

**Beyond Fragility: Advancing Skilled Human Capital for Disaster Risk
Reduction and Resilience in Africa**

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Introduction

This paper is prompted by critical awareness that the aspirations of both the Sendai Framework for Disaster Risk Reduction and the 2030 Agenda for Sustainable Development hinge substantially on advancements in (sub)national resilience building. It also recognises the heightened urgency for strengthened resilience capability in developing countries, as well as in more developed countries that experience differential states of fragility at subnational levels.

In this context, the paper foregrounds an important tension between the aspirational intent of the Sendai Framework and its prospects for realisation. It argues that while the Sendai Framework's complex, interlinked components imply availability of skilled human capital (at national and subnational scales), many of the countries most exposed to complex, recurrent and interlinked threats lack access to the evolved, 'future-ready' and integrated skill-sets that underpin the Framework's implementation. This is specifically the case for countries with sustained levels of fragility that face higher levels of disaster risk than those with robust governance capability.

The paper seeks to critically examine whether purposeful investments in high-value disaster risk-related human capital and human resources enable progress towards strengthened risk reduction capability at national and subnational levels – especially in variable, complex, high-risk contexts. It intends to sharpen understanding on the role of high-value human capital in resilience creation, particularly in chronically at-risk countries facing multiple threats - going beyond the often blunt and un-nuanced observations on 'mainstreaming disaster risk reduction' and 'DRR capacity building'.

This contribution probes prevailing literature on the role of skilled human capital and higher education in advancing development, along the changing face of higher education's engagement in the disaster risk, resilience and fragility domains. In addition, in a globally unprecedented study, the paper also incorporates preliminary findings on the career pathing of more than 200 graduates (since 2011) with disaster risk management-related qualifications from two African universities that are partners in the Periperi¹ U initiative. This

¹ Partners Enhancing Resilience for People Exposed to Risks

empirical research specifically profiles the post-qualification employment trajectories of African graduates who have new, cross-disciplinary skill-sets that explicitly integrate considerations of risk and resilience within fields as diverse as economics, environmental management, food security, public health and urban planning – and speaks to the graduates' early deployment profiles.

Drawing on this evidence, the paper argues for greater investment in higher (tertiary) education – especially in developing countries - to introduce contextually relevant cross-disciplinary curricula that purposefully and systematically advance capability in managing risk and advancing resilience. As underlined by a growing body of literature that transgresses the international higher education, state fragility and disaster risk reduction domains, such investment confers pro-active and protective benefits. Crucially, it unlocks diverse access to a wider range of developmental pathways than prevailing conceptions of 'build back better' that overlook the potential inherent in both skilled human capital and the institutions that enable it.

The paper is structured in four parts. It begins by revisiting the role that skilled human capital plays in advancing development, with a specific focus on higher education's role in this mission. Following sections explore emerging thought on strengthening skilled capability in at-risk contexts, including disaster-prone low income countries and situations of fragility. The paper then examines the post-qualification career trajectories of 200 graduates of new, cross-disciplinary disaster risk-related degrees from two African universities and the effect of post-graduation deployment on (sub) national risk management capacity. It concludes by interrogating the study's results in relation to the role played by skilled human capital that is contextually "fit for purpose" for advancing resilience, particularly in chronically at-risk countries facing multiple threats.

Sustainable development: Urgency for skilled human resources

The role of skilled and agile human resources is acknowledged as crucial to social and economic development in an increasingly digital and interlinked world (Salmi, 2016). This recognition was explicit in the 2030 Agenda on Sustainable Development, and reflected in Sustainable Development Goal (SDG) 4 that gives specific emphasis to inclusive and equitable quality education and life-long learning (United Nations, 2015). In a welcome and more encompassing formulation than its Millennium Development Goals (MDGs) predecessor, the SDGs (through SDG 4) foreground "access to affordable and quality technical, vocational and tertiary education, including university" as well as the expansion of the "number of scholarships available to developing countries" (ibid, 17). These thrusts reflect an understanding of the urgency for all countries to advance skilled human resources necessary to grow, embrace and optimise the kind of knowledge economies that increasingly define the

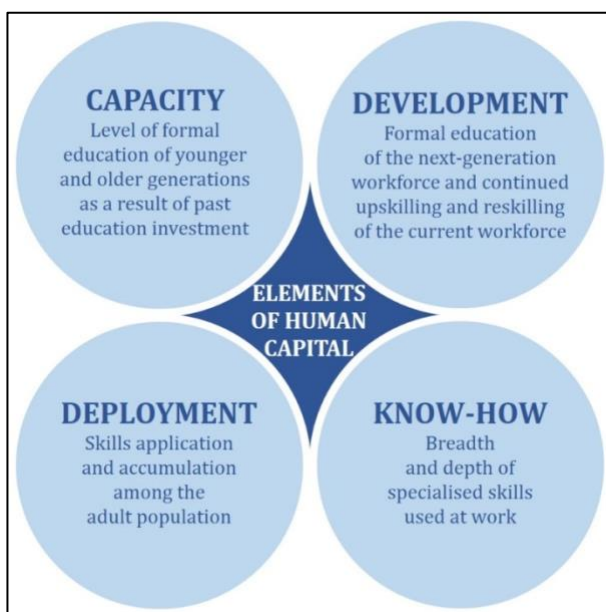
digitally intense Fourth Industrial Revolution (Schwab, 2016). They also highlight the crucial role of high value human capital in enabling the implementation of the 2015 global landmark agreements, including the Sendai Framework for Disaster Risk Reduction.

In the case of both the Agenda on Sustainable Development and the Sendai Framework for Disaster Risk Reduction, the successful realisation of their 2030 ambitions presupposes access to and mobilisation of skilled human resources, especially in at-risk developing countries. The Sendai Framework specifically, takes forward more than forty years' engagement in disaster risk reduction and disaster management that have consistently underscored the centrality of skilled human resources.

While recognising its inherent limitations, the concept of human capital is particularly applicable to discussions on accelerating disaster risk-related skills in at-risk developing countries. In this context, the paper applies the WEF's (World Economic Forum's) definition of human capital, as the "knowledge and skills people possess that enable them to create value in the global economic system" (WEF, 2017, 5).

Consistent with the thrust of SDG 4, the WEF's 2017 Global Human Capital Report, explicitly underlines the importance of life-long learning through a mix of education and "on the job learning" (WEF, 2017). It also foregrounds the central roles that human capital plays both in advancing national productivity, as well as the functioning of a country's civic, political and social institutions (ibid, viii). The report identifies four underpinning and interlinked thematics that inform a country's human capital profile (Fig. 1). These include its existing *capacity*, largely informed by levels of both primary, secondary and tertiary education attainment as well as basic literacy and numeracy (ibid, 41). *Deployment* represents the level of workforce participation reflected nationwide, while a *development* component emphasises both the "formal education of the next generation workforce", along with the "continued upskilling and reskilling of the current workforce" (ibid, 5). The final element, *know-how*, refers to the richness and diversity of a country's work-related skills - gained, for instance - through learning-by-doing, formal on-the-job learning, and staff training (ibid, 44).

Figure 1. Elements of Human Capital (WEF, 2017, 3)



This conceptualisation provides valuable insights for tailoring and differentiating human capital investments in specific regions and contexts – addressing gaps and optimising strengths. For instance, Sub-Saharan Africa's youthful demographic profile, anticipated to stretch well into the 21st Century, offers a clear rationale for sustained and committed investment in primary, secondary and tertiary education. This diverges markedly from forecasted population trends in Western Europe. In this region, 35% of the population is projected to reach at least 60 years by mid-century, with concomitant implications for more emphasis on life long learning and re-skilling (ibid, 25).

Composite index results for 2017 also show that the high-end regional performers, North America and Western Europe, have been successfully able to leverage more than 70% of their available human capital. This contrasts starkly with results from South Asia and Sub-Saharan Africa, in which neither region was able to optimise more than 54% of its respective talent pools. The report largely attributes this to shortcomings in formal education attainment and skill diversification (ibid, 7).

Beyond its benefits for macro-level forecasting, the WEF conceptualisation also holds promise for human capital investment planning in specific sectors and fields of practice. This is particularly relevant for fast-paced and highly dynamic domains such as disaster risk reduction and resilience building. Not only do these fields require contextually embedded national and local understanding of multi-scalar risk dynamics. They are also increasingly technology-dependent, applying and integrating diverse sciences to manage risks as wide-ranging as geo-physical threats, hydrometeorological conditions, transboundary epidemics and multi-scalar, cascading

disasters. Findings from the most recent human capital index juxtapose this urgency for "future-ready", technology-intense skill-sets against the reality in many developing countries of pervasive capacity deficits that thwart the creation of new forms of skilled human capital.

For instance, in Africa, recognition of prevailing deficits in skilled human capital was specifically foregrounded in *Agenda 2063: the Africa we want* (African Union Commission, 2015). The Agenda's first aspiration, which seeks "A prosperous Africa based on inclusive growth and sustainable development", explicitly profiles the importance of basic, as well as higher education, science, technology, research and innovation (ibid, 2). It gives heightened emphasis to post-graduate education and science, underlining their importance in transforming development across the continent (Box 1.)

Box 1: Excerpt on Human Capital Development, *Agenda 2063: the Africa we want* African Union Commission 2015²

"Africa's human capital will be fully developed as its most precious resource, through sustained investments based on universal early childhood development and basic education, and sustained investments in higher education, science, technology, research and innovation, and the elimination of gender disparities at all levels of education. Access to post-graduate education will be expanded and strengthened to ensure world-class infrastructure for learning and research and support scientific reforms that underpin the transformation of the continent." Excerpted from *Agenda 2063: The Africa we want* (African Union

Advancing skilled human resources that are 'future-ready' - focus on higher education

Accelerating awareness of the role that the "innovative application of knowledge" plays in advancing "social progress and economic development" (Salmi, 2017, xiii), has refocused attention on tertiary education, especially in developing countries. In his background paper to the International Commission on Financing Global Education Opportunity's report on *The Learning Generation: Investing in education for a changing world*, Salmi

² https://au.int/sites/default/files/documents/33126-doc-03_popular_version.pdf

(2016) argues that low-income countries would be unlikely to realise the SDGs without robust higher education systems. He cautioned that the full range of SDG aspirations, "from developing a vibrant agricultural sector and building up a resilient infrastructure to mitigating the devastating effects of climate change and preserving the environment, cannot happen without the participation of scientists and well-trained professionals and the application of leading edge research for finding appropriate solutions to the big challenges faced by mankind" (Salmi, 2016, 12). However, he also acknowledges that developing countries face increasing pressure to "strengthen their capacity to create and apply knowledge through well-trained graduates and relevant research" (ibid, xiv). Their failure to achieve this increases the prospects of economic marginalisation due to pervasive capacity constraints in unlocking and optimising new technologies (ibid, 6-7).

Such conclusions are consistent with recent research on the development impact of tertiary education on low and lower-middle-income countries (Oketch, McCowan & Schendel, 2014). Drawing on results of 99 published studies, the report probed recognised tertiary education pathways (teaching, research and community service) to impact. It specifically examined outcomes related to graduate earnings and productivity, as well as technological transfer and more wide-ranging institutional benefits (ibid, 5). Among its conclusions, the study argued that returns on investment to higher education had been largely underestimated, with tertiary education having particularly favourable impacts on graduates' capabilities, including in health, nutrition, political participation and women's empowerment. It also noted beneficial effects in "the strengthening of both formal institutions and social norms, in areas such as governance, public services and the environment" (ibid, 52).

Keeping pace with changing risks – fast-tracking higher education capacity in disaster risk reduction in developing countries

Implicit in these views on tertiary education is the expectation that higher education systems have capacity to keep pace with changing societal and workforce demands. It also infers agility within the tertiary education sector itself to offer the kinds of future-ready curricula envisioned by the WEF to produce skill-sets that are fit-for-purpose under conditions of rapid change. In this context, McCowan (2016) suggests that the universities most likely to realise the SDGs apply a *developmental* model of engagement. This is reflected materially in taught course offerings that are well aligned with societal needs for human resources, research that is directed "towards applied areas of need", and by a focus on providing "advisory services to government and communities" (ibid, 513). It also implies a deliberate emphasis on harnessing the university's collective skills and capabilities to solve contextually relevant, real-world problems, as well as a greater emphasis on transdisciplinary

teaching and research. These approaches, that transgress entrenched "silo-like" disciplinary traditions and that actively engage diverse stake-holder groups, are viewed as essential for addressing today's complex and interlinked social development challenges (Gibbons, 1994; Horlick-Jones & Sime, 2004; Lotz, et al, 2015; Max-Neef, 2005).

Clearly, the disaster risk domain sits 'front and centre' within the remit of contemporary tertiary education. It represents a complex development challenge as well as a socially meaningful transdisciplinary field with urgency for curricula innovation – especially in at-risk developing countries. Yet, as with sustainability science and other cross-disciplinary academic domains, the introduction of disaster risk-related higher education programmes has proved persistently difficult to implement within institutions of higher learning (Holloway, 2014; Yarime, et al, 2012). Its complex cross-disciplinary identity and seemingly chaotic scope of application pose enormous conceptual and practical challenges to tertiary institutions.

Such obstacles were already apparent more than 20 years ago, when David Alexander lamented, "part of the problem with training has to do with the failure of a coherent academic field to emerge from the welter of disciplines that have had a hand in the study of disasters" (Alexander, 1997, 297). He also noted that "disciplinary training imposes a viewpoint and represents a barrier to holistic forms of understanding". ... "This has led to domination of the field by the technocratic disciplines – engineering, geophysics, hydraulics, meteorology and so on" (ibid, 1997, 297).

Remarkably, two decades beyond Alexander's critique, and despite growing global traction of the risk and resilience discourse both scientifically and developmentally, there is still limited focused engagement of the higher education sector in these fields – even in well-resourced countries. This was underlined in the ANDROID Disaster Resilience Network's survey of European universities reported in the *Disaster Resilience Education and Research Roadmap for Europe 2030* (Amaratunga, et al, 2015). While the study findings reported encouraging evidence of interdisciplinary collaboration, they also foregrounded a persisting scarcity of disaster resilience related academic programmes across Europe, and a preferential emphasis on engineering courses. In addition, survey results indicated the relative recency of the programmes offered, with fewer than 20% established for longer than ten years (Amaratunga, et al, 2015; Perdikou, et al, 2016). These observations resonate with emergent thinking on training for workforce resilience in the health sector, which found limited evidence of interdisciplinary education that cut across fields (Madrigano et al, 2017). As an example, the authors proposed the integration of "health sciences with urban planning and engineering education" to advance capacity for resilience (ibid, 8).

In an intriguing juxtaposition, there is strong evidence from developing countries of vigorous higher education engagement directly related to disaster risk and resilience capacity development. For instance, a detailed study of *Advances and linkages of the scientific and academic community with Disaster Risk Reduction* in Latin America and the Caribbean identified 94 DRR-related academic programmes, with 68 of the courses positioned at post-graduate level (Jiménez, 2016). However, the authors cautioned that these actually represented a modest DRR capacity building involvement of only 6% of Latin America and the Caribbean's 1 234 universities – in a region with highly complex and dynamic risks.

Progress to fast-track skilled risk and resilience capacity is similarly reported in small island developing states, where new technologies have been harnessed to overcome difficulties in access to course content and support. As one example, in recent months, the University of the West Indies began pilot-testing component modules of its inventive on-line Disaster Risk Management Graduate Programme. This initiative sought to urgently close the gap between scientists and disaster risk management practitioners and provide a path for professional development of DRM practitioners in the Caribbean. The ground-breaking initiative represents a core component of the *Enhancing Knowledge and Application of Comprehensive Disaster Management* initiative funded by Global Affairs Canada.³

Likewise, in the cyclone-exposed South Pacific, the University of the South Pacific's recent introduction of an integrated qualification in resilience has sought to accelerate skilled professional capacity in the Pacific Islands Region (Hemstock, et al, 2016). With a curriculum that combines Climate Change Adaptation and Disaster Risk Reduction content and that is offered primarily on-line, this EU-funded programme also provides students with a choice of eight sectorally diverse qualification pathways. These include agriculture, coastal management, energy & infrastructure, fisheries, forestry, health, tourism or water resources (University of the South Pacific, 2018).⁴

Despite resource constraints, African universities have also successfully initiated and sustained a wide range of institutionally-embedded disaster risk-related capacity-building programmes that have embraced fields

³ (<https://sflcn.com/uwi-offer-graduate-courses-disaster-risk-management/>).

⁴ <http://www.usp.ac.fj/news/story.php?id=2840>

as diverse as disaster risk management, food insecurity and public health disaster management. Over almost two decades, the continent's higher education institutions have progressively introduced at least 20-30 disaster risk-related programmes (in English, French and Portuguese) that are academically robust and grounded in local context – and that have gained strong traction across key stake-holder groups. With co-funding from USAID's Office of Foreign Disaster Assistance, the Periperi U partnership has been particularly effective in harnessing HEI capabilities to fast-track skilled human resources in disaster risk management. This has enabled the appointment of hundreds of Masters-qualified DRM graduates at national and subnational levels across Africa, in countries as diverse as Ethiopia and Madagascar. It has also provided a stable architecture for nuanced disaster risk research and provision of practitioner short courses (Francioli, 2018; Holloway, 2014; Ofir & Mentz, 2015).

Building skilled human capital for disaster risk reduction in fragile contexts – 'business as usual' for developing country HEIs

This successful introduction of disaster risk-related academic programmes represents a novel strategy to address complex risks at national and subnational levels. It is underpinned by a logic that recognises the reflexive interlinkages between disaster risk management, fragility and sustainable development, and the protective role of appropriately skilled human resources under conditions of duress. Implicit in the approach is the acknowledgement that disaster risks accumulate through the interplay between external shocks and vulnerable conditions, irrespective of whether these are of natural origin, human-induced or intertwined through complex, cascading interactions.

Periperi U's purposeful investment in cross-disciplinary disaster risk management-related academic programmes in Africa represents a progressive higher education strategy to address human capital deficits in countries viewed as chronically fragile - those with compromised resilience to shocks, and limited capacity to manage emergencies (OECD, 2008, 16). Significantly, the partnership's over-arching capacity building strategy was never limited conceptually to either a "natural hazards" or a "fragile states" paradigm. The incremental design and introduction of contextually specific disaster risk-related programmes across Africa were prompted by a more expansive and integrated view that disaster risks were driven by wide-ranging forms of socio-economic and institutional vulnerability that required new forms of skilled human resources (Holloway, 2005; Holloway, 2009; Research Alliance for Disaster and Risk Reduction, 2017).

This decade-long investment has unlocked a sustainable mechanism for the steady flow of graduates with skills in developmental risk management as well as response. Their subsequent career pathing into

government and civil society organisations (see following section) suggests both developmentally enabling and transformative benefits. This enhanced capability translates into strengthened institutional agility to manage shocks of all kinds - buttressing the potential for disasters to act as threat multipliers for fragility as underlined in the *2018 States of Fragility Report* (OECD, 2018, 108).

Such outcomes resonate with and corroborate vigorous critiques that underscore the opportunity costs of excluding higher education in situations of fragility (Milton & Barakat, 2016; Tierney, 2011). In a comprehensive examination of the role of higher education in post-war reconstruction, Milton & Barakat (2016) foreground the sector's neglect and lack of priority by international assistance organisations. They stress the flaws in this view, noting that "higher education can make a critical contribution to reconstruction from the outset of post-war transitions" (ibid, 405). The authors add that post-war reconstruction efforts should go well beyond a narrow focus on infrastructure restoration, but include accelerated emphasis on "re-pooling human capital to ensure sufficient numbers of trained professionals in critical areas" (ibid, 409). Remarkably, this critique also applies to prevailing international policy on post-disaster reconstruction. For instance, while the World Bank's recent "Building Back Better" report underlines the urgency to advance resilience, it overlooks the scope for "building back better *human capital*" during reconstruction (Hallegatte, Rentschler & Walsh, 2018). Similarly, the Sendai Framework for Disaster Risk Reduction 2015-2030, omits specific reference to the higher education sector's crucial role in advancing disaster risk related skill-sets. This is despite the Framework's energetic call for increased engagement of science and technology in disaster risk reduction (UNISDR, 2015).

The exclusion of human capital from such policies is at variance with their resilience-building aspirations. Given the centrality of skilled human resources in enabling transformative processes that minimise the likelihood or scale of future loss, it is puzzling and illogical that focused efforts to strengthen workforce resilience are not integral elements of these policy mechanisms

Periperi U's accumulating evidence from multiple African higher education institutions reinforces these critiques. The partnership's incremental introduction of more than 40 new disaster risk-related academic programmes and modules over the past decade has enabled a steady flow of skilled graduates into national and subnational institutions, often in countries facing protracted conditions of duress. Growing evidence from this developmental model of engagement to sustainably fast-track skilled disaster risk-related human capital (McCowan, 2016; WEF, 2017) holds increasing promise for advancing resilience in contexts that are simultaneously fragile and disaster-prone.

Probing post-graduation pathways – Periperi U graduate tracer findings

Implicit in Periperi U's collective effort was the intent to introduce disaster risk-related skill-sets that are "fit for purpose" for Africa's complex risk terrain. The initiative's original ambition was that graduates would take-up employment in government, civil society and academic institutions, conferring protective and transformative benefits, and averting the need for costly technical support through international humanitarian assistance.

To interrogate this premise, from May – June 2018, empirical data were gathered from a multi-country 'tracer' study of approximately 400 (primarily) Masters graduates from newly introduced disaster risk-related academic programmes in six African countries. The Research Alliance for Disaster and Risk Reduction (RADAR), Periperi U's Stellenbosch University-based secretariat, designed and circulated a uniform data-capturing tool on post-degree graduate employment that was populated by Periperi U partner focal points, and subsequently returned, then analysed at RADAR.

A surge in disaster risk-related graduates

Tables 1 and 2 represent graduate data from five Periperi U partners; Ardhi University, Tanzania (ARU), Bahir Dar University, Ethiopia (BDU), Makerere University Uganda, the University of Antananarivo (Tanà) and the Technical University of Mozambique (UDM). Table 1 indicates the total number of disaster risk-related graduates with new disaster risk-related degrees, showing that a staggering 308 students completed Masters degrees during this period, with a further 135 completing disaster risk-related BSc degrees at UDM (these data exclude detailed information on more than 300 BSc DRM and SD graduates from BDU).

Table 2 presents data on 100 untraceable graduates, whose post-graduation employment could not be verified, constituting 22.6% of the graduate pool. These graduates, who could not be traced, were removed from subsequent analyses for BDU and Tanà. This reduced the total graduate pool to 201 due to the downwards adjustments for Tanà (102) and BDU (99).

Table 1: Total Graduates from New Periperi U Supported Disaster Risk-Related Academic Programmes

University	Disaster Risk-Related Programme	Male *		Female *		Total
		No.	%	No.	%	
ARU ¹	Masters Disaster Risk Management (DRM)	21	65.6	11	34.4	32
ARU ¹	MSc Disaster Risk Management (DRM)	12	48.0	13	52.0	25
BDU ²	MSc DRM and Sustainable Development	101	83.5	20	16.5	121
Makerere ³	Masters Public Health Disaster Management	6	60.0	4	40.0	10
Tanà ⁴	MPhil Multidisciplinary Disaster and Risk Management	70	66.7	35	33.3	105
UDM ⁵	MSc in Technical Education, Development and Disaster Management (DM)	9	60.0	6	40.0	15

Subtotal: Postgraduate		219	71.1	89	28.9	308
UDM ⁵	BSc Environmental Engineering and DM	45	33.3	90	66.7	135
Subtotal: Undergraduate		45	33.3	90	66.7	135
Total		264	59.6	179	40.4	443

*Percentages are based on total graduate numbers for each programme.

¹ Ardhi University, Tanzania; ² Bahir Dar University, Ethiopia; ³ Makerere University, Uganda; ⁴ University of Antananarivo, Madagascar; ⁵ Technical University of Mozambique.

Table 2: Number of Untraceable Graduates from New Periperi U Supported Disaster Risk-Related Academic Programmes

University	Disaster Risk-Related Programme	Male *		Female *		Total
		No.	%	No.	%	
ARU ¹	Masters Disaster Risk Management (DRM)	10	47.6	4	36.4	14
ARU ¹	MSc Disaster Risk Management (DRM)	5	41.7	2	15.4	7
BDU ²	MSc DRM and Sustainable Development	22	21.8	0	0.0	22
Makerere ³	Masters Public Health Disaster Management	4	66.7	0	0.0	4
Tanà ⁴	MPhil Multidisciplinary Disaster and Risk Management	2	2.9	1	2.9	3
UDM ⁵	MSc in Technical Education, Development and Disaster Management (DM)	3	33.3	3	50.0	6
Subtotal: Postgraduate		46	21.0	10	11.2	56
UDM ⁵	BSc Environmental Engineering and DM	12	26.7	32	35.6	44
Subtotal: Undergraduate		12	26.7	32	35.6	44
Total		58	22.0	42	23.5	100

*Percentages are based on total graduate numbers for male/female graduates in each programme shown in Table

1.

¹ Ardhi University, Tanzania; ² Bahir Dar University, Ethiopia; ³ Makerere University, Uganda; ⁴ University of Antananarivo, Madagascar; ⁵ Technical University of Mozambique.

Data in Table 1 indicate robust graduate output, especially in Ethiopia, Madagascar and Mozambique. These represent highly disaster-prone countries, with histories of either protracted armed conflict or political instability. They also foreground the cross-disciplinary character of the programmes, with ARU, BDU and Tanà having successfully introduced inter- or transdisciplinary courses. However, the data also profile the highly gendered nature of this field, with women constituting fewer than 30% of all Masters graduates. This is juxtaposed however, against the gender profile of graduates from UDM's BSc in Environmental Engineering and Disaster Management – with women comprising an impressive 90 of its 135 graduates (66.7%). This four-year course is

significant, as entails the completion of a student research project, which involves additional supervision and support.

Strong evidence of workforce traction in Ethiopia and Madagascar

Evidence from Ethiopia and Madagascar (Table 3) confirms strong work-force traction for DRM graduates, including high employment prospects (98%) and placements across diverse fields. Significantly, 98 graduates have taken up government positions at (sub)national or local scales in a wide range of ministries and government departments. A further 59 (29%) reported employment in either international or nongovernmental organisations. In Ethiopia, 46% of BDU's MSc DRM and Sustainable Development graduates were employed in civil society and international organisations, reflecting the country's long-standing humanitarian assistance profile, along with a concentrated presence of international agencies.

Table 3: Post-graduation Employment for DRM-qualified Graduates, Bahir Dar University, Ethiopia and University of Antananarivo, Madagascar

Employment Category	BDU		Tanà		Total	%
	No.	% *	No.	% *		
Academia/Education	9	9.1	9	8.8	18	9.0
Government (Sub-national and local)	28	28.3	7	6.9	35	17.4
Government (National)	14	14.1	49	48.0	63	48.8
International Organisation IO, (I)NGO	45	45.5	14	13.7	59	29.4
Private Sector	3	3.0	19	18.6	22	10.9
Unemployed	0	0.0	4	3.9	4	2.0
Total	99		102		201	

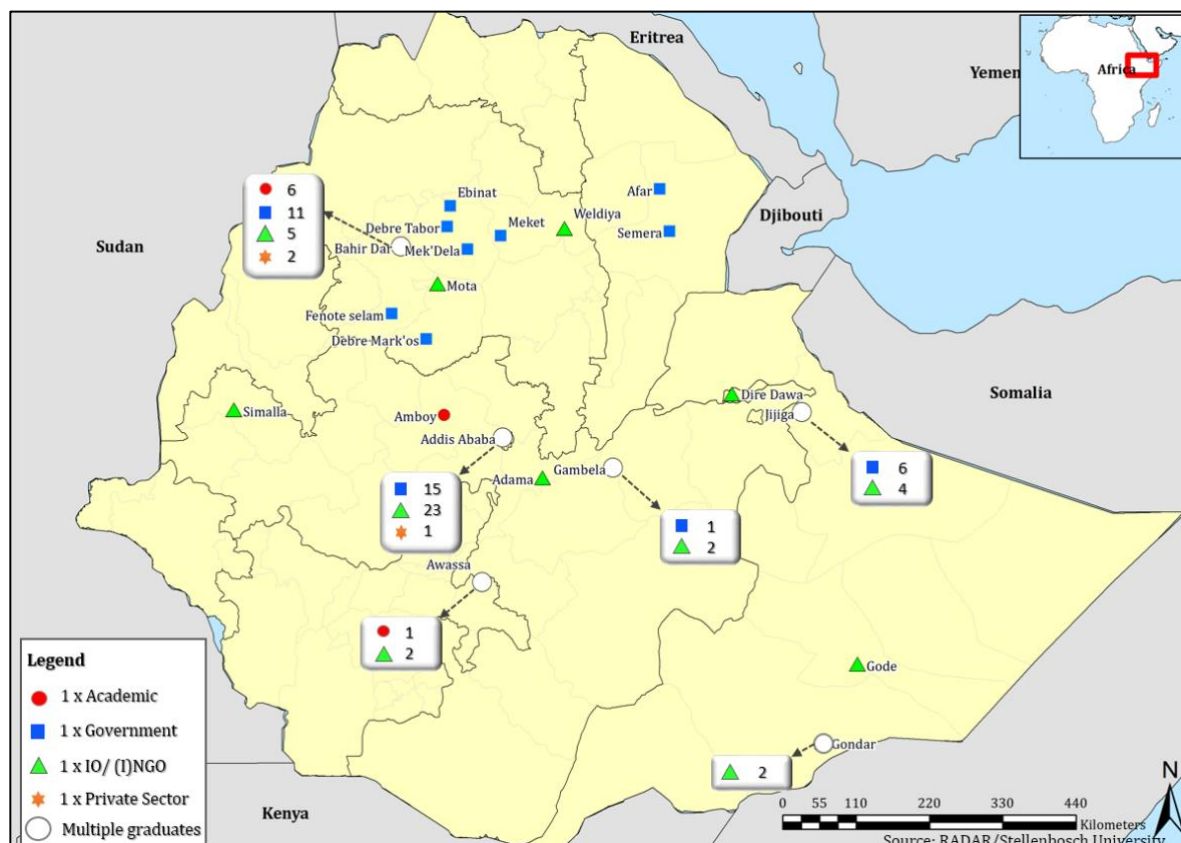
*Percentages are based on total graduate numbers for each university.

These employment patterns suggest that DRM-qualified graduates offer a high value skill-set that is "fit-for-purpose" for multiple fields and sectors, especially in at-risk countries such as Ethiopia and Madagascar. They also suggest that disaster risk-related skills are applicable at multiple administrative levels. This is reflected in the dispersion of graduates across national, subnational and local scales. For instance, almost half of all Tanà's graduates in government posts were located in Antananarivo, compared with 14% of the BDU post-graduate pool, which was more widely dispersed across subnational and local scales.

A more detailed spatial analysis (Fig. 2) of BDU Masters graduate employment patterns provides insight on these highly diverse post-graduation pathways. This shows a remarkable 50-50 split between graduates situated in Addis Ababa (mainly employed by international agencies or nongovernmental organisations) and those working at subnational scales (primarily in government positions). A remarkable 11 MSc DRM and Sustainable Development graduates were situated in various departments within local government in Bahir Dar

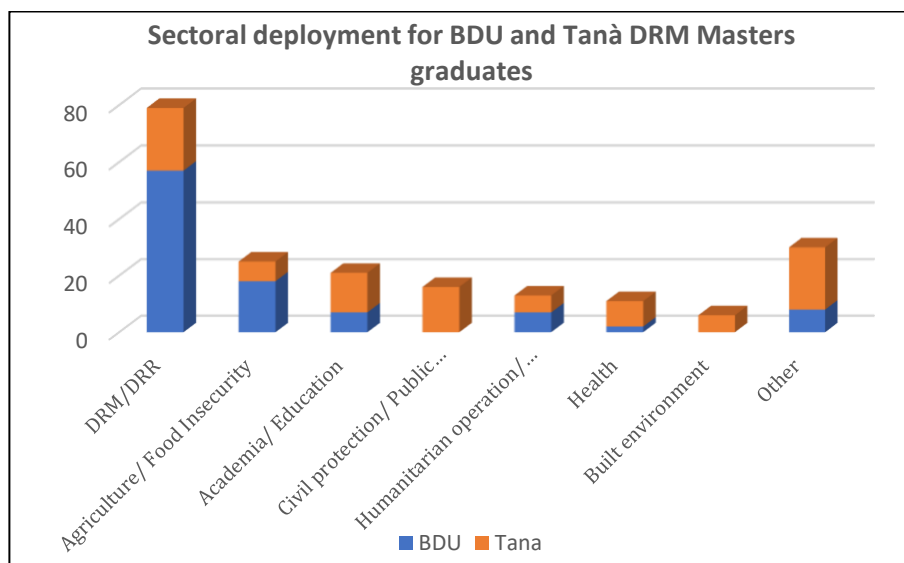
City. Altogether, more than 30 graduates were employed in Amhara Regional State alone, occupying positions in government, academia, the private sector and nongovernmental organisations.

Figure 2: Spatial and Workforce Distribution of MSc Disaster Risk Management and Sustainable Development Graduates from Bahir Dar University, Ethiopia



Sectoral and thematic employment patterns were also instructive, with 104 (52%) of all BDU and Tanà graduates in either defined disaster risk management positions or those related to food insecurity and agriculture (Fig. 3). While this sectoral concentration is expected due to its close alignment with recognised disaster risk reduction needs in Africa, the data suggest the DRM skill-set has emerging credibility in other sectors. For instance, a small, but growing number of Tanà graduates reported employment in the environmental, health, renewable energy, tourism and transport fields.

Figure 3: Numbers of DRM Masters Graduates Employed by Sector; Bahir Dar University, Ethiopia and University of Antananarivo, Madagascar



These findings materially demonstrate how, with modest sustained support, African higher education institutions have incrementally introduced complex, disaster risk-related academic programmes in challenging risk environments. These now provide a steady flow of skilled human capital that is both valued and increasingly embedded in a diversity of organisations and institutions at national, sub-national and local levels. While it exceeded this study's scope to probe the relationship between skilled human capital deployment and disaster loss, these findings indicate strong traction between the cross-disciplinary disaster risk management skill-set and workforce demand in Ethiopia and Madagascar – countries viewed as chronically at-risk.

Build back better human capital

Results from this study offer useful insights on enhancing skilled human capital in developing countries that face complex, interlinked risks under conditions of uneven governance or socio-political volatility. They also provide grounded guidance on higher education strategies that can accelerate global disaster risk reduction capacity development, (UNISDR, 2018).

They show how higher education institutions in at-risk countries can fast-track skilled human capital to advance risk management. Findings also indicate that, with modest and sustained support, tertiary institutions in disaster-prone developing countries have a remarkable capacity to develop inventive, "fit for purpose" disaster risk-related academic programmes that enable graduate deployment across multiple fields and administrative

scales. Not only does this confer protective benefits; it also offers prospects for incrementally transformative change, due to strong levels of traction between graduate skill-set and social demand.

However, the results also foreground persisting concerns and disconnects. The constrained focus on skilled human capital in both global disaster risk-related and post-conflict reconstruction policies represents a crucial shortcoming in advancing resilience in at-risk contexts. Given the central role that skilled human resources play in enabling transformative processes that minimise the likelihood or scale of future loss, it is puzzling and illogical that systematic investment in high-value human capital remains excluded from these policy mechanisms.

Contrary to prevailing views on rising disaster losses and advancing fragility, this study advances an optimistic perspective. It draws on empirical evidence to show staggering progress in disaster risk and resilience capacity building in some of Africa's most challenging development contexts. These outcomes of careful and sustained investment in new forms of future-ready human capital through African tertiary education institutions hold promise – not only in averting disaster losses, but also in advancing development, even in countries under conditions of chronic duress.

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