



# Building Inclusive Disaster Management Systems: Opportunities and Constraints in Addressing the Needs of the Vulnerable

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## Abstract

Extreme events such as cyclones lead to massive loss of lives and properties and erode developmental gains. The projections of increasing frequency and intensity of extreme events may result in the creation of enduring disaster zones with displaced economies and populations, with disproportionate effects across the social strata. Disadvantaged groups including children, the elderly and the disabled bear the brunt of such events due to pre-existing challenges that exacerbate their vulnerability, thus requiring tailored measures in disaster situations to effectively address their needs. Despite the special protection that children and the disabled receive as stipulated in international human rights laws and standards, they are often ignored in disaster management. This study explores measures and interventions that can assist in achieving inclusive disaster planning and management with reference to the occurrence of cyclones in Mozambique. Qualitative methods involving literature studies are used to shed insights on this theme. Overcoming the challenges to inclusion involves adopting rights-based

approaches and mainstreaming vulnerable groups across all phases from planning to decision-making. Sound institutional collaboration in risk governance coupled with regular reiteration of risk mitigation measures and responsibilities is essential. Ultimately, given that cyclone-related losses have significantly reduced in developed nations due to improved management, Africa has an opportunity to develop tailored interventions that are best suited for its conditions. The study feeds into goal 10 of the 2030 Agenda for Sustainable Development that seeks to address inequalities together with those due to age, disability and opportunity amongst others.

## Keywords

Disasters · Cyclones · Mitigation · Sustainable development · Vulnerable

## 7.1 Introduction and Background

Tropical cyclones are storms that originate from tropical oceans and rely on warm water for their source of energy (Chan and Kepert, 2015). Although there has been substantial progress in meteorological science, the knowledge about tropical cyclones including sophisticated warn-

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ing systems and effects of cyclones both in tropical and subtropical communities is still dire (Roux, 2020; Fedorov et al., 2010). This makes it necessary to reinforce mitigation measures to help limit the impacts of such disasters in vulnerable areas. Moreover, the physical attributes of tropical cyclones cause devastation through strong winds, surges and floods. The fatalities are often the outcome of surges and floods, collectively resulting in destruction of physical infrastructure, housing and resources. The destruction caused by wind is mediated by terrestrial features and land cover (Witvorapong et al., 2015; Virof et al., 2016).

The mammoth size of tropical cyclones is such that they easily overwhelm most terrestrial infrastructure and land cover (Knapp et al., 2010). *Inclusive disaster management frameworks are needed to safeguard the health and well-being of some of the most vulnerable in the society* (Pereira et al., 2017) and “*Leave No One Behind*” in terms of disaster management. *This chapter investigates the core factors in achieving inclusive disaster management systems. Cyclones and earthquakes are regarded as the most destructive disasters amongst natural phenomena* (Garnier and Desarthe, 2013). *Although there are sophisticated meteorological devices for monitoring these natural phenomena globally to caution vulnerable communities, it is critical to enhance preparedness.*

In the recent past times, cyclones like Katrina (USA), Jeanne (Central America and the Caribbean) as well as Nargis (Myanmar) unleashed incalculable destruction of infrastructure and led to numerous loss of lives (Knutson et al., 2019). It is estimated that around one million people lost their lives due to tropical cyclones over the last five decades (Grinsted et al., 2012). This has been attributed to several interacting factors including population escalation in susceptible areas and poor management measures amongst others. However, it is noteworthy that cyclone-related fatalities have diminished substantially in developed nations as a result of improved management measures. Nevertheless, cost implications of cyclones have significantly increased with Hurricane **Katrina’s USD 100**

**billion bill**, regarded as the highest after its socio-economic impacts in New Orleans in August 2005 (Roux, 2020).

### 7.1.1 Socio-Economic Impacts of Cyclones

The most susceptible areas for tropical cyclone surges and flooding effects are low-lying plains and beach fronts along the coast. Interestingly, these areas are often the target of housing projects, tourism resorts, coastline resources and fishing establishments (Bender et al., 2010). Recovery is furthermore inhibited by household and community capital, resources and infrastructure. Social costs of cyclones involve the loss of lives and livelihoods, destruction of agricultural produce resulting in food scarcity and damage to essential health and education services (Knutson et al., 2019). Moreover, there are worsened economic indices as governments need to reconstruct destroyed areas and money budgeted for other development initiatives is now rechannelled to repair the destruction caused by the cyclone (Hoarau et al., 2012). The priorities of the community are disrupted as they shift from development to recovery. On the reverse, others argue that one advantageous social impact of cyclones is that they foster social cohesion as people unite to prepare for the cyclone and engage in recovery activities, thus forging new relationships (Hoarau et al., 2012).

### 7.1.2 Psychological and Environmental Consequences of Tropical Cyclones

Psychiatrists and psychologists argue that there are a wide range of experiential traumas which both victims and responders go through. These include grief, hopelessness, and social and psychological breakdown all contributing to the phenomenon of post-traumatic stress disorder (PTSD). Moreover, climate impacts are forecasted to increase in intensity and frequency

(Donkor et al., 2019; Nhamo and Agyepong, 2019). The destruction to the natural environment reduces landscape functions that support social well-being and cultural heritage (IPCC, 2012). There are also consequential impacts on agriculture (Donkor and Mearns, 2018; Donkor et al., 2020a), tourism destinations, fishing and building materials (Gonzales, 2020). It has also been observed that there are intangible socio-economic and ecosystem consequences where there is loss of species, weed invasion of new locations and migration of labour from income-generating activities to the restoration of the environment (Donkor and Mazumder, 2020).

Cyclonic winds have been observed to cause loss of animal habitats, disrupting and affecting ecosystems. Whilst flying debris can kill individuals and wildlife, there is considerable devastation of infrastructure including power lines, communication towers, bridges and roads (Gonzales, 2020). Cyclonic floods due to ocean water surges can cause drowning of people and wildlife and are often the cause of mass deaths in the event of a cyclone (Roux, 2020; Fedorov et al., 2010). Overflowing waters can destroy homes and buildings in the littoral zones. Flood waters can also devastate vegetation and cause surges into estuaries, destroying the plant and animal lives that exist therein (Gonzales, 2020). Erosion resulting from the powerful cyclonic windstorms can destroy prevailing vegetation and ecosystems causing places to become bare and susceptible to wind erosion. Moreover, the soil that is carried off into new places can destroy the local vegetation (Gonzales, 2020). Cyclonic storm surges can also result in erosion. Waves that extend the shoreline pull sand into the ocean, making the areas extensively eroded. This can destroy beach and dune ecosystems (Gonzales, 2020).

Every year cyclones, typhoons and hurricanes affect **dozens of countries** around the world. Losses of life and material damage are significant due to strong winds, heavy rains, large swells and storm surges. Hazardous phenomena are not only located on islands and coasts. Even mitigated, hurricanes often cause damage inland, through floods and landslides, sometimes hundreds of

kilometres away from the ocean (Gonzales, 2020). This makes it imperative to localise sustainability in the context of such extreme events to be able to address them holistically (Mearns, 2012; Dube and Nhamo, 2020). The projections of increasing frequency and intensity of extreme events such as tropical cyclones may result in the creation of enduring disaster zones with displaced economies and diminishing populations, whilst rising intensity exacerbates the loss of lives. The youth tend to be more resilient and emigrate far from the disaster zone to find opportunities in different places to where the destruction has occurred (Pereira et al., 2017; Knutson et al., 2019). The elderly, being more predisposed to ill health and depression, are less resilient to recover from the effects of the cyclones (Tomokawa et al., 2018). Whilst the lessons learned from one disaster help prepare for future events, the experience of the events is probably distorted for everyone, as people select and construct their memories, and prioritise their actions, behaviour and responses (Tomokawa et al., 2018). Any individual has an incomplete and personal experience of a disaster, which affects the way in which they will interpret future warnings and information.

Ultimately extreme events like cyclones have a disproportionate effect across the social strata (Signé, 2017). Thus, some individuals are affected adversely as a result of pre-existing circumstances that affect their vulnerability. Some of the determining influences on people's ability to mitigate the effects of extreme events include gender (Sarrasanti et al., 2020), age, disability, race or ethnicity. It has been observed that women, children, the elderly and the disabled are amongst the most vulnerable and require tailored measures in disaster situations (Sithirajvongsa, 2017). Moreover, although the protection of vulnerable groups is promoted in several international human rights laws and standards, the special needs of vulnerable groups such as children and the disabled are often overlooked in disaster emergencies (Thanthathep, 2015). Furthermore, the fate of the disadvantaged in disaster emergencies has received a dearth of research. This study helps bridge this gap by con-

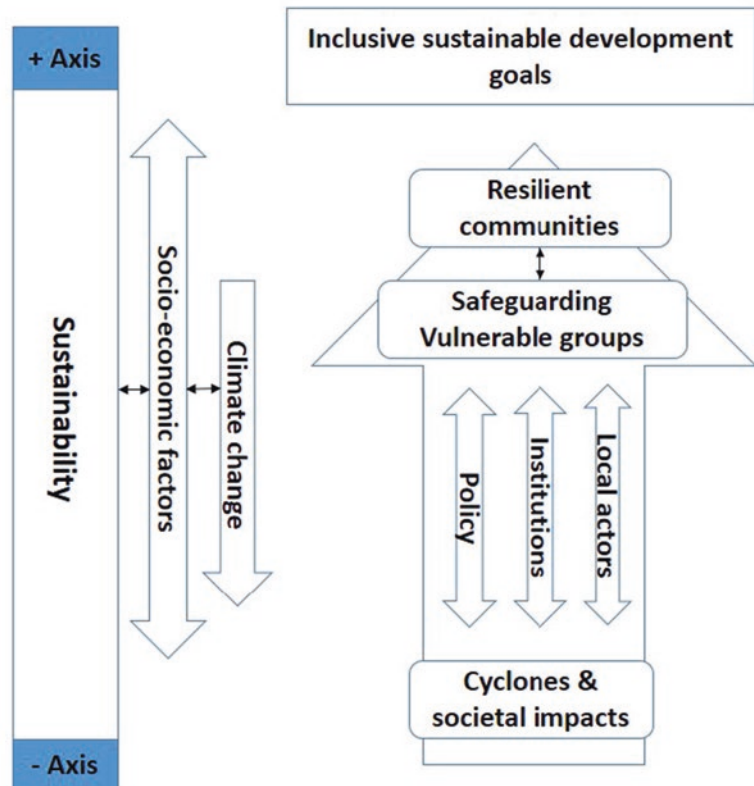
tributing knowledge on measures that can be adopted to better secure and address the peculiar needs of vulnerable groups such as children and the disabled. This has become urgent as the frequency and impact of extreme events have become more pronounced in Africa as demonstrated by cyclones Idai and Kenneth. The study employs the study of literature on the occurrence of cyclones in Mozambique to shed insights on this topic. The complicated nature of such extreme events calls for a concerted effort by all key stakeholders to ensure a holistic approach to addressing such events (Fig. 7.1).

This includes robust collaboration policymakers, institutions and civic society to foster resilient communities in the larger framework of an inclusive and sustainable development aligned with the SDGs (Fig. 7.1).

The need to ensure that vulnerable populations on the continent are adequately protected and not discriminated against is important to the

continent’s inclusive development whilst addressing social inequalities (Fig. 7.1). Moreover, it contributes to the Sustainable Development Goals (SDGs) and the African Union’s Vision 2063. Furthermore, the recent COVID-19 global lockdowns have highlighted the need for tailored local interventions that address resilience in the absence of external support. This makes it imperative to explore local policy interventions that can adequately address some of the continent’s pressing challenges such as this theme. The study commences with the broader problem of the study encapsulated in the study background, which is further detailed in Sect. 7.1. A theoretical framework is used to frame the context of the study which leads to the methods employed to prosecute the objects of the study. This is followed by the main findings and discussions of the finding. Issues addressed include mainstreaming vulnerable populations’ (e.g. children and the disabled) needs in disaster planning, relief and

**Fig. 7.1** The nexus of cyclones and sustainable development. Source: Authors



recovery from climate-induced extreme events, reinforcing physical infrastructure and compliance with land-use planning, disaster awareness and education. Ultimately, this helps answer questions on main factors affecting the inclusivity of disaster management in the African context with reference to cyclones such as Cyclone Idai in Mozambique.

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## 7.2 Materials and Methods

The port city of Beira (Fig. 7.2) in Mozambique is located on the mouth of the Pungwe and Buzi River along Longitude 34° 50' E and Latitude 19° 51' S. Beira bore the brunt of the Cyclone Idai that hit the country on March 14, 2019. The cyclone caused severe torrential rains, powerful windstorms and massive floods in south-eastern Africa particularly Mozambique, Malawi, Zimbabwe and Madagascar costing in excess of \$1 billion (Oxfam, 2020). The majority of communities were under water, all communications lines were interrupted, and there were huge losses of lives and displacement along with the destroying of a number of buildings in Beira (World Vision, 2020). It was estimated that 90% of the area was totally devastated with most of the communities being inaccessible. The area has a populace of circa 500,000 who were forced to seek refuge in makeshift relief camps, built by government and managed by humanitarian organisations (UNOCHA, 2019). A cholera outbreak affecting more than 2000 individuals in the aftermath of the crisis further complicated humanitarian efforts (World Vision, 2020). The storm exacerbated prevailing infrastructural problems like poor roads filled with potholes and litter as well as lack of maintenance of its buildings (Oxfam, 2020). Cyclone Idai left in its aftermath a serious food crisis, as a projected 700,000 hectares of farm produce was destroyed. The enormity of Beira's desolation highlights the susceptibility of areas undergoing accelerated urban growth devoid of sound planning. Rising sea levels and climate change are all factors that led to the disaster (World Vision, 2020).

The theoretical framework for the study stems from socioecological systems theory. Natural systems and social systems are individually complex in their own respect. In addition, many of our environmental and social challenges entail the further intricacy of interaction between social and natural systems (Berkes, 2007). This scenario comes in the face of mounting evidence of the profound impact of human-related factors as drivers of environmental change. Thus, there has been increased demand for creative forms of cross-disciplinary collaborative approaches to tackle social and environmental issues in-depth (Berkes et al., 2003). This has resulted in several concepts with such attributes including socioecological systems (Halliday and Glaser, 2011). These social-ecological systems are intricate adaptive systems consisting of many diverse human and non-human elements that interact. They adapt to fluctuations in their environment and their environment changes as a result (Halliday and Glaser, 2011).

An *impact* refers to a rapid unforeseen event, whilst the *impact area* connotes the location which has high probability of bearing or has suffered the whole impact of a disaster, thus requiring core life-saving and emergency operations. Furthermore, *mitigations* comprise the activities employed ahead of a disaster seeking to limit or avoid its effects on society and environment. *Vulnerability* on the other hand is a result of being prone to loss and hurdles to the ability to be restored, whilst the ability to gain complete restoration from a catastrophic impact is regarded as *resilience* (King and Anderson-Berry, 2015). Ultimately, *disaster risk reduction* (DRR) is a systematic method for detecting, evaluating and limiting the hazards of a disaster. It seeks to minimise socio-economic vulnerabilities to disasters and address the ecological and other threats that cause them.

This study is premised on the *case study* approach. Literature and theoretical studies are vital qualitative methods of drawing insights into related thematic areas under consideration (Creswell, 2013). The case study approach of qualitative research was employed in this study. Case studies are utilised as empirical valuations

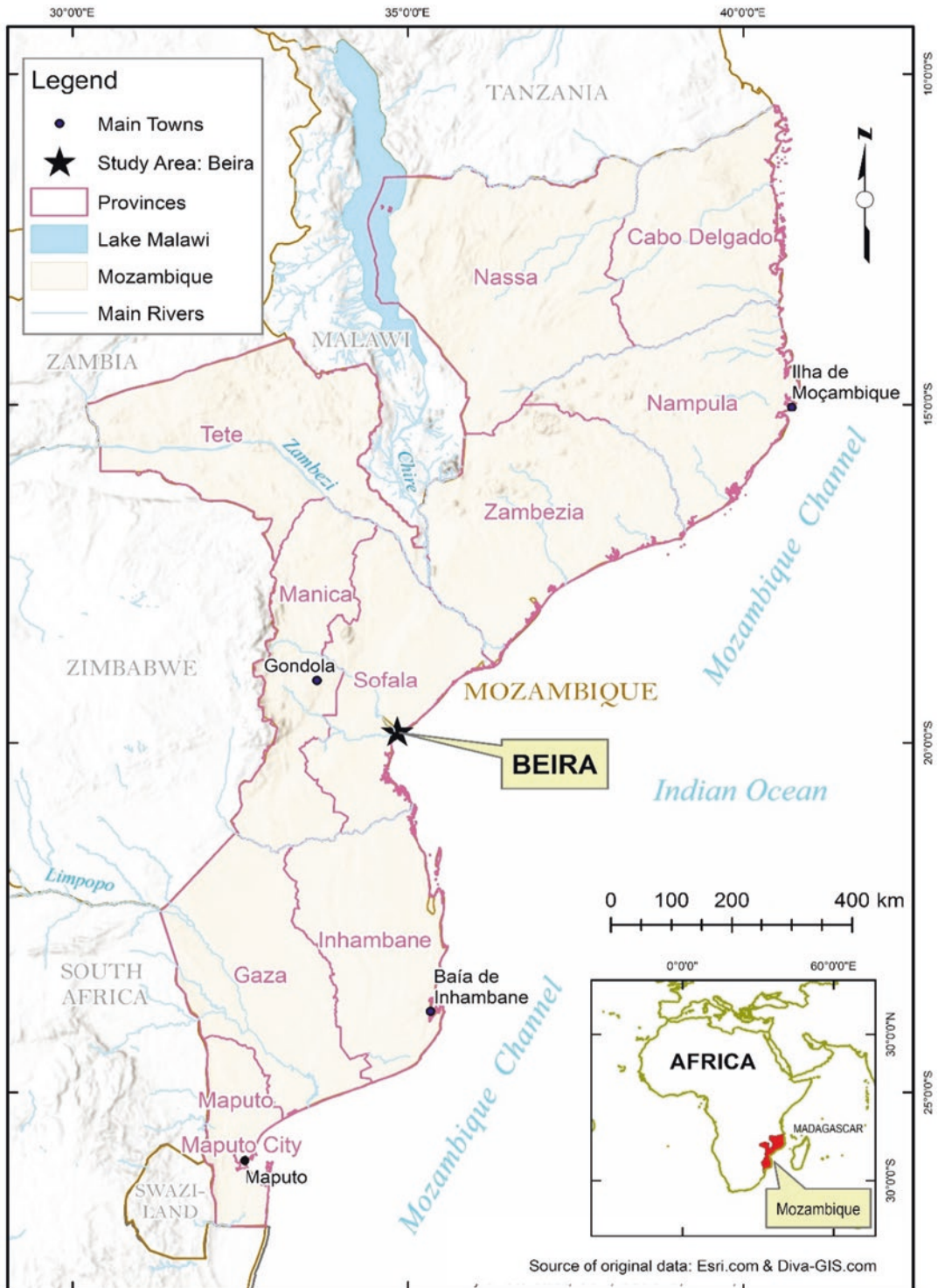


Fig. 7.2 City of Beira and its position in Mozambique and Africa

of contemporary phenomena within real-life settings; when the differences between phenomenon and context are unclear; and in which diverse sources of evidence are used (McCombes, 2020). The case study technique was therefore used to afford profound insights on the nexus of disaster management and vulnerable groups which is the study focus and makes possible the making of valid generalisations.

Additionally, a literature review enables a critical analysis of the current state of scholarship on a phenomenon of interest within a particular time frame (Ralph et al., 2014). Some core documents were scrutinised to draw insights on the diverse thematic areas of this study from websites such as ScienceDirect, Google Scholar and Web of Science. These include publications from the United Nations Office for Disaster Risk Reduction (UNISDR), *Sendai Framework for Disaster Risk Reduction 2015–2030 (Sendai Framework)* and Sustainable Development Goals (SDGs). Hence, scientific articles and journals were perused as the core literature sources in the scholarship review process largely within a 10-year period. Systematic searches were conducted on scientific databases like ScienceDirect to gather data on several themes. The searches were structured around specific keywords such as “Disaster management”, “Inclusivity”, “Vulnerable groups” and “Cyclone impacts” which were paired with *Boolean operators* such as *AND* as well as *OR*. Examples of such searches include *Disaster management and vulnerable groups and Cyclone impacts on vulnerable groups amongst others*.

Through a thematic content analysis, the core themes stemming from the literature were pieced together into similar paragraphs by way of *meaning condensation*. Meaning condensation denotes a summarisation of repetitive themes into terse formulations (Creswell, 2013). The meaning condensation technique to analysis involves five core steps: the whole of a selected text is first assessed to enable a comprehensive overview; the *meaning units* are recognised by the researcher; the key thematic areas as per the meaning unit are paraphrased succinctly; the meaning units are then cross evaluated; ulti-

mately, the critical themes of the overall text are merged to compose a descriptive statement (Torraco, 2016).

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## 7.3 Results and Discussions

### 7.3.1 Creating Room for Kids in Disaster Management

Children are impacted by disasters annually across the globe. The UNISDR (2011) states that children bear the brunt of disasters annually and encourages their involvement in disaster risk reduction activities. Children, particularly in poor nations, suffer disproportionately from burdens caused by disasters such as cyclones. Such burdens can further exacerbate social inequalities and be counterproductive to the SDGs particularly SDG 10 of reducing inequalities as well as the notion of Leave No One Behind. Moreover, children can be proactive partners contributing to disaster risk reduction activities such as those related to cyclones (Pfefferbaum et al., 2018). Their involvement comes with a number of advantages such as improved personal development and problem-solving, survival skills, self-esteem, leadership and teamwork skills. Such measures reflect the Sendai declaration on disaster complexity and its acknowledgement that achieving the framework depends on concerted collective efforts by all stakeholders.

Ultimately, children’s involvement facilitates children’s overall development by giving them experiences on accepting and adapting to change (USDHHS, 2017). For affected communities, there is the ripple effect of conscious citizens, enhanced social cohesion and disaster readiness. Knowledgeable and engaged children can be adept than those without information and uninformed to protect themselves and others. Children are, therefore, resources that can be nurtured and organised for disaster readiness, response, rescue and resilience. Stakeholders have to consider methods to adequately integrate children into disaster risk reduction (Pfefferbaum et al., 2018). Such child-centred disaster management is an integration of disaster management and chil-

dren's rights (Sillah, 2015). UNICEF (2019) estimates that over three million people were in need of emergency humanitarian assistance in the wake of Cyclone Idai with children accounting for more than half of those directly impacted. The sheer size of children victims shows that this group needs to be prioritised in future cyclone management planning. Moreover, their training will ensure that a sizeable portion of the population is informed about disaster preparedness. The lack of a child-centred disaster planning could have been the cause of children in Beira being found shocked and helpless in the images following the cyclone event.

### 7.3.2 Engaging with the Needs of the Disabled

Disabled people comprise 7–10% of the global populace (Alexander, 2015). In the event of disasters such as cyclones, disabled people are faced with physical impediments, communication challenges and other obstacles to access basic services. Thus, disability-inclusive disaster management has gained currency in core international guidelines on disaster management (King et al., 2019). However, disabled people are seldom engaged in the disaster management cycle and tend to be disregarded in all stages (Twigg et al., 2018). Challenges with accessing resources and non-compliance with building codes further worsen the plight of the disabled in disasters (Alexander, 2015). Sensitisation, fighting prejudices and stereotypes will limit vulnerability and lead to enhanced performance in disaster management.

Disabled people's vulnerability in disasters is a function of their impairment, surroundings, societal and institutional framework and culture. Policies often consider their vulnerabilities to the detriment of experiences and resources for coping with hazards and disasters (Stough et al., 2017). The disabled are overlooked in the sharing of warnings prior to a disaster; accessing evacuation paths and refuge centres is challenging; requisite care and refuge centres are absent; and they are often disregarded in emergency response

(Twigg et al., 2018). Additionally, disabled people have a higher likelihood of being without employment, socially excluded and sidelined from decision-making practices and residing in harmful settings devoid of basic services. Consequently, the "leaving no one behind" agenda underscores a holistic approach to realising sustainable development for everyone including the disabled. Although disability is referenced in the SDGs several times, the dimensions pertain to growth and employment, inequality and access to human settlements, coupled with data collection and monitoring of the SDGs. The United Nations' #Envision2030 in working to facilitate the integration of disability in the operationalisation of the SDGs encourages coupling these factors to safeguard the disabled.

Disasters such as cyclones can be a substantial source of long-lasting injuries and impairments and can further worsen pre-existing challenges (Twigg et al., 2018). Relief organisations seldom integrate disability in their assessment of measures and there is a dearth of knowledge on the long-term recovery pathways of the disabled (Stough et al., 2017). Relief agencies' accounts indicate that several disabled people in the countries affected by Cyclone Idai were jobless and relied on well-wishers to fend for themselves. The cyclone devastated the livelihoods of the well-wishers who support the disabled, indirectly worsening their plight. This highlights the need for tailored livelihood programmes for the disabled to address their peculiar needs and help limit their vulnerability (UNOCHA, 2020). Moreover, to transform the disability inclusion rhetoric into meaningful action demands supportive approaches, structures and frameworks amongst stakeholders. Engagement in decision-making is regarded as a core problem by disabled people. Disabled people are marginalised in emergency preparation and programming by their governments, especially at the local levels (Kett et al., 2018). The problem of marginalisation and corporation has to be dealt with prior to the occurrence of the disaster or emergency. This includes enhancing the representation of the disabled in decision-making structures at all levels and partnering with them (Zayas et al., 2017).



Nevertheless, it is important to address social norms and discriminatory practices that exclude the disabled access to social networks and other sources of support (Alexander et al., 2015; Le Masson, 2018).

### 7.3.3 Displacement

A look at the narrative on migration in the aftermath of Cyclone Idai highlights questions of disadvantage and social class. Migration was widespread especially in the disadvantaged groups and people residing in highly populated locations of Beira (Fig. 7.2). Similar patterns were observed after the incidence of Hurricanes Katrina and Rita (Myers et al., 2008). Although the influence for people's decision to leave a place is complicated, financial challenges are significantly correlated with relocation to areas with better opportunities (Alexander et al., 2015). The destruction of homes is a trigger for displacement, but disadvantaged groups such as the blind are unlikely to reside in secure homes. The loss for such groups becomes complicated by the destruction of their fragile livelihoods with implications for further social inequality (Selby and Kagawa, 2014).

It is noteworthy that the social welfare scheme in many countries on the continent including Mozambique is not robust enough to adequately cater for the needs of such vulnerable groups. This makes it critical for the African Union (AU) or regional groupings such as the Southern African Development Community (SADC) to develop a continental or regional policy framework, respectively, that will guide member states in policy formulation regarding the needs of disadvantaged groups. This is because after the tragic loss of lives, there are also lingering social impacts that continue to impact affected communities long after a cyclone (Boon et al., 2011). In the immediate aftermath of Cyclone Idai, several children were said to have been separated from their families whilst many others were allegedly missing or unaccounted for in the following months (UNOCHA, 2019; Oxfam, 2020). Such an experience can result in significant separation

anxiety coupled with the psychological distress of becoming an orphan. This is a pointer for developing strong local counselling and trauma management for the region and continent.

Examples from other extreme events show that at least 300,000 learners were separated from their homes and communities after being evacuated in the aftermath of Hurricane Katrina (Peek and Fothergill, 2006). The displacement following a cyclone impacts the disabled as well as children. Scenes from Beira after Cyclone Idai showed how schools were completely damaged and the educational infrastructure was devastated. However, schools are very critical to the recovery of learners from associated psychological trauma (Boon et al., 2011; Boon and Pagliano, 2014). It has been observed that the school environment facilitates children's coping mechanisms and restores them to some form of normalcy. Although the penetration of the insurance industry in many parts of Africa is low, the continent's profile as a climate hotspot is an opportunity to develop innovative insurance schemes that can provide some relief from climate-induced extreme events such as cyclones which are forecasted to increase in frequency and intensity on the continent. This can range across building insurance schemes for critical infrastructure such as schools and hospitals inter alia.

### 7.3.4 Triaging Tropical Cyclone Hazards

Successful mitigation of the dangers related with tropical cyclones is a cross-disciplinary and multi-institutional activity involving civic organisations, government agencies, non-government organisations and grassroots groups (Ayonga, 2016). The physical infrastructure in coastal areas and other vulnerable locations needs to be reinforced with the introduction of strict building codes and construction of defences like sea walls and levees. Some argue that the presence of such measures should be considered temporary and that they cause communities to rather become complacent (Brown et al., 2018). Nevertheless, the construction of defences reinforces buildings to survive high winds and

localised flooding. This makes it imperative to enhance enforcement and compliance to safeguard vulnerable communities. This needs to be coupled with effective land-use planning for sustainable urban development (Green et al., 2011). For Africa this scenario also points to the need to experiment with novel building materials and methods that are more adapted to our local conditions and facilitate resilience to such extreme methods in the framework of appropriate technology (Ayonga, 2016). Effective mitigation also includes enhanced disaster preparedness. Weather agencies and emergency services have roles to play in communication, warning, sensitisation, preparations and education. Contemporary education hence needs to make sustainability an important component given its importance for sustainable development (Donkor et al., 2020b). Communication not only includes pre-season sensitisation campaigns but also embraces mitigation, response and recovery. Furthermore, the media is a crucial partner in spreading knowledge and warnings and keeping the community abreast with developments. The media as partners in this regard will have to be involved in training on the reportage of such events and the ethical dimensions of sensitive reporting and ethical implications regarding vulnerable groups.

### **7.3.5 Policy Formulation on Vulnerable Groups and Disaster Management**

Policy content and dissemination have an influence on policy implementation (Dinham and Scott, 2000). Moreover, policy implementation is enhanced by an efficient coordination and ownership amongst core key stakeholders coupled with the proactive support of central government. This is necessary for the scaling up of disaster risk reduction (DRR) measures (Kahwa, 2014). It is critical in addressing the peculiar needs of the vulnerable that core bottlenecks are addressed. These include ambiguous policies, poor leadership, poor evaluation frameworks, lack of human resources and inadequate public-private collaborations (Kanyasan et al., 2018). In the case of Cyclone Idai, the absence of leadership in emer-

gency response from the central government is often cited as a cause for the delay of relief efforts and prolonged suffering of victims. However, it is also arguable that the Government of Mozambique may not have the capacity to deal with such an event and could have been faced with resource constraints as a poor nation. Nevertheless, this also points to the need to explore local or indigenous knowledge related to disaster management and couple them with modern interventions for relevance and effectiveness. Additionally, it highlights the point that in Africa especially, all stakeholders need to be proactive and do their part. For learners it is vital for schools to mainstream DRR topics such as cyclones and have a disaster assembly point on their premises (Killion, 2015). Learners' awareness of prevention and response measures must be facilitated through textbooks and capacity-building or training programmes involving their teachers. The school curricula must incorporate disaster risk reduction and simulation exercises (Lim et al., 2016). Learners will also have to become familiar with the contacts of emergency services. Teachers' experiences have an influence on learners and the exchange of experiences between teachers is a viable means of enhancing their knowledge and ultimately transferring this to their learners. The exchange of experiences and lessons can be facilitated via exchange platforms such as academic exchanges and site visits, to enhance skill development and capacity building in DRR and cyclone management (Montagu and Bloom, 2009; King and Anderson-Berry, 2015). Cyclone-related policies will however have to be backed with proactive management to be fruitful (Rice, 2010). Studies from countries such as Laos highlight some core strategies for enhanced cyclone disaster recovery interventions. This includes boosting institutional knowledge, capacity building and clear institutional mandate and harmonisation. Furthermore, the absence of a national legislation and practical guidelines on DRR has been observed to be a core hurdle (Saito et al., 2015). In some instances, this challenge has been cited as resulting in ambiguous mandates which compromised stakeholder ownership and affected awareness creation (Donkor et al., 2017) of policies.

## 7.4 Conclusion

Vulnerable populations form a significant subset of the global populace whose needs deserve focus on disaster management frameworks. Consequently, key global policy documents such as the Sendai Framework and the SDGs acknowledge the complexity of disaster management and emphasise the need for concerted collective efforts by all stakeholders. Holistic approaches in disaster management are gaining global currency and need to guide local measures to engender effective tailored interventions. This includes enhancing the enforcement and compliance to land-use planning and building codes to safeguard vulnerable communities. Furthermore, building materials and methods that are more adapted to local conditions in the framework of appropriate technology need attention. This has to be coupled with disaster awareness and training to improve mitigation, response and recovery. For example, learners' disaster awareness and education can be facilitated through textbooks and capacity-building or training programmes (Donkor et al., 2018) involving their teachers. Social and demographic changes are core issues exacerbating hazard vulnerability, thus requiring robust governance measures. This includes enforcement and compliance of building codes to mitigate cyclone effects whilst securing development gains. Effectiveness of mitigation measures will need close institutional collaboration in risk mitigation coupled with regular reiteration of risk mitigation measures and responsibilities. Critically vulnerable groups like the disabled and children have to be mainstreamed in the entire process and play proactive roles in enhancing inclusivity in disaster management interventions.

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