

# Assessing the integration between disaster risk reduction and urban and regional planning curricula at tertiary institutions in South Africa



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Urban areas are increasingly being affected by more frequent and severe disasters. It has been argued in theory and international development policy that the integration of disaster risk reduction (DRR) within existing urban planning (UP) curricula would greatly benefit efforts to build resilient urban environments. However, the current status quo and progress of this crucial transdisciplinary integration in the South African University context remain unclear. Through the application of an exploratory mixed method research design, this article established that UP lecturers at South African universities have a good grasp of the theoretical need for the integration of DRR into existing curriculums and have also tentatively started to integrate DRR into some of their modules. However, because of challenges such as full curricula, financial and human resources constraints and integration predominantly happening on postgraduate level, integration has not occurred in sufficient depth while also missing the opportunity to expose the majority of the student cohort and future urban planners to much-needed DRR knowledge.

**Transdisciplinary contribution:** This article illuminates the current status of integration across and collaboration between DRR and UP at selected South African Universities.

**Keywords:** urban and regional planning; disaster risk reduction; urban planning; curriculums; transdisciplinary integration; universities; South Africa.

## Introduction

Urban areas are becoming increasingly vulnerable to disaster risks because of population growth, climate change and urbanisation.<sup>1,2</sup> These risks *inter alia* include seasonal flooding, veld and informal settlement fires, droughts, mining accidents, oil spills and epidemic disease outbreaks that severely affect communities.<sup>3,4</sup> The increase in build-up infrastructure and densification in densely populated urban areas is directly linked to climate change that in turn is partially responsible for an increase in urban disaster risks.<sup>1,5</sup> Urban disaster risk is also increased by the proliferation of vulnerable communities in urban spaces who lack the socio-economic, political and environmental capital to deal with the impacts of disasters using their own resources.<sup>6</sup> Existing levels of socio-economic vulnerability and exposure to environmental hazards are contributing to many urban environments not being resilient to current and future disaster risk.<sup>7</sup> In the context of ever-increasing urban disaster risk, it is becoming increasingly important to strengthen structural and non-structural disaster risk reduction (DRR) interventions that contribute to building urban disaster.<sup>5</sup> According to Boshier et al.,<sup>8</sup> the integration and collaboration of DRR into urban planning (UP) curricula represent a non-structural intervention that may well contribute significantly to reducing the manifestation and impact of urban disasters.

The need to integrate the two fields has been widely debated in academic scholarship and policy considerations, and has been campaigned for since the early 2000s.<sup>9,10</sup> Research that was conducted by Walmsler<sup>10</sup> with staff from international developmental agencies, non-governmental organisations (NGOs) and academics working in the fields of disasters and UP from across the globe found that often developmental agencies involved in either UP or DRR do not adequately integrate solutions related to these interrelated fields in their project planning and implementation. This leads to solutions that do not holistically address the increase in urban disaster risk. The necessity of looking at improving this transdisciplinary integration<sup>i</sup> is especially relevant for developing countries with high urbanisation rates and densely populated areas. The adverse impact of disasters on South African cities has been concerning, since the majority of economic,

i. Integration refers to the transdisciplinary integration across, and collaboration between, the two distinct disciplines, that is, DRR and UP, to address and find solutions for complex problems like urban disaster risk.

social and political activities that ensure the stable functioning and sustainable development of the country occur in these urban areas.<sup>11</sup> The importance of investigating how closer collaboration can be established between the DRR profession and urban planners seems to be a step in the right direction of planning for resilient cities.

In view of the need for closer integration between DRR and UP and subsequent benefits for addressing urban disaster risks by proactive UP, it is alarming that the issue of DRR and the role of planning is not particularly stipulated as part of the guidelines for core competencies and curricula development at South African tertiary institutions that offer planning qualifications.<sup>4</sup> It can be argued that two of the core competencies for planners namely, 'Planning for sustainable cities and regions' and 'Environmental planning' can encapsulate planning to prevent disaster risks, although it is not explicitly stated.<sup>4</sup> Currently, it is unclear to what extent DRR is included in planning curricula at South African tertiary institutions. This article investigates the current status quo relating to the integration of DRR into UP curricula at South African Universities. As a point of departure, the article looks at the theoretical and policy arguments advocating for the transdisciplinary integration of DRR in UP.

## Literature review

A scoping review of existing literature on the need and possibilities to integrate DRR and UP has revealed a strong campaign for advocating the integration and collaboration of these two disciplines on both the level of academic scholarship and a policy and legislative level. These two perspectives are unpacked in the first two sections of the literature review, while the challenges of the proposed integration are discussed in the third section. The literature review concludes with the role and mandate of higher education institutions (particularly universities) in this movement towards an integrated approach.

### Campaigning for integration: An academic scholarship perspective

Various authors such as Pelling,<sup>12</sup> Pelling and Wisner,<sup>13</sup> March and Kornakova<sup>14</sup> and Galasso et al.<sup>15</sup> have recognised UP as a key element of DRR. Etinay et al.<sup>16</sup> argue that UP is ideally placed to address the underlying drivers of disaster risk in urban areas because of the nature of UP that deals with spatial solutions to address rapid urbanisation, environmental degradation, poor urban governance and socio-economic inequality. According to Léon and March,<sup>17</sup> the increased occurrence of disasters in urban areas has necessitated the need to integrate DRR into UP. Barton and Tsourou<sup>18</sup> and Etinay et al.<sup>16</sup> point towards the dangers of poor UP, especially in the case of poor infrastructure planning and lack of integrated economic development, that may be conducive in creating environments that are susceptible to disaster impacts. Furthermore, Perrow<sup>19</sup> and Elmqvist et al.<sup>20</sup> agree that sound UP may well play an active role in reducing

disaster vulnerability and reducing disaster exposure of urban communities. Urban planning that is cognisant of its ability to address the structural drivers of disaster risk is better placed to decrease future disaster impacts.<sup>10,21</sup> One example of proactive utilisation of UP as a preventative strategy in reducing disaster risks is through the rearrangement of land uses and the adjustment of spatial arrangements and functions in order to assist with mitigating the proximity of residential areas and infrastructure to hazards, and reduction of socio-economic vulnerabilities.<sup>17</sup> Chmutina et al.<sup>22</sup> agree that DRR infused spatial planning helps to regulate long-term use of space and minimise human-induced threats and exposure to natural hazards. From a theoretical perspective, understanding the significance of integrating DRR into UP seems to be crucial for fostering resilience and mitigating the adverse impacts of disasters in urban areas.

There are several benefits to the integration between UP and DRR. Rivera and Wamsler,<sup>23</sup> and Etinay et al.<sup>16</sup> highlight that UP can play a major role during disaster recovery and reconstruction by helping to develop more resilient urban environments through the strategic planning of towns and cities that are planned in such a way that the underlying drivers of disaster risk are eliminated. According to Sagar<sup>24</sup> and Leon and March,<sup>17</sup> UP has over the decades developed a plethora of technical (i.e. engineering and technology) and non-technical (e.g. policies, training and awareness programmes) approaches to assist in creating safe and prosperous urban environments. Drawing on this existing body of knowledge will allow for the emergence of DRR interventions that are more holistic in their ability to address urban-specific disaster risks. The integration between DRR and UP could also contribute to relieving the economic pressure of disasters on society. According to Rivera and Wamsler,<sup>23</sup> the economic cost of disasters will continue to rise in the future, unless risk reduction measures are instituted. From an economic perspective, creating sustainable spatial environments from the start is better than adjusting and repairing them after the disaster.<sup>25,26</sup> The integration between UP and DRR is also said to play a fundamental role in the creation of disaster resilient urban environments by establishing building standards, improving access to basic services and infrastructure, reducing hazard exposure, and overall levels of socio-economic vulnerability.<sup>14,24</sup>

### Campaigning for integration: A policy and legislative perspective

In the realm of international policy, there is an urgent need to prioritise the integration of DRR into UP, as it plays a vital role in ensuring sustainable development, enhancing global resilience, and achieving the targets set by international agreements and frameworks. Since the early 1990s, several policies have supported this integration, including the Yokohama Strategy and Plan of Action for a Safer World (1994); the UN Declaration on Cities and Other Human Settlements in the New Millennium (2001); Johannesburg Plan of Implementation (2002), and The Future

We Want-Rio+20 (2012). However, the emphasis on integration seems to have intensified in policies related to the United Nations' (UN) 2030 development agenda.<sup>27,28</sup> The primary document in this instance, the Sustainable Development Goals (SDGs) makes specific provision under SDG 11 for the development of sustainable cities and communities. Through this goal, the UN envisions a future where urban settlements are safe, inclusive, sustainable and resilient by 2030, especially by emphasising the following:

By 2030, significantly reduce the number of deaths and the number of people affected and decrease the economic losses relative to gross domestic product caused by disasters, with focus on protecting the poor and people in vulnerable situations (SDG 11.5).<sup>30</sup>

Consequently, to achieve this sub-goal of SDG 11, a logical course would be to strive for greater integration between DRR and UP, and combine the various strategies and techniques within the two fields of study and practice to address the systemic drivers of disaster risk and exposure in urban environments.<sup>16</sup>

The need to integrate DRR into UP is also alluded to in various parts of the *Sendai Framework for Disaster Risk Reduction 2015–2030* (SFDRR), which serves as the guiding global policy on DRR.<sup>29</sup> For instance, paragraphs 24(g) and 24(l) of the SFDRR both advocate for the need to build an understanding of disaster risk among key developmental stakeholders and sectors (e.g. UP) by integrating DRR education into existing student and professional development pathways. Additionally, paragraph 27(d) of the SFDRR speaks directly to how UP can assist in improving the governance of disaster risk in built up areas by ensuring the compliance with regulations (e.g. building codes) and approaching land use planning through a DRR lens. Finally, paragraph 30(f) of the SFDRR highlights the potential benefits of integrating DRR and UP by arguing that integrating disaster risk assessment into land use policy development and planning of the built environment would allow for the development of a more resilient urban environment, that take note of all the disaster risk and how those disaster risk may change because of factors such as climate change and environmental degradation.

The need to integrate DRR and UP is also strongly alluded to in the New Urban Agenda (NUA)<sup>30</sup> of UN-Habitat. The vision of the NUA is to promote urban environments that are inclusive, free of discrimination, just, safe, healthy, accessible, affordable, resilient and sustainable with a view to ensuring intergenerational prosperity and quality of life. To achieve this lofty goal, it is envisaged under paragraph 13(g) that existing and future urban developments should 'adopt and implement disaster risk reduction and management, reduce vulnerability, build resilience and responsiveness to natural and human-made hazards and foster mitigation of and adaptation to climate change'.<sup>30</sup> Paragraphs 77 and 101 envision the specific roles that UP can play in achieving the goals of the NUA and building more resilient urban environments including, development of quality

infrastructure, increasing the use of spatial planning that incorporates ecosystem-based approaches, slum upgrading and rehabilitation, promoting measures such as strengthening and retrofitting of risky housing stock, integrating DRR and climate change adaptation measures into territorial development planning.

In South Africa, the integration of DRR and UP is a critical aspect of policy implementation, aiming to create sustainable and resilient cities. The Spatial Planning and Land Use Management Act (SPLUMA) plays a significant role in guiding this integration. The Act refers to the importance of incorporation of risk reduction measures into land use planning and development processes with the preparation of SDFs (Spatial Development Frameworks).<sup>31</sup> Further to this, it recognises the need to identify and mitigate risks associated with specific spatial patterns and growth in urban areas in Section 12 (1) (j).<sup>31</sup> By doing so, the SPLUMA enables the implementation of measures to reduce vulnerability and strengthens resilience. Therefore, the integration of disaster risk assessments, hazard mapping and emergency response planning into planning frameworks is promoted. It is clear that DRR and UP have similar objectives and mutually reinforcing benefits that would contribute towards improving sustainable economic development, social protection, and service delivery within urban environments.<sup>17</sup> These aims are more likely to be accomplished if the two fields were to converge.<sup>32</sup> The importance of integration has been recognised by international organisations and national governments. However, even with the benefits of integrating the two fields, there are still challenges in achieving the integration between the two fields.<sup>33</sup> Some of the major challenges are briefly alluded to in the section that follows.

## Unpacking the challenges towards integrating disaster risk reduction and urban planning

Some of the most common challenges in integrating DRR into UP relate to prevailing perspectives on and misconceptions between UP and DRR, lack of practical experience in the management of disasters, and research and training gaps between the fields. These are briefly discussed below.

### Prevailing perspectives on and misconceptions between urban planning and disaster risk reduction

León and March<sup>17</sup> argue that one of the major impediments to integrating DRR and UP is the lack of clarity on who is responsible for managing disaster risk. Boshier<sup>34</sup> argues there is a general lack of awareness among UP stakeholders' about their roles and responsibilities in the activity of DRR. According to Wamsler,<sup>10</sup> UP stakeholders have indicated that they do not feel that certain non-structural and small-scale risk reduction measures (e.g. disaster risk assessment) are necessarily their responsibility. This position by urban planners is problematic, for if disaster risk assessment and subsequent risk reduction strategies are to holistically address disasters, expertise and knowledge from various technical fields including UP are required at all stages.

The position also greatly limits the exchange of ideas and concepts that would promote greater integration between the fields. Pelling<sup>12</sup> and Nguyen et al.<sup>35</sup> also indicated that urban planners are reluctant to engage with disaster risk management (DRM) concepts and policies, as these are considered as additional restrictions on land use planning and urban development that could hinder economic growth opportunities.

According to Sagar,<sup>24</sup> there is also a fundamental misunderstanding among the DRR fraternity about the value UP can add to the management of disasters. Specifically, the notion exists that UP strictly consists of physical approaches to developing urban environments such as engineering, rather than to being able to address socio-economic drivers of vulnerability. This misconception persists, in spite of observations by Etinay et al.<sup>16</sup> that UP is ideally placed to assist in addressing the underlying drivers of disaster risk in urban areas. Because of these misconceptions about the fields of UP and DRR, practitioners in the fields often work in silos and do not do enough to integrate the two fields in practice.

#### **Lack of practical experience in the management of disasters**

Chmutina et al.<sup>22</sup> indicate that although international policies call for multi-stakeholder involvement in DRR, the reality is that outside disaster management departments, very few other departments (e.g. UP) have practical experience in dealing with disasters and how to reduce disaster risk. Consequently, Boshier<sup>34</sup> observes that there is an insufficient understanding of the practical use of DRR for achieving resilient built environments. The lack of practical experience and involvement in the management of disasters further discourages the integration between DRR and UP. It is argued in this case that the main reason for the lack of experience and knowledge about DRM among urban planners revolves around the fact that the 'Guidelines for Competencies and Standards for Curricula Development'<sup>39</sup> does not directly link UP to DRM. The 13 competencies for planners include specific knowledge fields<sup>ii</sup> that do not directly imply the link with DRM but are left for interpretation. Other reasons for this lack may well include *inter alia*: (1) urban planning departments and disaster management agencies working in silos instead of sharing knowledge that has resulted in a lack of cross-disciplinary understanding and skills development; (2) the lack of acknowledgement in development and planning legislation requiring the integration of DRM and urban planning; or/and (3) the legacy of the Apartheid-era planning where the focus remains on addressing socio-economic disparities and less attention on disaster risk considerations.

ii. The core competencies include: Settlement history and theory; Planning theory; Planning sustainable cities and regions; Urban planning and place making; Regional development and planning; Public policy, institutional and legal frameworks; Environmental planning and management; Transportation planning and systems; Land use and infrastructure planning; Integrated development planning; Land economics; Social theories related to planning and development; and Research.

#### **Research and training gaps between the fields**

Research and adequate skills and capacity building through formal (e.g. university curriculums) and informal training (e.g. short course training programmes) can provide a solid foundation for the integration between related developmental fields such as DRR and UP. However, León and March<sup>17</sup> and Sagar<sup>24</sup> indicated that on the level of research, existing research on DRR and UP often does not focus on the tools, methodologies and conceptualisations that could foster greater integration between the fields to bring about more holistic management of urban risk. Instead, the focus remains on the functioning of the hazards that affect urban environments and disaster events that have occurred in megacities in the developed world. Sagar<sup>24</sup> also indicates that the current lack of integration between DRR and UP can also be rooted in the exclusion of DRR from urban and regional planning (URP) curricula in many parts of the world. Disaster risk reduction as subject or integrated topic in existing UP curricula in tertiary institutions globally, including South Africa, is extremely rare. Only a handful of universities worldwide present UP degree programmes that actively incorporate DRR. This has severe implications for the planning of sustainable cities as graduating urban planners very rarely possess in-depth knowledge and skills to plan for and reduce disaster risk.<sup>36</sup>

It is clear that without addressing these gaps between UP and DRR, the connection between the two fields will remain weakly theorised and integration in practice will continue lagging behind. However, within the context of this article it is argued that universities can play a crucial role in ensuring that strides are made towards addressing at least one of the gaps between UP and DRR that is, research and training gaps between the fields. The mandate to address this specific gap is by ensuring the formulation of UP curriculums that actively integrate concepts, tools, and methodologies related to DRR.

#### **The mandate of universities to develop disaster risk reduction infused urban planning curriculums**

Parvin et al.<sup>37</sup> and Boshier et al.<sup>8</sup> argue that universities should take the lead in integrating DRR into existing UP curriculums. Shaw et al.<sup>38</sup> and Thayaparan et al.<sup>40</sup> agree that universities are ideally placed to develop curriculums that are responsive to the changing needs of society, for instance, the increased need to reduce the impact of disasters in urban settings. Curriculum in this instance refers to formal academic courses that emphasise theoretical content and practical learning to develop the knowledge and skill level of students.<sup>41,42</sup> Curriculums are intended to develop critical thinking, basic competencies and communication skills among students who will enter professional careers. According to Yakovleva and Yakovlev,<sup>43</sup> well-developed curricula present students with new information that allows them to challenge their preconceived notions or understanding of a topic. Subsequently, skills emerge that would benefit them when carrying out a task in a professional environment.

Importantly, curriculum development has also been identified as a key mechanism by which complex problems and emerging societal needs can be addressed.<sup>44,45</sup> To continue its value in addressing complex problems, such as urban disaster risk, Hamnett<sup>46</sup> and Roy et al.<sup>47</sup> argue that existing URP curricula should integrate DRR as a crosscutting element. Shaw et al.<sup>39</sup> elaborate that the ideal integration of DRR into existing UP curriculums should strive to strike a balance between theoretical teaching (e.g. basic DRR concepts, theories and tools, disaster resilience and climate change adaptation) and practical teaching (e.g. conducting risk assessment; integrating DRR measures into existing urban and regional development plans).<sup>39</sup> By taking a holistic approach to incorporating DRR into existing URP curricula, a culture of disaster prevention and urban disaster resilience is created among student and future planning professionals.<sup>48,49</sup> It should be noted that the need for universities to integrate DRR concepts into a wide array of related developmental fields (e.g. URP) is also supported by South African disaster management legislation. Specifically, the National Disaster Management Framework (NDMF), as part of *Key Enabler 2: Education, training, public awareness, and research*, states that aspects of DRM should be integrated into existing education programmes and curricula that are relevant to disaster risk.<sup>50</sup> In this regard, disaster risk programmes at universities that develop career paths related to DRM, such as URP should integrate DRR into existing curriculums according to approved academic requirements and standards.<sup>50</sup> Additionally, the National Disaster Risk Management Education and Training Framework of 2013 also emphasises the need to integrate content and teach about DRM to strategically important professional disciplines. This would include UP.

Despite the clear theoretical and legislative push for closer integration between URP, universities in South Africa have been slow to take a leading role in integrating DRR into existing planning curricula. The reason being that the current progress and unique challenges experienced by South African universities in this process are not well known. The rest of this article will explore the current status quo in terms of the integration of DRR into UP curriculums. However, before the results of the study are presented, the research methodology utilised in the study is first elaborated on.

## Research methods and design

### Research design

A qualitative exploratory investigation was selected to guide this investigation. The main purpose in this case was to seek a contextualised understanding and 'making sense' of the extent to which DRR is integrated in planning curricula by obtaining data from participants (in this case the heads of planning departments and/or groups).<sup>51</sup> This type of investigation aims to make sense of the world from the perspective of participants and is focussed on achieving depth of understanding rather than statistical representativeness as required in quantitative oriented studies. Whereas in quantitative research, large amounts of data are used in order

to reach generalisations or seeking to be representative, qualitative studies such as these use smaller groups or cases to generate transferable knowledge where existing theories fail to adequately explain a particular phenomenon.<sup>52,53</sup> Rather than seeking to be representative of a larger population or duplicable in other contexts, the design in this case was selected to explore the stance of the integration of DRR in the training of planning students – a topic for which universal variables do not currently exist.<sup>54</sup> The exploratory design that was followed in this case is also appropriate because the aim of a study being to understand a particular phenomenon (in this case, the status quo regarding DRR and UP integration in tertiary education of planning students) rather than seeking explanations and generalisability.<sup>55</sup>

### Data generation methods

The research design informed the development of the research tools used to collect data from participants. Specifically, the study used a web-based electronic survey conducted on Google Forms.<sup>56</sup> The authors were necessitated to use the electronic survey as the primary data collection because of the coronavirus disease 2019 (COVID-19) protocols that were in place at the time that the research was being conducted. The electronic survey was a combination of open- and closed-ended questions. The questionnaire was divided into four sections as specified in Box 1.

The participants were sampled through both purposeful and snowball sampling techniques. Sampled participants were chosen for their ability to provide insights into the overall level of integration of DRR in URP curriculums at South African Universities. The first step in securing the research sample was to consult the website of the South African Council for Planners (SACPLAN) to determine the South African Universities that provide courses in URP in South Africa. In total, 11 universities were identified through this process. Subsequently, the researcher contacted the department heads at each of these institutions. These department heads were contacted via email and served as gatekeepers and identified staff members best suited to participate in the study. To be included in the study,

**BOX 1:** Questionnaire sections and section description.

SECTION
<p><b>Demographic data</b> This section aimed to collect demographic data to understand the profiles of the participants involved in the study.</p>
<p><b>Current knowledge of DRR</b> This section aimed to determine the participants knowledge of disaster and DRR and the role of URP in connection to DRR. Both the participants level of knowledge and experience regarding the integration of DRR and UP were investigated.</p>
<p><b>Current integration of DRR into urban and regional planning curriculums</b> The aim of this section was to identify the participants' understanding regarding the current levels of integration of DRR into their existing URP curriculum at their current higher education institutions. Included were questions about the modules taught by the lectures and whether any include the topic of disasters.</p>
<p><b>Challenges to and opportunities for integration of DRR into urban and regional planning curriculums</b> This section consisted of questions designed to identify the current obstacles impeding integration of DRR into URP curriculums. Questions also aimed to highlight the best practice in integration or recommendation on improving integration.</p>

DRR, disaster risk reduction; URP, urban and regional planning.

potential participants would have to have aspects of DRR already integrated into the modules they teach. Staff members who had no aspects of DRR included in their modules were excluded from participation. Through this process, a total of 18 participants were identified across the 11 institutions.

### Data analysis and interpretation

The results of the qualitative data were examined by means of thematic analysis. Thematic analysis aims to identify, interpret and clarify patterns and themes that emerge from qualitative feedback from research participants. This thematic analysis was guided by the six-step process proposed by Maguire and Delahunty.<sup>57</sup> These steps included:

1. Becoming familiar with the data
2. Generating initial codes
3. Searching for themes
4. Reviewing themes
5. Defining themes
6. Writing up of theme interpretation

The responses of each question were individually analysed according to each survey section to identify any similarities and themes from the answers. These themes and similarities identified in each section were then cross-referenced and compared to the other answers. Major themes and patterns were then written up.

### Ethical considerations

Qualitative research is particularly concerned with ethical issues because of the complexities of researching private lives and placing accounts in the public arena.<sup>58</sup> Informed consent, confidentiality, consequences of the research and bias of the researcher are ethical issues outlined by Brinkmann and Kvale<sup>59</sup> as important issues to address in qualitative research. To address ethics in this case, two measures were employed: Firstly, the study was submitted and approved by a Scientific Committee as adhering to the Faculty of Natural and Agricultural Sciences Ethics Committee and approved with ethics approval number NWU-01551-20-A9. Secondly, a disclaimer that informed the participants of the following were included in the questionnaire: (1) the purpose of the research, (2) the ethics number of the research, (3) rights of participants, namely that participation was voluntary, and that they could withdraw at any stage as well as assurance that the identities of the participants would be kept confidential.

## Results

The section to follow outline some of the major findings and trends that have emerged from the data collection process.

### Participant views on the need for integration between disaster risk reduction and urban planning

Literature and policy have indicated that there needs to be closer integration between DRR and UP. Participants in the study echoed this sentiment. Participants unanimously

agreed that DRR is a relevant field of study for aspiring urban planners. Most of the responses provided by participants in support of this motion related to urban planners playing a leading role in planning settlements in such a way as to address the drivers of disaster risk and mitigate disaster impacts. Specifically, one respondent indicated that by being aware of the impacts of disasters on people in urban areas would encourage urban planners to plan adequate infrastructure and housing. Another participant supported this opinion, who stated that:

'[S]ettlement planning can aid in mitigating the effects of disasters caused by natural phenomena and man-made hazards.' (Participant from University A)

(Participant from University A). The need to integrate DRR more closely with UP was also framed by some participants through the lens of climate change, its impact on disasters, and the need for UP to adapt to this emerging reality dynamically:

'DRR is relevant for the field of UP because of the dynamically changing natural environment within which UP is practised as a profession. Natural disasters are expected to occur at an unprecedented rate as a result of CC and cities are not exempted from this. Seeing as most of the global population are now living in cities and seeing that cities house most of the financial assets, it is imperative to include DRR as part of the UP process so as to reduce the vulnerability of cities to natural disasters.' (Participant from University B)

Significant benefits were also foreseen in the closer integration between DRR and UP as fields of study by participants. Great emphasis was placed on the ability of urban planners, with the knowledge of DRR, to be better positioned to make more holistic planning decisions to benefit urban environments. In this case, a respondent from University B indicated:

'Yes, it would be beneficial to integrate DRR because every UP graduate is a potential decision-maker whose decisions are likely to impact many lives [positively or negatively depending on their knowledge].' (Participant from University B)

Participants also agreed that integrating DRR into UP is beneficial for ensuring urban resilience and sustainable development. Finally, it was identified that integrating DRR in UP allows lecturers to develop a wider array of practical coursework and case studies, to which UP students could find planning-based solutions:

'UP is a practical subject, and we are currently living in a year affected by floods, fires, etc., so if this is included in the curriculum, lecturers can even give students projects or case studies of what is currently affecting the country.' (Participant from other University)

### Curricula as a mechanism to foster integration between disaster risk reduction and urban planning

Participants indicated that to foster greater integration between DRR and UP, adapting existing UP curriculums would be an excellent conduit to facilitate greater integration. For the most

part, it was recognised that to build resilient and sustainable cities in future, urban planners would increasingly need to be cognisant of topics related to DRR and climate change adaptation. The following responses encapsulated this notion:

'The increase of disasters has become inevitable, and urban planners are pressured to ensure resilient urban development. This cannot be achieved without DRR measures. Therefore, DRR and climate change adaptation should be included on URP curriculums, thus assisting in the betterment of planners to be proactive in planning projects.' (Participant from University E)

A participant from University J added that in light of the threat posed by climate-driven disasters on urban environments 'that DRR should become a core component of both theory and practice in UP curriculums'.

### Status quo in the level of integration of disaster risk reduction in current town and regional planning curriculums

The initial responses by participants aligned well with the theoretical and policy imperatives for greater integration between DRR and UP. However, despite this positive trend, evaluating the current status quo as it relates to the practical integration of the two subject fields in the existing curriculums was also important.

#### Modules utilised to integrate disaster risk reduction into the curriculum

Participants from most universities indicated that DRR is already included in the existing curriculum. This was facilitated by integrating DRR into some of the existing planning modules. Participants indicated that DRR was being integrated into modules related to sustainable development, environmental planning, spatial planning and resilience, flood planning, urban design and infrastructure, metropolitan planning, planning law, housing and development policy, and city security and safety. Participants indicated that the DRR concepts and topics currently included in their curriculums focussed mostly on disaster prevention, urban disaster resilience and climate change. One such instance relates to a module on flood planning which aims to teach students how to prevent flooding in urban settings at University E:

'Students are required to monitor flood plains, waste management, water management, land or ground typologies, contours or gradient, and similar phenomena that form a crucial part of site analysis and feed into the urban design process.' (Participant from University E).

Other examples of modules integrating DRR are that of urban infrastructure and Metropolitan planning, in this instance a respondent indicated:

'In our Urban Infrastructure class, we teach largely around infrastructure failure and how the state and communities deal with that. Additionally, in our Metro Planning class, we look at how local government is mandated to manage disasters and also how it is accommodated in the spatial development framework.' (Participant from University F)

### Share of module allocated to disaster risk reduction teaching

Once it was determined that some modules were already being used to integrate DRR into the existing curriculum, it was also essential to determine what percentage of the modules were being used for DRR teaching. This would give insight into the actual extent of integration of DRR in current curriculums. To achieve this, a set of questions was posed to participants relating to the academic year and/or level DRR is being integrated into the curriculum, the number of modules in their curriculum that currently integrate DRR-related topics, and what percentage of the module participants estimate is dedicated to teaching about DRR. Table 1 summarises the responses given by participants. Most universities indicated that for integrating DRR into their curriculum, an average of one or two modules carry DRR content. The exception to this rule was Universities E and H, which use three modules. Importantly, participants indicated that within the identified 1 or 2 modules, only half or a quarter of the module content is dedicated to DRR-related teaching. Consequently, the depth of DRR integration into existing UP only functions at moderate to low levels. No university in South Africa has a dedicated subject focussing exclusively on DRR. Potential contributing factors to the low levels of integration are discussed later in this article.

#### Integration at undergraduate vs. postgraduate level

Another trend from the analysis in Table 1 is that DRR within South African UP curriculums has been integrated more at a postgraduate than undergraduate level. It can be argued that the focus on postgraduate integration of DRR into UP has benefits for expanding mutual research between the two fields; however, a significant drawback of this focus is that only a select few students who chose to proceed with their

**TABLE 1:** The status quo of disaster risk reduction integration within undergraduate and postgraduate urban planning curriculums at South African universities.

Academic level	Number of modules containing DRR content	% Content of module relating to DRR	Institution
Undergraduate	1	25	University A
	1	Information not provided	University E
	2	56 (Module 1) 44 (Module 2)	University G
	2	15 (Both modules)	
	1	Information not provided	University J
Postgraduate	1	5	University D
	2	5 (Both modules)	
	1	20	University I
	2	Information not provided	University F
	1	Information not provided	University E
	3	50–70	
	1	1 lecture	
	1	Information not provided	University B
Both	3	50 (All 3 modules)	University H
	1 (Undergraduate) 1 (Postgraduate)	20 50	University C
	1	Information not provided	University E
Other: Second year diploma programme	2	Information not provided	University G

DRR, disaster risk reduction.

studies are exposed to DRR-related concepts in their curriculum. Consequently, most UP students at South African Universities, who are to be found at an undergraduate level, are either getting limited or no exposure to DRR within their curriculum. Some participants alluded that this trend should be reversed as DRR benefits UP training at all levels:

'Yes, DRR should be included as part of UP courses in undergraduate and postgraduate studies. It is an important component of UP and should form a central component of certain courses, particularly those concentrating on environmental planning and land use management.' (Participant from University E)

### **Challenges hampering the integration of disaster risk reduction into existing urban and regional planning curriculums**

To understand some of the reasons behind the limited integration of DRR in existing UP curriculums, participants were asked if they could identify the challenges that currently hamper the integration of DRR into UP curriculums at South African universities. Participants identified several issues, including, lack of finances, lack of academic resources, lack of understanding of the topic, lack of learning and practical material, lack of exposure to best practices, lack of interest, complexity of the topic, irrelevance of DRR to UP, lack of time and overfull curriculum. To this end, participants identified lack of space and time in the curriculum as the primary factors limiting the integration of DRR into UP planning curricula at South African universities. A participant from University A, elaborated that 'there is limited time, expertise and space to add DRR within the curriculum'. This sentiment was supported by a participant from University E who argued that 'adding DRR to the curriculum would mean there is too much material to cover in the existing planning curricula'. Participants further indicated that the primary issues are made more difficult to overcome because of the financial constraints faced by most institutions that prevent hiring additional staff with the requisite expertise to drive efforts to integrate DRR into existing UP curricula. These budgetary challenges were alluded to in the following participant responses: 'Budget remains the main constraint in bringing on board people with relevant skill sets. Some schools may well-integrate DRR because of resources at their disposal' (Participant University E); 'Most institutions are faced with financial issues because students being unable to pay their fees, and they are running on a tight budget' (Participant University H). The complexity of the topic of DRR and the lack of exposure of most academic staff specialising in UP to DRR was also identified as a constraining factor. As one participant indicated:

'Academics have their specific relatively small fields of specialisation that make it difficult for them to shift to and understand another topic. Most have committed much of their energy to develop a footprint in their own field and won't do it to become an expert in another field (i.e. disaster risk reduction).' (Participant from University G)

## **Discussion**

Rapid urbanisation and the growth of the global population have led to an increase in urban disaster risk. The impact of urban disasters on vulnerable urban communities in South Africa has highlighted the need to strengthen urban resilience. The contribution of UP in an effort to increase reduction endeavours has become more noticeable. The relevance of integrating DRR with UP is supported by the results found in literature and in this research study.

The frequency of disasters has caused a rise in the necessity to integrate DRR with UP theory and practice. Urban planning has a crucial role in contributing to the security of development of a dependable infrastructure and addressing the underlying drives of disaster risks. Especially, since poor UP could lead to an environment that is exposed to hazards leading to an increase in risks. Both scholars and the participants noted that urban planners are crucial in mitigating disaster impacts. This has also been supported in various global and local policies. The benefits of including DRR are linked to the recovery and reconstruction of urban areas that assist in the mitigation of disasters. This is evident among the respondents as they mentioned that these benefits lead to holistic planning and resilient UP. By drawing on existing UP practices and infusing it with DRR concepts and theory that will allow planners to be more risk conscious of an area. Therefore, enabling them to make informed planning decisions that result in urban development that is not only resilient, but sustainable. This will also have a positive effect on the environment, urban infrastructure, socio-economic sectors and urban communities.

Integration leads to a holistic approach that imprints a culture of disaster prevention and resilience among students who will apply this in future practice. Universities taking on the leading role provide opportunities to address the risks and challenges unique to South Africa. Noticeably, the results showed that there is both a need and room for integration in UP curriculums and is becoming increasingly relevant in the field. Currently, the level of integration of DRR in UP curricula is at a moderate level, with DRR being integrated in a diverse variation of modules related to different elements of UP. Therefore, DRR should become a core component in the curriculum to allow both theoretical and practical learning. Especially with modules that focus on DRR concepts such as disaster prevention, climate change and urban disaster resilience. The increasing level of awareness among urban planners does give way to openings and research opportunities on risk integration. This is a crucial finding since literature indicated that some of the misconceptions included a lack of awareness on DRR among urban planners and what that entails, which limits possible exchange of ideas and the engagement of DRR and UP concepts.

The results did correspond with the limitations of the understanding of DRR among planners as indicated in the literature. Existing research on the topic does not provide enough clarity on how to effectively approach DRR and UP

integration. Especially in the context of applying it to cities that are not only affected by disasters, but are also left vulnerable because of their socio-economic status. The result supported this where UP lecturers need to increase their level of theoretical understanding of DRR. From the responses collected during this research study it is apparent that universities could assist in bridging some of the gaps mentioned. When integrating DRR in UP curriculums, students are taught DRR through theory and how to apply it critically. This is all to balance theoretical and practical thinking. The inclusion of DRR in UP curricula will allow for more practical learning and application opportunities according to the respondents, which is a crucial element of UP.

## Conclusion

It is becoming increasingly important to address South Africa's urban disaster risk profile. Drivers of disaster exposure including unplanned urbanisation, socio-economic inequality and climate change are increasing the variety, frequency and intensity of disasters in South African cities. Urgent action is therefore needed to ensure the effects of urban disasters are reduced. Theory and policy prescripts have indicated that the incorporation of DRR in existing UP curriculums serves as the foundation of building more disaster resilient cities as students would integrate their DRM knowledge into their everyday work as urban planners once they graduate. Urban planning departments at South African Universities therefore need to assume a leading role in the integration process by mainstreaming DRR into existing curriculums. The article has shown lecturers within UP departments at South African Universities, have a solid understanding of the need to integrate DRR and UP more closely. It was universally acknowledged that such an integration is becoming more urgent, as the impact of climate change-related disasters is already being seen in our cities. It also emerged that the majority of universities have already tentatively started to include DRR-related topics in at least 1 or 2 of their modules. However, in spite of these positive trends, concerns emerged relating to the depth of DRR integration in existing curricula. No university indicated a stand-alone subject in DRR being part of their UP curricula and the modules that contain topics related to DRR only spend on average 5% – 20% of the module touching on the issue. Additionally, it was discovered that most universities only integrate DRR at a postgraduate level. As the potential exists that a majority of planning students will not continue with postgraduate studies after they have completed their graduate qualifications, a scenario is created where most qualified urban planners would never have had any exposure to DRR related topics during their university training. Many of the integration issues have been shown to be vested in challenges relating to lack of time and space to include DRR into already full curricula, financial and human resources constraints, and lecturers lacking exposure to theoretical and practical concepts of DRR. These challenges will need to be addressed by developing additional skills and capacity for lecturers, reviewing existing curriculum compositions, and

revisiting budget allocations. If these challenges can be addressed, Universities in South Africa can start to produce UP curriculums to foster a culture of disaster-risk awareness and resilience among future UP professionals. In turn, this will contribute to safer and more resilient built environments for all South Africans.

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## Authors' contributions

T. K. was a masters student who conducted the main research and wrote the article. C.C., L.K. and K.P. were the supervisors who critically revised the article.

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## Data availability

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