change each other. Her research and publications have been specifically geared towards re-thinking the relations between the natural and social sciences, in order to establish modes of collaboration that reframe the issues of climate change and sustainable development as inter-disciplinary projects that support and innovate human and non-human well-being. [Link to presentation]

Mark New

Mark New is the ACDI Director and AXA Research Chair in African Climate Risk. He is also a coordinating lead author on the IPCC 6th Assessment Report, responsible for Chapter 17 of Working Group II (Decision Making Options for Managing Risk), and an editor for Global Environmental Change and Environmental Research Letters. Mark serves on the Science Committees of the World Adaptation Science Programme and the South African Global Change Science Programme. [Link to presentation]
Daniel Olago

Daniel Olago is Associate Professor at the Institute for Climate Change and Adaptation, and the Department of Geology at the University of Nairobi. His current research focuses on the interactions of groundwater, surface water, climate, environment and human linkages with a special focus on eastern Africa. He has been involved in capacity strengthening activities in local, regional and international contexts and for a diverse range of stakeholders from grassroots levels, to management, policy-making groups and government agencies.

George Outa

George Odera Outa is a researcher with over 30 years of teaching experience at undergraduate and postgraduate levels. As an environmental lawyer he has also more recently proposed the imperative of international jurisdiction over national forest management on the basis of Indigenous knowledges and cultures, such as those of the Ogiek of Kenya in the Mau Forest conflict. He is a laureate of the St Andrews Prize for the Environment, and a lecturer at the Institute for Climate Change and Adaptation at the University of Nairobi.

Melanie Skead

Melanie Skead is the Director of the Centre for Teaching and Learning at Stellenbosch University. Previously, she was a Senior Lecturer in the Centre for Higher Education Research, Teaching and Learning (CHERTL) at Rhodes University and Senior Manager of Teaching Development at Nelson Mandela University. She has been working in Higher Education since 1988 and holds a PhD in English and two professional qualifications in education including a Postgraduate Diploma in Higher Education (Academic Development) from Rhodes University. Melanie has been active in academic development since 2003. Her experience in the field spans across student, staff and curriculum development as well as academic leadership at various higher education institutions including Vista University, Fort Hare and Nelson Mandela University and Rhodes University, where she coordinated the National and Rhodes PCDip (HE) and supervised PhD students. Link to presentation

Sheona Shackleton

Sheona Shackleton is the Deputy Director at the ACDI. She also holds an Honorary Professorship with the Department of Environmental Science at Rhodes University. Sheona has worked at the interface between rural development, livelihoods and natural resource use and management for the past 35 years. Her research and postgraduate supervision has covered a diversity of areas within this broad theme such as community conservation, rural livelihoods and vulnerability, ecosystem services and human well-being, forest product use and commercialisation, natural resource governance and climate change adaptation. Link to presentation

Nicholas Simpson

Dr Nick Simpson is a postdoctoral research fellow at the ACDI. He is the Chapter Scientist for Chapter 9 “Africa Climate Change Impacts, Adaptation and Vulnerability” of the IPCC 6th Assessment. Nick’s current research concentrates on the complexity of climate risk, how everyday Africans perceive climate change, energy poverty / access, and security practices at the interface of climate change and conflict. Nick’s previous research has extended security studies to the governance of new ‘Anthropocene’ risks / harms. Link to presentation

Christopher Trisos

Christopher Trisos directs the Climate Risk Lab at the ACDI. The lab integrates data and methods from environmental and social sciences to help inform rapid, just and equitable responses to the climate crisis. Christopher’s current research questions focus on climate change risks to biodiversity and whether ecological disruption from climate change will be gradual or abrupt; climate change risks to the biodiversity of wild-harvested food plants; how climate change impacts the prevalence of infectious disease; whether solar geoengineering increases climate change risks; how to manage risk across interconnected social and environmental systems. Link to presentation

Shem Wandiga

Shem O. Wandiga is Professor of Chemistry at the department of Chemistry, University of Nairobi and has been the Acting Director, Institute for Climate Change and Adaptation until recently. Professor Wandiga was the Principal Investigator in project called ‘Capacity building to evaluate and adapt to climate change-induced vulnerability to malaria and cholera in the Lake Victoria Region under the CEF funded, UNEP executed and START and TWAS implemented project: Assessment of Impact and Adaptation to Climate Change. He was the Coordinator of another CEF funded, UNEP implemented and ACTS executed project on integrating vulnerability and adaptation to climate change into sustainable development policy planning and implementation in eastern and southern Africa. KENYA Pilot Project Design: Increasing Community Resilience to Drought in Makueni District. Link to presentation
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WORKSHOP 1 PROGRAMME

Day 1

Session 1: Welcome and orientation to the workshops
- Overview of ARUA-CD and workshop programme.
- Introductions.
- Breakaway group discussions: what is working well and what is not working well in our climate change Masters curricula.

Session 2: How do we include the latest advancements in climate change research in Africa in our curricula?
*With Dr Nick Simpson*
- Latest research findings and concepts, for example:
  - IPCC AR6.
  - Intersection of climate change with other SDGs.

Day 2

Session 1: How do we incorporate the latest theories and ways of thinking about climate change in Africa in our curricula?
*With Prof Sheona Shackleton*
- Transdisciplinarity (including working with policy makers and practitioners).
- Politics and Power in climate change in Africa.
- SARUA Masters curriculum.

Session 2: What are some of the new tools and approaches for teaching climate change?
*With Dr Chris Jack and Dr Marieke Norton*
- Staying up to date, avoiding fake information.
- Resources available and knowledge systems for climate information and climate change teaching.
- Theoretical and practical challenges of working in cross-disciplinary teaching teams
- New ways of teaching (incl. online, blended, problem-based learning, case studies, short courses).

Day 3

Session 1: How do we undertake the process of reviewing and updating our curricula?
*With Prof Shem Wandiga and Prof Chris Gordon*
- Gathering info to design a new course: learning from PAWES curriculum
- Accreditation and formal review processes.

Session 2: What tools are useful for reviewing and updating our curricula?
*With Dr Melanie Skead*
- Using the DELTA framework to review curricula.

Day 4

Session 1: How can we support one another in keeping our curricula relevant and updated?
- Building a network: research partners, examiners, supervisors.
- Sharing teaching tools (e.g., case studies from across Africa).

Session 2: How can we support one another in keeping our curricula relevant and updated?
- Reflections from the workshop.
- Looking ahead.
WORKSHOP 2 PROGRAMME

Day 1

Session 1: Welcome and orientation to the workshops
With Prof Sunita Facknath
- Welcome, recap and orientation to the workshops.
- Case study of transdisciplinarity in climate change curriculum: Experiences from the University of Mauritius.
- Breakaway group discussions. Sharing a challenge or success of integrating transdisciplinary teaching practice into your curriculum (field trips, integrating multiple disciplines in teaching team, practitioners as teachers or invigilators).

Day 2

Session 1: How do we make a relevant and impactful climate change curriculum?
With Prof Mark New
- Engaging with IPCC AR6 in Teaching.
- Hearing from our graduates: what do they want from climate change curricula?
- Breakaway group discussions. How do you balance content on defining the problem vs finding solutions in your curriculum?

Session 2: How can we support one another in keeping our curricula relevant and updated?
With Ernest Aryeeetey
- Engaging senior leadership at our institutions to support new ways of teaching climate change.
- Deciding on workshop outputs, the list of which includes this report, an information brief, case studies for teaching, guidelines for African climate change curricula, and journal articles on teaching practice.