

Chapter 6

Climate Change Adaptation and Planning Education in Southern Africa



**Abraham R. Matamanda, Jennilee M. Kohima, Verna Nel,
and Innocent Chirisa**

Abstract Cities in Southern Africa are experiencing a rapid rate of urbanisation, which exacerbates the impacts of climate change on cities. The recent droughts and water stress in Cape Town, South Africa and Windhoek, Namibia, impacts of Cyclone Idai that destroyed 90% of Beira city, and recurrent heatwaves are evidence of the impacts of climate change on cities in the region. Planners are responsible for the spatial configuration of spaces and places such that cities are safe, resilient, sustainable, and inclusive; hence planning for climate change is imperative. In this study, we argue that the recurrence of climate change-related disasters in Southern Africa reflects the lack of skills, knowledge and capabilities among planners to integrate climate change adaptation into urban planning processes. Like any other profession, planning practice is informed by education and training of the graduates, which influences their worldview and ideology that they take into the professional world. This study examines the contribution of planning education to climate change adaptation in Southern Africa, using the case of Zimbabwe, South Africa and Namibia. Using content analysis of course syllabi in terms of the pedagogy on climate change adaptation, the study identifies the knowledge, skills, and abilities schools impart to planning students. The study reveals that climate change is recognised as a planning dilemma, but it is yet to be integrated into the planning curriculum and is consequently marginalised.

A. R. Matamanda (✉)

Department of Geography, University of the Free State, Bloemfontein, South Africa
e-mail: matamandaa@gmail.com

J. M. Kohima

Department of Architecture and Spatial Planning, Namibia
University of Science and Technology, Windhoek, Namibia

V. Nel · I. Chirisa

Department of Urban & Regional Planning,
University of the Free State, Bloemfontein, South Africa
e-mail: NelVJ@ufs.ac.za

I. Chirisa

Department of Demography Settlement & Development,
University of Zimbabwe, Harare, Zimbabwe

© The Author(s) 2022

G. Alem Gebregiorgis et al. (eds.), *Planning Cities in Africa*, The Urban Book Series,
https://doi.org/10.1007/978-3-031-06550-7_6

Keywords Urbanisation · Climate change · Adaptation · Planning education · Case study

6.1 Introduction

Climate change impacts on cities have long been recognised as cities increasingly become hotspots for different climate-induced hazards and disasters (Baarsch and Schaeffer 2019). In recent years, the persistent droughts that compromised water security in Cape Town, South Africa, indicate the impacts of climate change on African cities (Scott et al. 2019). In 2019, Cyclone Idai was associated with heavy rains, flooding and landslides that caused immense damage to property, livelihoods and human life across cities in Malawi, Mozambique and Zimbabwe. In Mozambique, 90% of the city of Beira was destroyed, which amounted to millions of dollars lost in infrastructure and services (Shaban 2019). In other cities, heatwaves have become the norm and have been described by Carter (2018) as “a potential silent killer of citizens in African cities”. New diseases and plagues that destroy farmlands have emerged that jeopardise food security, as recently experienced in East Africa (Stone 2020). The events from climate change-induced floods in Durban and destroyed some planned suburbs raise critical questions for professional planners as to how they can best adapt settlements to climate change. Against this background of increasing climate-related hazards and disasters, African cities are rapidly urbanising (Obasanjo et al. 2020). Therefore, planners must adapt cities to climate change to increase the resilience, sustainability and safety of these spaces where an increasing share of the continent’s population will be residing soon.

The role of urban planning in adapting cities to climate has long been acknowledged where climate change is identified as a “super wicked problem” that requires extraordinary skills from planners (Campbell 2006; Lyth and de Chastel 2007; Broto 2014). What remains under-researched from the African context is how planners are trained and equipped to address emerging problems induced by climate change in their professional practice (Davidson and Lyth 2012). Albeit the implications of climate change prevalent in cities, Adelina, et al. (2020) note that it appears that planning education in Africa has not been scaled-up to systematically integrate climate change issues. Watson and Odendaal (2012) have recognised that African cities have changed dramatically and have different problems to combat, including climate change. Hence the need for a change in planning education to address these contemporary challenges.

The need for this change was recognised by participants at the 2010 Association of African Planning Schools (AAPS) Conference where the integration of climate change in planning schools was identified among the key themes, and planning schools were called upon to critically think about enhancing the planning curriculum (AAPS 2010). The major drawback in the existing planning curriculum, which, according to Odendaal (2012), fails to integrate many contemporary planning issues in African cities. The curricula and educational philosophy remain entrenched in the

colonial system. Odendaal (2012: 175) has lamented that “the planning education philosophy and pedagogical approaches in most African planning schools are inherited from the colonialists and in many instances reflect a mismatch between plans, urban space and training of planners”. Planners, who are at the centre of land development processes, are responsible for the spatial ordering of cities and, ultimately, the functioning and form of the city (Giordano et al. 2020).

We explore how planning education in selected planning schools integrate pressing climate change issues based on this background. We undertake a situation analysis and needs assessment of the existing skills, knowledge and capabilities learned in planning education about climate change adaptation, resilience and mainstreaming. We ask the question: How are planners trained to respond to climate change adaptation? Specifically, the study includes the following objectives:

- Identify the modules that focus on climate change.
- Examine the extent to which the identified modules reflect on climate change adaptation.
- Explore the knowledge, skills and abilities relating to climate change adaptation in cities that planning schools are imparting to planning students.
- Assess the scope and content of the curriculum and guidelines for selected modules with regards to climate change adaptation in African cities.
- Analyse the gap in planning education concerning climate change adaptation for African cities.
- Outline lessons for planning education concerning the integration of climate change in African cities.

6.2 Climate Change and Planning Education: A Literature Review

African cities are complex spaces confronted with multiple socio-economic and political challenges (Zellner and Campbell 2015). Climate change adds to these challenges. The realities of climate change for cities and towns have increased the urgency for planners and other professionals to adapt cities to these realities (Blakely 2007). The impact on human settlements, especially the most vulnerable spaces that include informal settlements that the poor inhabit, call for immediate action to promote the liveability of these settlements (Satterthwaite et al. 2020).

It is also interesting that it is not only informal settlements where the poor live that are vulnerable to climate change impacts. The increasing water scarcity in African cities, although arising from other factors such as poor governance, cannot be detached from the effects of climate change. An example is Cape Town in 2018, when the city went dry (Scott et al. 2019). Destruction of key infrastructure as happened in Beira, the burden on taxpayers and the need for adaptation strategies require planning professionals who understand the complex dynamics of climate change and

the consequences of the process (Davidson and Lyth 2012). Therefore, it becomes critical to understand how planners are educated about climate change.

The place of planning education in climate change mitigation and adaptation cannot be underestimated. Scholars are increasingly articulating the nexus between climate change, and university education (Mochizuki and Bryan 2015; Leal Filho 2017; Monroe et al. 2019), resulting in a growing body of knowledge. This has been emphasised internationally through Article 12 of the Paris Agreement that among other issues, encourages governments to enhance climate change education and training (UNFCCC 2015). Moreover, universities are encouraged to create new academic programmes in various disciplines to ensure that future professionals understand the challenges posed by climate change and have the necessary tools to effect successful mitigation and adaptation (UNESCO 2017).

Planning education may be positioned on the first two of the four pillars of education, as shown by Delors (1996). Firstly, Delors (1996) indicated that learning might be undertaken with the objective of knowing—learning to know. In this instance, students are provided with theoretical content that equips them with the knowledge to understand climate change issues and dynamics and how they manifest in cities. The rationale is to ensure that students appreciate the causal factors and the consequences of climate change from a planning perspective. Molthan-Hill et al. (2019) explain that through learning to know, students are also introduced to the tools and strategies that may be used to address different climate change impacts on cities.

Secondly, according to Delors (1996), students may be taught to learn to do so that they can apply their knowledge in a real-world context. This type of learning is the ideal form of education through which skills are turned into competencies. Rather than solely acquiring knowledge, students are trained and educated to become competent professionals with coping skills and the ability to adapt to different situations. This is critical considering that climate change and cities are complex. Hence planners must be trained to understand systems and envision different solutions and future scenarios using essential skills (Molthan-Hill et al. 2019). In this regard, planning education becomes critical and may be enhanced through environmental design, land use planning and environmental planning modules. Studio type of education may also be relevant as it helps bring students in sync with local realities.

Climate change education in planning schools is often based on four approaches outlined by Molthan-Hill et al. (2019). Firstly, climate change education may be through piggybacking, a common approach used in most institutions where some components of climate change are integrated into existing modules or courses. Molthan-Hill et al. (2019) explain that the existing structure of the module or course is not changed; rather, some climate change-related content is added. Secondly, climate change learning may be through mainstreaming, which still involves the integration of climate change content in existing modules and courses, but this is done with a broader cross-curricular perspective. For example, the University of Dar es Salam in Tanzania mandates all students to obtain at least a basic understanding of climate change. Thirdly, there may be specialisation by designing specific climate change-related modules and courses. Climate change may thus be made an elective

course that some students will focus on, while others focus on project management, transport planning or infrastructure planning. Lastly, climate change learning could be implemented through an inter-disciplinary approach adopted such that the modules on climate change may be offered across a particular university or faculty. Thus, climate change is addressed from a multi-disciplinary perspective to allow students to appreciate its complexity and ultimately be better equipped to address its impacts (Molthan-Hill et al. 2019). This may be done so that students appreciate the socio-economic, scientific and political dimensions of climate change.

6.3 Methodology

The study was qualitative and adopted a case study design. Secondary data collection methods were used in this study and included a review of planning courses from selected universities in Southern Africa. Three planning schools were purposively selected to inform this study, namely the University of the Free State (UFS), South Africa; University of Zimbabwe (UZ) and Namibia University of Science Technology (NUST), Namibia. The University of Zimbabwe was selected, because it recently reviewed its curriculum. Hence, it was critical to identify the outcomes of such an assessment and what recommendations were made regarding including climate change content in the curriculum. The modules that focused on climate change, their content and the scope and breadth of the covered issues were determined. Gaps in the planning courses were identified. Using content analysis of course syllabi in terms of the pedagogy on climate change adaptation, the study identified the knowledge, skills and abilities that planning schools imparted to planning students.

6.4 Case Studies

6.4.1 South Africa: University of the Free State

South African cities are vulnerable to climate change, the effects of which are flooding, heatwaves and sea-level rise. The impacts of climate change have resulted in water scarcity in cities such as Cape Town. In contrast, the constantly expanding human settlements in Alexandra, Johannesburg, Cape Town and Durban have been exposed to climate change-induced flooding. The destruction of ecosystem services cannot be understated considering the green initiatives that are imperative to redress climate change.

The Department of Urban and Regional Planning (DURP) at the University of the Free State is one of the planning schools in South Africa that train planners who

are eligible to register as professionals with the South African Council for Planners (SACPLAN)¹ once they have graduated and undertaken the requisite candidacy period (internship). The DURP strives through excellent teaching and scholarship to deliver competent urban and regional planners and research that will contribute to creating sustainable human settlements and improved quality of life, particularly in Africa. The philosophy of the DURP is premised on the need to produce proficient planners who can make a difference to their environment. In this regard, the department has resolved to place “sustainable human settlements” among its research focus. The thrust of this has been on the green agenda with a focus on sustainability, climate change adaptation and mitigation, and resilience as the substantive issues that students should be acquainted with.

To register as a professional planner with SACPLAN, graduates from DURP must pass the Bachelor of Spatial Planning Honours (BSPH) and the Master’s in Urban and Regional Planning (MURP). Once the graduates have been awarded their qualifications, they must complete the necessary practical training stipulated by SACPLAN. The BSPH forms the foundation for professional qualification in the DURP and involves nine modules that cover different aspects of spatial planning. Although there is no single module in the DURP programme that specifically focuses on climate change, climate change is covered in the following modules:

- Research in Environmental Planning,
- Human Settlement Planning,
- Research in Regional Planning Theory,
- Research in Urban Development,
- Basic Practice.

At the Honours level, students are expected to understand the dynamics of climate change and how it is a planning issue. In most modules, several cross-cutting issues such as climate change and informality pertinent to developing sustainable settlements are integrated into the curriculum. The Research in Environmental Planning module addresses ecological and environmental issues in settlement planning and development and includes climate change issues. The other modules mentioned include measures and proposals to deal with climate change. Hence, climate change issues have been integrated into the existing curriculum and become an issue that students are cognisant about in what Delors (1996) calls learning to know. The BSPH also trains the students to apply their knowledge in the real world (Delors 1996). This is confirmed by the objective of the BSPH that seeks to capacitate graduates so that they can practically apply theory in urban and regional planning projects. This is demonstrated by an assignment in the regional planning module that requires students to identify critical environmental issues such as climate change and suggest ways of preventing, mitigating and managing the problems.

¹ The SACPLAN is the statutory council established within the Planning Profession Act, 2002 (Act 36 of 2002) whose sole purpose is to regulate the planning profession based on certain terms and conditions.

The MURP also has various modules that adopt the piggybacking approach to climate change education. Climate change is integrated into modules that include geographic information systems for planners. The focus of the modules is to capacitate learners with technical skills critical in climate change intervention, as mapping usually enables the understanding of the impacts of certain hazards such as floods. In this regard, one of the assignments for this module, tasked students to “Create a map that contains a Spatial Development Framework proposal for Mangaung, as one of Mangaung’s proposals, entails reinforcing climate policy objectives through green interventions and protecting the environment”. In the Theory of Planning module, students are introduced to different planning theories and emerging concepts in urban planning. Climate change features as a cross-cutting issue, which is discussed in one of the study units where students are familiarised with different substantive issues in planning, such as resilience and sustainability. This particular module focuses on raising awareness of the impacts of climate change. Moreover, the Urban Research Project module also addresses issues in climate change as it identifies it as a critical urban issue that requires the attention of planners. For example, an assignment the students were given read: “effectively link economic, environmental and social aspects in relation to sustainable urban planning and urban management: explain how these issues, as well as climate change, have been integrated into the SDF (Spatial Development Framework) of Mangaung”.

6.4.2 Zimbabwe: University of Zimbabwe

Urban and Regional Planning, as a discipline, is currently offered at the UZ, Great Zimbabwe University (GZU), and Lupane State University (LSU). In 1984, the Department of Rural and Urban and Regional Planning (DRUP) was formed, supported by the government, at the University of Zimbabwe and the Institute of Social Studies (ISS) in the Netherlands, which was willing to fund research and the teaching in aspects of rural development within the Faculty of Social Studies. The initial core areas of research and teaching in the DRUP were in 1988, when the department had its first undergraduate enrolments. At the time, the degree programme was centred on modules consisting of a combination of aspects of sociology, urban design, architecture, planning, real estate, quantity surveying, engineering, project planning and management, environmental systems, transport planning and management, and professional planning.

The foregoing historical background to the planning discipline and profession in Zimbabwe is necessary to understand how the subject of climate change has either been absorbed or ignored in certain courses/modules of the curriculum. The courses can be clustered in five categories:

- *Environment-oriented cluster* begins with understanding environmental processes and systems and tapers towards why planners should understand how their

designs impact the environment and how the environment (climate, geology, geomorphology, soils, ecology and hydrology) may impact on the designs.

- *Design-oriented cluster*, which covers aspects of urban and environmental design theory and entails studio design: the design of the outdoor to include both soft and hard landscapes, adequate stormwater drainage, the inclusion of trees not only for ornamental purposes but functional purposes such as shade and reduction of floods.
- *Circulation and service-oriented cluster*, focusing on how services (water, sewer, transport, power and construction) within a planned system environment are provided, managed and disposed of.
- *Theoretically oriented cluster*, which seeks to offer multi-perspectivity as to how and why certain development happens or fails to happen in spaces with or without plans. The various perspectives are sub-clustered in environmental, engineering, philosophical, political, economic, technological and professional, to name but a few. In this cluster, planning theory, planning thought and professional practice feature directly as modules that seek to offer explanations and achieve understanding.
- *Research and policy cluster* acknowledges that planning as a continuous process thrives with emerging data generated by responding to a policy environment created by local, central and international governing bodies.

This clustering is not, per se, a smooth and simply defined parameterisation as there are overlaps between them. In creating a graduate planner, several of the courses emphasise the subject of climate change differently while others become almost silent on the subject. When layout planning is done in the design-oriented cluster, the emphasis on climate is quite clear and obvious. For example, in designing road width, the road should be wide enough to accommodate stormwater drains, which can be used to channel water as quickly as possible. Road designs should also allow for soft landscaping that acts as a sustainable urban drainage system, enhancing or allowing for natural drainage to replenish underground water sources.

Climate change features as a subtopic in the Environmental Systems, Environmental Planning, Urban Development and Management and Urban Policy and Planning courses offered by the Zimbabwean universities. Climate change is perceived as already affecting Zimbabwe and its urban areas. Urban and regional planning greatly influences some of the critical climate change mitigation strategies, such as energy efficiency at different scales, sustainable urban mobility (walkability and mass transportation) and carbon sinks through green infrastructure. Urban and regional planning also plays a vital role in building resilience in climate change by creating a resilient urban environment, which can be through promoting density, diversity and connectivity in urban areas.

In Project Planning and Management, Quantitative Techniques and Planning Techniques and Methods, climate change is barely seen in the curricula. Lecturers acknowledged that there is little awareness of climate change and its impacts on the

general population. They acknowledged that local authorities should be at the forefront in promoting climate adaptation and mitigatory measures in cities. However, little is known about the efforts that these municipalities are taking.

In the teaching of Quantitative Techniques, it is possible to employ quantitative techniques in decision-making and use relevant illustrations in linear programming. The same can also be said for the teaching of Planning Techniques and Methods, as research methods used in planning are part of the aspects covered. The teaching of Project Planning and Management involves students understanding the project planning cycle and project management techniques. Projects are affected by climate change; hence there is a need to understand the application of climate adaptive projects. Therefore, there is an apparent need to include climate change aspects in the course.

In the teaching of the ArcGIS and Remote Sensing mapping in planning and development, climate change is acknowledged as a phenomenon that needs to be well understood as it affects all facets of life and needs to be factored into all planning and development phases. It is an issue, because all plans for development and management should encompass ways of adapting to climate change, reducing the negative impact of climate change, heightening positive impact and developing without accelerating climate change. Understanding the occurrence and effects of climate change through change analysis from high-resolution remote sensing images using different ArcGIS software is essential.

The development planning module stresses the master plans, development plans, sectoral development and development change. There is a strong relationship between climate change and development. Climate change is a game-changer in the zonation of land uses and design of buildings, especially in urban areas.

Planning techniques and methods, project planning and development, development planning, research methods and statistics, development and governance, property management and property valuation should all consider the influence of climate change. Climate change is both a planning and real estate issue. It is a planning issue because planning does not occur in a space or a vacuum, but in an environment influenced by climate change. For example, the physical environment has changed because of climate change, which has implications for spatial planning (place-making). It is a real estate issue in the sense that the way buildings are designed needs to consider issues of sustainability, which includes energy saving in the form of green buildings. This also implies that the materials to be used should be environmentally friendly and meet climate change demands. Nevertheless, some students view climate change as an area to be studied mainly in the department of geography. Some may not understand the implications of climate change to the planning fraternity.

6.4.3 *Namibia: Namibia University of Science and Technology*

Namibia is considered one of the countries most vulnerable to climate change, due to its very dry semi-arid to desert nature (Reid et al. 2008: 453; Tervo-Kankare et al. 2018: 274). The frequency of droughts will thus increase with predictions of water shortages in urban areas. The lack of or limited financial resources, skills and technologies, and high levels of poverty contribute to the vulnerability of Namibia to the realities of climate change. Thus, Namibia developed a national policy framework to mitigate and adapt to the adverse effects of climate change on the environment. Like many cities of the developing world, the rapidly growing city of Windhoek battles with the impacts of climate change such as rising temperatures, falling dam levels and erratic rainfall, which has led to both droughts and flash floods (Van Rensburg 2016: 623; Scott et al. 2018: 6). The high level of urbanisation and the proliferation of informal settlements in the city are possible contributing factors. Windhoek is expected to face even greater droughts, floods, biodiversity loss and water supply depletion. Hence, the city of Windhoek developed its Integrated Climate Change Strategy and Action Plan to facilitate its response to climate change (Stockholm Environment Institute 2018: 36–37). This strategy is developed in line with and to support the National Policy on Climate Change and the National Climate Change Strategy and Action Plan.

The Department of Architecture and Spatial Planning at the Namibia University of Science and Technology (NUST) was established upon the transformation of the university from the Polytechnic of Namibia. The Department of Architecture was formerly under the School of Engineering. The Section of Land Use Planning was formerly under the Department of Land Management, which was created in 2012. It is the only department offering planning education in Namibia and focuses on an integrative, transdisciplinary understanding of the urban environment. It is considered as the driver of change to overcome apartheid planning. It also revised local standards and regulations to align with contemporary issues and challenges by providing the industry with relevantly skilled, knowledgeable and competent young professionals. The department has seen a steady increase in the student population interested in the profession for rural and urban development and planning streams. The Town and Regional Planning Honours degree offered at NUST is professionally accredited by Namibia Council of Town and Regional Planners and Namibia Institute of Town and Regional Planners. These two bodies extensively influence the content of courses offered in spatial planning.

The department understands its important position as the only planning school in Namibia and the requirement to create and instill awareness and understanding of climate change in the built environment among the students. It offers various graduate courses focusing on environmental and climate-related research and teaching in its programme. Climate change is highly integrated into the curricula. The Advanced Theory of Urban and Regional Planning course includes a unit on climate change. The Environmental Planning course covers multiple topics such as air pollution

problems and solutions, climate change causes, evidence, trends and solutions at various levels. Sustainable Settlement Planning entails exploring the blue and green economies for sustainable planning. To graduate multi-skilled built environment professionals with the town and regional planning and regional and rural development specialisations, the curriculum for Town and Regional Planning focuses on teaching climate change implications in land use, urban resilience, sustainability, environment and development. The Regional and Rural Development curriculum looks more into understanding and solving the complex problems resulting from climate change through learning practically and theoretically about climate change.

Over the years, planning educators at NUST observed the depth of students' knowledge about climate change adaptation in cities through class dialogues, discussions and participation. The sophistication of analysis while exploring climate change adaptation in cities is evident through assessments. Educators referring to SDG Goal 11 "*Make cities inclusive, safe, resilient and sustainable*" and other development and climate change goals ensure that students apply critical thinking and problem solving while reacting to climate change challenges of urban areas in Namibia and Africa.

The current curriculum offers at least 22 out of 82 courses on climate change and climate change adaptation to a greater and lesser extent through its undergraduate and postgraduate programmes. This translates to 27% of the Bachelor and Bachelor Honours in Town and Regional Planning courses. Bachelor Honours of Regional and Rural Development includes climate change-related content as well. Courses such as Integrated Environmental Management, Environmental Planning and Natural Resources, and Sustainable Development offered to undergraduates cover climate change and related thematic areas extensively within the local and global context. Additionally, the students are encouraged to consider research topics linked to climate change, adaptation and mitigation and sustainability, through courses such as Planning Theory, Sustainable Local Economic Development, Rural Development Methods and Practice, Spatial Planning Practice and Mini-theses. Students in the department have already produced mini-theses with climate change topics in both streams over the past years.

Through the 22 courses identified as covering climate change adaptation directly or indirectly, students are introduced to intermediate knowledge, skills and abilities to contribute to a climate change adaptation discussion on urban areas. There are 14 courses, seven courses each within the programmes of Town and Regional Planning and Regional and Rural Development. Climate change is covered in three courses in both the Town and Regional Planning Honours and the Regional and Rural Development Honours. They cover introductory information on climate change in the global and Namibian context, then move on to impacts, adaptation and mitigation measures. They also cover the nexus between natural resources and climate change. A mini-thesis research topic from 2018 dealt with the "*Evaluation of Spatial Planning Adaptation Measures for Sea Level Rise in Langstrand, Walvisbay*".

6.5 Discussion and Conclusion

The universities discussed above demonstrate that climate change is recognised. It has been observed that climate change is recognised as a planning issue that students must understand its manifestation and its impacts and ways to mitigate and adapt cities and regions to the mounting problems. As part of the accreditation of any South African planning programme, SACPLAN requires among other things, that the curriculum include setting standards and competencies (SACPLAN 2014). While these competencies require planners to know and apply concepts to sustainable cities and regions, climate change is not specifically mentioned (Lewis and Nel 2020). Thus, there is no explicit requirement for South African planning programmes to stress climate change. Hence, issues related to climate change are usually subsumed into other modules, and the emphasis thereon depends on the planning school's focus. This is in line with the AAPS calls for climate change to be included in planning courses. Still, it does not feature as centrally as aspects such as informality. Instead, it is rather included in various guises within the curricula, not only in South Africa but also in the UZ and NUST.

All three planning schools recognise the realities of climate change and how it manifests as a planning issue. In this regard, climate change has been integrated into the respective curricula but mainly through a piggybacking approach. This approach involves learners being introduced to climate change and increasing their awareness of the realities of the challenges posed by this problem. There is also some effort made to equip the students with the skills to address climate change issues in real life as evident from the ArcGIS modules at the UFS and UZ, which require students to make simulations of real-life incidences and how they may inform policy. Such an approach exemplifies what Delors (1996) terms "learning to do", which betters the more passive "learning to know".

However, given the wide-ranging and increasingly devastating effects of climate change on cities, health, livelihoods and lives, climate change needs more attention within the planning curricula. The knowledge of climate change, its various impacts and relevant regional predictions must become more prominent, and more attention must be given to preventing, mitigating and coping with the effects of climate change in urban, regional and rural planning and management. This should better the existing piggybacking that characterises the existing planning education. It is suggested that climate change should be introduced as a standalone module, which is compulsory for all students. This would also require the teaching staff to be capacitated in climate change issues and necessitate them to understand the dynamism of climate change that transcends across disciplines and must be approached from different worldviews and contexts.

References

- AAPS (Association of African Planning Schools) (2010) Summary of discussion and proceedings of the 2010 AAPS Conference: Revitalising planning education in Africa. 5th to 8th October 2010 Coral Beach Hotel Dar es Salaam Tanzania
- Adelina C, Archer D, Johnson O, Opiyo RO. (2020) Governing sustainability in secondary cities of the Global South. SEI Report, July 2020. Stockholm Environment Institute, Stockholm
- Baarsch F, Schaeffer M (2019) Climate change impacts on Africa's economic growth. Africa Development Bank, Abidjan
- Blakely EJ (2007) Urban planning for climate change. Lincoln Institute of Land Policy, Cambridge, MA
- Broto V (2014) Planning for climate change in the African city. *Int Dev Plan Rev* 36(3):257–264
- Campbell H (2006) Is the issue of climate change too big for spatial planning? *Plan Theory Pract* 7(2):201–230
- Carter S (2018) Heatwaves could become a silent killer in African cities. African Climate & Development Initiative, 30 November. Available at <http://www.acdi.uct.ac.za/news/heatwaves-are-silent-killer-african-cities>. Accessed 21 July 2020
- Davidson J, Lyth A (2012) Education for climate change adaptation—enhancing the contemporary relevance of planning education for a range of wicked problems. *J Educ Built Environ* 7(2):63–83
- Delors J (1996) Learning: the treasure within. Report to UNESCO on the International Commission on Education for the Twenty-first Century. UNESCO, Paris
- Giordano R, Pilli-Sihvola K, Pluchinotta I, Matarresse R, Perrels A (2020) Urban adaptation to climate change: climate services for supporting collaborative planning. *Clim Serv*. <https://doi.org/10.1016/j.cliser.2019.04.004>
- Leal Filho W (2017) Climate change research at universities addressing the mitigation and adaptation challenges. Springer, Berlin
- Lewis M, Nel V (2020) Setting standards and competencies for planners. In: Silva CN (ed) Routledge handbook of urban planning in Africa. Routledge, London/New York, pp 162–176
- Lyth A, de Chastel L (2007) Shifting towards sustainability: education for climate change adaptation in the built environment sector. *Australian Planner* 44(3):12–14
- Mochizuki A, Bryan A (2015) Climate change education in the context of education for sustainable development: rationale and principles. *J Educ Sust Develop* 9:4–26
- Molthan-Hill P, Worsfold N, Nagy GJ, Leal Filho W, Misfud M (2019) Climate change education for universities: a conceptual framework from an international study. *J Clean Prod* 226:1092–1101
- Monroe MC, Plate RR, Oxarart A, Bowers A, Chaves WA (2019) Identifying effective climate change education strategies: a systematic review of the research. *Environ Educ Res* 25(6):791–812
- Obasanjo O, Pinzó JC, Mills G, Hartley R, Hamukoma N, Calburn, Doyle N, Games D, Muzanda A, van der Merwe E, Kilcullen D, Davis D (2020) Future of African cities project. Special report—January 2020. Where the rubber hits the road. The Brenthurst Foundation, Johannesburg
- Odendaal N (2012) Reality check: planning education in the African urban century. *Cities* 29(2012):174–182
- Reid H, Sahlen L, Stage J, Macgregor J (2008) Climate change impacts on Namibia's natural resources and economy. *Clim Policy* 8:452–466
- SACPLAN (South African Council for Planners) (2014) Guidelines for competencies and standards for curricula development. Midrand. <https://sacplan.org.za/wp-content/uploads/Competencies-Guidelines.pdf>
- Satterthwaite D, Archer D, Colenbrander S, Dodman D, Hardoy J, Mitlin D, Patel S (2020) Building resilience to climate change in informal settlements. *One Earth* 2(2):143–156
- Scott D, Davies H, New M (eds) (2019) Mainstreaming climate change in urban development: lessons from Cape Town. UCT Press, Cape Town
- Scott D, Ipinge KN, Mfuno JKE, Muchadenyika D, Makuti OV, Ziervogel G (2018) The story of water in Windhoek: a narrative approach to interpreting a transdisciplinary process. *Water* 10(1366):1–16

- Shaban ARA (2019) 90% Of Mozambican city of Beira destroyed by Cyclone Idai—Red Cross. Africa News, 18 March, 2019. Available at: <https://www.africanews.com/2019/03/18/90-percent-of-mozambican-city-of-beira-destroyed-by-cyclone-idai-red-cross/>. Accessed 21 July 2020
- Stockholm Environment Institute (2018) From policy to practice—Annual report 2018. The Stockholm Environment Institute, Stiftelsen
- Stone M (2020) A plague of locusts has descended on East Africa. Climate change may be to blame. National Geographic, 14 February 2020. Available at: <https://www.nationalgeographic.com/science/2020/02/locust-plague-climate-science-east-africa/>. Accessed 21 July 2020
- Tervo-Kankare K, Saarinen J, Kimaro ME, Moswete NN (2018) Nature-based tourism operators' responses to changing environment and climate in Uis Namibia. African Geographical Review 37(3):273–282
- UNESCO (United Nations Educational, Scientific and Cultural Organization) (2017) UNESCO at COP23. Climate change education. Available at: <http://unesdoc.unesco.org/images/0026/002600/260083e.pdf>. Accessed 22 August 2020
- UNFCCC (United Nations Framework Convention on Climate Change) (2015) Paris Agreement. Available at: http://unfccc.int/paris_agreement/items/9485.php. Accessed 22 August 2020
- Watson V, Odendaal N (2012) Changing planning education in Africa: the role of the Association of African Planning Schools. J Plan Educ Res 33(1):96–107
- Van Rensburg P (2016) Overcoming global water reuse barriers: the Windhoek experience. Int J Water Resour Dev 32(4):622–636
- Zellner M, Campbell SD (2015) Planning for deep-rooted problems: what can we learn from aligning complex systems and wicked problems? Plan Theory Pract 16(4):457–478. <https://doi.org/10.1080/14649357.2015.1084360>

Abraham R. Matamanda graduated from the University of Zimbabwe with a B.Sc. (Hons) in Rural and Urban Planning and an M.Sc. in Social Ecology. He holds a Ph.D. in Town and Regional Planning from the University of the Free State (UFS). Abraham lectures in the Department of Geography at UFS. His current research focuses on climate change adaptation, informal urbanism, medical geography and political economy. Abraham has presented his work at international conferences and contributed to national and international peer-reviewed journals. Among his recent publications is a book he co-edited: *Urban Geography in Postcolonial Zimbabwe: Paradigms and Perspectives for Sustainable Urban Planning and Governance*

Jennilee M. Kohima lectures in the Department of Architecture and Spatial Planning at Namibia University of Science and Technology. She obtained her M.Sc. in Land Management and Land Tenure from TU Munich in Germany and a Master of Urban and Regional Planning from the University of the Free State (UFS). She has over 10 years of work experience in the public, private, development and academic sectors in various development and planning fields. She is currently a Ph.D. candidate at UFS, and her research interests are around issues of urban informality, land use management, bottom-up planning and planning education

Verna Nel qualified as a town and regional planner at Wits University and obtained her M.Sc. and Ph.D. through University of South Africa. After three decades of working primarily for municipalities, she moved to the Urban and Regional Planning Department of the University of the Free State. She has diverse research interests that include spatial and urban resilience, local economic development and spatial governance. She has presented her work at international conferences and has published her research in leading journals and books

Innocent Chirisa is a Professor of Urban and Regional Planning in the Department of Demography Settlement and Development at the University of Zimbabwe. He is also a research fellow in the Department of Urban and Regional Planning at the University of the Free State in South

Africa. Currently, Prof. Chirisa is serving as Dean of the Faculty of Social and Behavioural Sciences at the University of Zimbabwe. His research interests are environmental systems, human settlements planning and resilience. To date, he has written 20 books, more than 80 book chapters and over 100 articles for peer-reviewed journals

Open Access This chapter is licensed under the terms of the Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0/>), which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

