Chapter 10
Climate Change and the Rising Disaster Risk in Africa

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Abstract Climate-related disasters have been on the rise in Africa. Amidst changing climate, when a climate-related disaster strikes, media, scientists, practitioners and policy makers alike are quick to attribute such an event to climate change, even in absence of scientific evidence. Yet, in an increasingly urbanized world, it becomes extremely difficult to delineate development-induced vulnerability and influence of climate change. Furthermore, making political statement and decision without evidence politicises climate change, and this does not only undermine effective management of disaster risk but also impedes countering climate change itself. Marked by exponential rise in Earth's surface temperature since 1850, climate change has been a subject of intense debates in recent years. Anthropogenic greenhouse gases—mainly carbon dioxide, water vapour, methane (CH4), nitrous oxide, chlorofluorocarbon and ozone—have created imbalance in earth's energy equilibrium. This is because, on one hand, the gasses trap infrared heat from the earth's surface in the atmosphere while, on the other, allow the planet earth to receive more solar energy than it emits. Climate change sceptics do not agree and have asserted that greenhouse gases are not enough to cause climate change and that the increase in solar output has been the major contributing factor for the rise in global temperature. Others are sceptical of the existence of climate change itself. However, there is overwhelming evidence that climate change is due to anthropogenic greenhouse gases' concentration in the atmosphere. Similarly, there is no evidence that climate change is due to increased solar output. Instead solar output has remained fairly the same since 1880. Consistent with climate change, climate hazards have increased fivefold between 1970 and 2010. However, it is argued that the most recent rise, globally, in climate-related hazards might be due to natural climate variability. Yet, it becomes

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increasingly difficult to distinguish between climate-related disasters attributable to climate change versus natural climate variability. Similarly, distinction has to be made between development-induced vulnerability and climate change. In an attempt to understand climate change-disaster risk nexus, interest in event attribution science has witnessed unprecedented growth. A study on attribution of climate change to the severe urban flooding in Dakar in 2012 generated mixed, yet important views among the respondents. Other studies conducted in Africa could not yield conclusive results. Whereas it is extremely difficult to relate events to climate change, lack of data in many African countries further contributes to poor understanding of climate change-disaster risk nexus. This chapter will examine disaster risk-climate change nexus in Africa and analyse trends in disaster risks amidst changing climate, based on available disaster statistics for the last century (1920–2019). In the wake of politicisation of climate change, where almost every single climate event is blamed on climate change, the authors will analyse disaster events in juxtaposition with climate change data and assess other non-climatic factors such as development-induced risks and vulnerability to make informed analysis on climate change-disaster risk nexus in Africa.

Keywords Climate change · Disasters · Africa

10.1 Climate Change

Chaos and ingenuity best describe life and survival of humankind on the planet earth over the past millennia. Amidst turbulent climate and geological processes (Burroughs 2005; Brown 2001), species that existed since the beginning of life on earth 600 million years ago had to grapple with treacherous environmental conditions (Burroughs 2005), as many had undergone extinctions due to climate change or geological processes (Desonie 2008). Due to the latest sudden rise in the earth's surface temperature since the 1880s, fears abound of prospect of another extinction of species on earth (IUCN 2019). The sudden and ongoing warming of global climate is engendered by increase in anthropogenic greenhouse gases in the atmosphere (IPCC 2012, 2015, 2018).

The anthropogenic climate change, particularly greenhouse effect, has been subject of intense debates since the 1990s (Desonie 2008). There are still those (sceptics) who question the notion that the unprecedented warming of the earth's surface temperature was due to anthropogenic influence. In contrast they (sceptics) argue that the current warming was due to increased solar output (Emanuel 2016; Pittock 2009). However, this argument was found to be unsubstantiated as there is existing evidence that proved that variations in solar output do not explain the ongoing unprecedented warming (Emanuel 2016). Whereas there was evidence that variations in solar outputs had caused climate change in the past, this does not seem to explain the current warming, and in contrary, there has been slight decrease in solar output since the 1980s (Emanuel 2016) (Fig. 10.1).

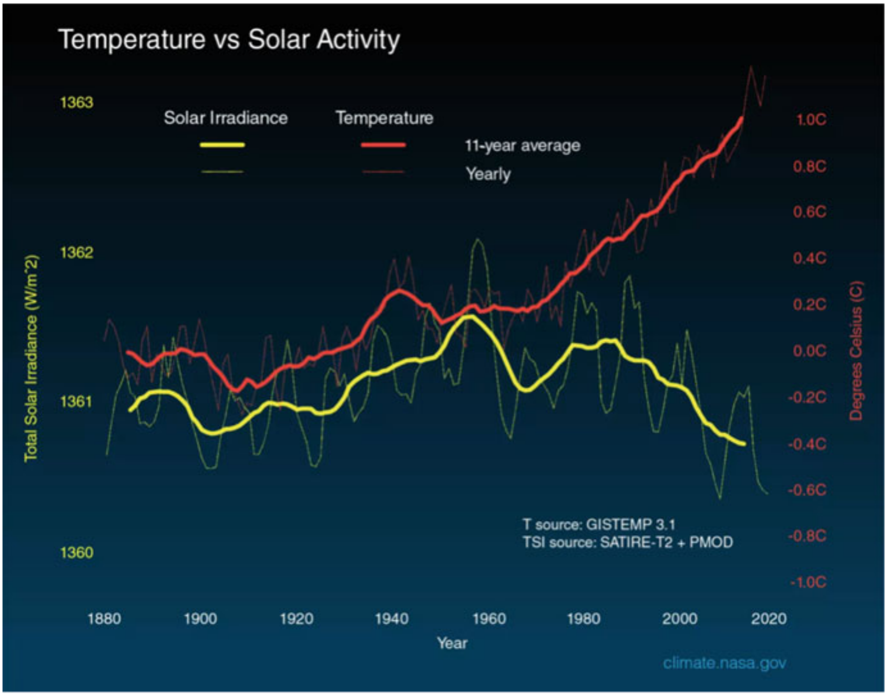


Fig. 10.1 Temperature vs solar activities. Source: NASA. The graph compares changes in global surface temperature, depicted in red, with amount of solar energy Earth receives, depicted in yellow, since 1880 through 2020. The lighter and thinner lines show the level of yearly solar variation, and the thicker yellow line shows the average 11-year Sun's natural cycle

The solar output, as can be seen from the above graphical presentation, despite small ups and downs, followed the Sun's 11-year natural cycle. In the same graph, the Earth's surface temperature has been on the rise (NASA 2021) despite normal solar output. Conversely, as can be observed from the graphical presentation above, there was a decrease in global temperature between 1964 and 1975 that made the sceptics of the anthropogenic-induced warming to euphorically believe that the decreased temperature during that period contradicted the case for anthropogenic-induced warming (Spier 2008, in Baum et al. 2012). Yet the decrease in the temperature in that period was due to increase in level of sulphur in the atmosphere as a result of rapid industrialization following World War II (Stern 2005 in Baum et al. 2012).

Cognisant of the warming climate and related impacts, a number of measures have been formulated. Founded in 1992 and comprised of 197 parties, the United Nations Framework Convention on Climate Change (UNFCCC) was established to support global response to combating climate change (United Nations 1992). This was followed by Kyoto Protocol with the aim to stabilise concentration of atmospheric greenhouse gases to level that is not dangerous to climate systems (United Nations 1998). Despite the successes made in implementation of the Kyoto Protocol, the Protocol faced serious setbacks as some of the high emitters such as the United States were not signatories (Viola 2016). Another major setback was exemption of developing countries from the emission caps (Viola 2016).

Conscious of the flaws associated with the implementation of the Kyoto Protocol, in 2015, the Paris Agreement on Climate Change was signed by the United Nations Member States, with the aim to undertake efforts to limit average global temperature's increase to 1.5 °C above pre-industrial levels and, at worst, restrain the increase in the global average temperature to 2 °C above pre-industrial levels (United Nations 2015a). By 2021, one hundred ninety-four (194) member states of the United Nations plus (1) the European Union ratified the Paris Agreement (United Nations 2021). The Paris Agreement recognises the need for effective and progressive responses to the imminent threat posed by anthropogenic climate change (United Nations 2015a) and calls for urgent actions that will lead to attainment of a net-zero emissions by 2050 (United Nations 2021). Attaining a net-zero emission means that no additional emissions of the greenhouse gases will be accumulated in the atmosphere as the continued limited emissions of greenhouse gases are to be absorbed by the climate systems (Pontoire 2020). However, achieving net-zero emissions would require that countries commit to submit and implement, every 5 years, Nationally Determined Contributions (NDCs) (United Nations 2015a). The NDCs are twofold. Firstly, countries are to communicate NDCs that should outline how they will mitigate anthropogenic climate change, towards the path of net-zero emission by 2030 (United Nations 2021). Secondly, countries are also required to implement their NDCs every 5 years, to build resilience to climate change (Pontoire 2020).

While the Paris Agreement has been described as "substantial beginning toward a net-zero world" (United Nations 2021), it has potential flaws (Viola 2016). Viola summarised the key flaws. First, the NDCS are voluntary, and each country may decide not to report its NDCs as there are no accountable mechanisms that can be applied to compel a party to commit to NDCs. Second, even at an unlikely scenario that the NDCs were fully implemented, average global temperature would still increase by 3 °C. Third, the agreement did not make strong reference to ending fossil fuel subsidies and effectively avoided mentioning establishment of national taxes on carbon to fasten transition to low-carbon economy. Fourth, an initial version of the accord that had proposed to reduce total emission of greenhouse gases between 70% and 90% was replaced with rather loose and reluctant clause—"as soon as possible". Fifth, emerging middle-income countries reject the notion of transferring resources to poor countries. Sixth, the agreement lacks robust reporting system as some countries argue that imposing a monitoring and reporting system would be an invasion of sovereignty. And, seventh, although the agreement committed developed countries to provide finances for adaptation and mitigation, there is some level of vagueness to what this constitutes as the agreement could not further define what that means, Viola concludes. The vagueness in defining the climate finance would mean that developed countries will then define at their own terms what constitutes a good project and then decide whether to finance it or vice versa (Stensrud 2016).

Despite its shortcomings, the Paris Agreement is better than no agreement (Clemencon 2016). Therefore, the need to restraining the increase in average global temperature (AGT) and attaining net-zero emission is welcome and urgent. However, in order to achieve the net-zero emissions of greenhouse gases and build resilience to anthropogenic climate change, substantial investments and implementation of climate change mitigation and adaptation to the impacts of anthropogenic climate change are prerequisite to achieving the goal of the Paris Agreement (United Nations 2015a).

10.1.1 Climate Change Mitigation

Climate change mitigation refers to actions that reduce or prevent emission of greenhouse gases (UNEP n.d.), either by reducing sources of the gases or by enhancing the sinks that absorb the gases (NASA n.d.). Climate change mitigation is a key aspect of the Paris Agreement, which is a critical pathway to attaining the net-zero emissions (United Nations 2021). The Paris Agreement, unlike the Kyoto Protocol that put burden of reduction of emissions of GHGs to the developed nations—rightly so because they are mainly responsible for the anthropogenic greenhouse gases' concentration in the atmosphere—requires all parties whether developed or developing to develop their emission reduction ambitions (United Nations 2015a). Whereas inclusion of the developing countries in the emission caps is important to ensure proportional responsibility sharing in mitigating impacts of climate change, this aspect of the Paris Agreement makes climate change process very political—fitting countries in global north and south against each other. The countries of the "global north are seen to be pushing for climate change agenda to discourage fossil fuel producing countries, mostly in the 'global south' from using their fossil fuel to develop their economies" (Clemencon 2016). After polluting the world and impoverishing the colonised others, particularly in Asia and Africa (Merchant 2021), the countries in the greater north remain unaccountable for their colonial past (Beslik 2019).

10.1.2 Adaptation

Climate change adaptation refers to actions that strengthen resilience and reduce vulnerability to climate change (United Nations 2015a) and involves adjusting to actual or expected future climate (NASA n.d.). Ongoing climate change adaptation discourses have generated intense discussions among academics and policy makers alike. Arguably, adaptation being wrongly driven by political elites and natural sciences missed out the people (Pelling 2011). Instead, it needs to be re-politicised to become apolitical, transformational and multidisciplinary (Klepp and Chavez-Rodriquez 2018). Observations such as those expressed by Pelling and

Chavez-Rodriquez are informed by current top-down and reductionist's approaches to climate change adaption that are being perceived to assume what the "people" want, including by negotiating on their behalf in global discourses. As the elites monopolise climate change discourses, they then frame adaption in relation to vulnerabilities from political lenses—by framing all vulnerabilities as climate-change driven, even though they could be driven by other socio-economic factors (Klepp and Chavez-Rodriquez 2018). Such dangerous misrepresentation and politicisation of adaption mean that other drivers of vulnerabilities are left unattended.

Further politicisation of adaptation is also observed in the global north-global south divides with regard to the climate change politics. On one hand, adaptation is heavily favoured by developing countries, mainly from the global south, while on the other hand, industrial countries, mainly from the global north, are expected to lead in mitigation by reducing their emission targets (Newell and Bulkeley 2010) and to take responsibility for contributing to paying adaptation costs in developing countries (United Nations 2015a).

As stipulated in the Paris Agreement, developed nations are committed by the agreement to pay 100 billion United State Dollars to developing countries (United Nations 2015a). However, developed nations, despite making commitments for financing mitigation and adaptation in developing countries, have "failed to help poor countries fight climate change, as the rich nations missed the 100 billion deadline" (Harvey 2020). Where some funds were provided, they were largely misallocated and implemented as per the donors' terms (Sikhakhane 2019).

Another characterisation of the north-south divides is the use of "vulnerability" against developing countries to adopt developed nations' narrative on climate change. Vulnerability, from the perspectives of the developing countries mostly, those generating fossil fuel, is perceived as a tool being used by the developed nations to force developing nations to abandon fossils fuel, with pretext that "climate change will affect vulnerable and poor nations the most" (IPCC 2012). As such, "the west is now using climate change to make Asia and Africa once again carry the white man's historical burden" (Merchant 2021). Merchant's concerns are shared among many developing countries who fear that the countries in the global north, having technology, will soon transition towards cleaner future—forcing the countries in the global south, particularly those with huge untapped hydrocarbon, to abandon fossil fuel and put their "development objectives in jeopardy" (Jakob and Steckel 2014).

Unless there are incentives that propel developing countries to do otherwise, the developing countries will engage in anything, whether it generates tons of CO_2 or vice versa, to address immediate needs of their populations and ensuing vulnerabilities (International Energy Agency 2010). Whereas developing countries could leapfrog certain technologies towards sustained growth, however the cost-benefit of such leapfrogging must be in the favour of the developing country; otherwise, it will not be adopted, for example, electric cars, which are expensive and do not serve the immediate needs of the poorest.

Besides mitigation and adaptation politics, the success of the Paris Agreement will be determined by not only regularly updating and implementing the NDCs but also an agreement on loss and damage emanating from the impacts of climate change.

10.1.3 Loss and Damage

The Warsaw International mechanism for loss and damage arising from anthropogenic climate change's impacts, including extreme climate events and slow-onset impacts, was set up to address impacts of the anthropogenic climate change in developing countries (United Nations 2015a). The agreement was reached in Warsaw, Poland, in 2013 by the parties to the UNFCC. The agreement recognises that loss and damage arising from adverse impact of climate change may not be addressed by adaptation actions (United Nations 2014). Furthermore, the Paris Agreement recognises the adverse impacts of climate change and need to reduce loss and damage arising from the climate change (United Nations 2015a). However, industrial nations during Paris Agreement negotiation ensured that inclusion of loss and damage in the Paris Agreement implied no liability to them nor holding them accountable for the damage or potential compensation to the developing countries (United Nations 2015a).

As such, the "Paris Agreement failed to meet the people test as it shies away from addressing justice to those affected by climate change and, instead, reinforces the "no basis for any liability or compensation" (Stensrud 2016), even when more developing countries have reportedly been bearing the brunt of impacts of climate change, driven mainly by the developed countries (IFRC 2020). Paradoxically, some developed nations are seen pushing for climate change agenda while behind the scene are involved in dubious fossil fuel business, as being witnessed in Mozambique (Cholteeva 2020).

This moral dilemma in responding to climate change (Bunzl 2015) in an unequal world (Newell and Bulkeley 2010) would likely leave developing countries with no other options but engaging in risky endeavours to do what the early industrial nations did—by polluting their parts (Merchant 2021). Among the developing countries, the current impacts of climate change are not as bad as prevailing underdevelopments and related crises. Certainly, if one were to be given a choice either to die instantaneously or 50 years later, the latter will prevail.

As required by the Paris Agreement, the emission reduction will significantly impact fossil fuel countries who "risk losing entire swathes of their economies' production capacities, and thus their wealth" (Robinson et al. 2021). Armed with high-tech technologies, developed nations are set to develop green energy sources, electric vehicles inter alia, for imports and exports. Consequently, developing fossil fuel-producing states would find it difficult to sell their fossil fuel supplies since they do not produce fossil fuel-consuming vehicles and technologies. Hence, they will be forced to stop their oil production. Consequently they will depend perpetually on their new masters—the greener nations to imports green technologies, which are very expensive compared to fossil fuel sources (International Energy Agency 2010).

This perception may be one of the most dividing realities that would undermine the gains made in climate change processes and ultimately derail the world order. Without frankly discussing these perceptions and fears through a transparent dialogue on the loss and damage, three possible avoidable scenarios abound.

Scenario I—two worlds apart. The developing nations, mostly the fossil fuel-producing states in one side, engaging in fossil fuel production and redoubling their efforts to advance fossil fuel-consuming technologies to power their economic developments. On the other side of the spectrum, developed or early industrialised nations engraving in their "greener and healthier" development and encouraging trade among themselves. There may also be hybrid situation in which some industrial or developing nations joining the either side of the bipolar world.

Scenario II—Abandoning climate change process. With either world deeply entrenched in its world view, there is a risk of a bitter divorce and desolations of the climate change agreements. The world would be set to freely dive into unstoppable climate crisis.

Scenario III—Survival of the fittest. At this stage the world order that humanity has been investing in for considerable amount of time may be grossly undermined. At such a stage of disunity, the strongest would manipulate the weak, including possibility of returning to world wars, colonisation or vice versa.

All the scenarios are akin to "fog is democratic" where a bystander, a producer or profiteer, all will be affected sooner or later (Beck 1992: 36). Hence, making climate change a political game fitting developing countries against those in developed countries or the global north and global south further complicates finding workable solutions for the climate crisis (Newell and Bulkeley 2010). While focusing on who pays in financial terms as per responsibility in emission is important, however, it also raises a similar question on who pays in failure to govern risk, for example, marginalising section of communities—making them vulnerable to disasters (Newell and Bulkeley 2010).

Blame games aside, developed nations should show moral responsibility to lead the world by stopping carbon emission and financing mitigation and adaptation as well as losses and damage in developing countries. Developing countries must do their parts, including using petrodollars to quickly transition to greener future and demonstrating use of petrodollars responsibly and stopping oil curse. Both the developed and developing countries must engage in an inclusive and risk-informed development and effective disaster risk management efforts to counter the growing climate and disaster risk.

10.2 Disaster Risk

Disaster risk is a function of hazard, exposure, vulnerability and lack of coping capacity (UNDRR 2017). If the four elements (hazard, exposure, vulnerability and lack of coping capacity) interact, they could potentially cause loss, injury or damage to life, livelihoods or asset, a system, a community or a society in a given period of time (UNDRR 2017). This characterisation of disaster risk is not a complete departure from the early concept of risk. Early definition of risk puts emphasis on "perception of loss potential associated with interrelationship between among humans and between humans and their natural (physical), biological, technological, and behavioural environments—precisely described as interactions between humans and risk environment" (Hood and Jones 2004). There is a great deal of detail and simplicity, albeit, to some extent, complexity in the earlier definition of risk. The natural, biological, technological and behavioural elements signify hazard in the risk environment. However, this classification can also become complex as behavioural element of the risk environment could represent exposure, vulnerability and coping capacity. Similarly, the interaction between behavioural and technological elements could also produce a hybrid hazard (socio-technical). Whereas it may appear straightforward, the financial element of the risk environment may not only represent vulnerability and coping capacity but also exposure.

The element of risk environment is worth explaining to better understand the disaster risk context. First, the hazard. Hazard can be a "process, phenomenon or human activity that causes loss of life, injury or other health impacts, damage to property or social and economic disruption or environmental degradation" (UNDRR 2017). Precisely, hazard is a "phenomenon or circumstance capable of or perceive to cause harm or costs to human society or environment" (Hood and Jones 2004). Hazards can be natural (physical), technological, behavioural (terrorism), biological and technological (Hood and Jones 2004) or broadly as anthropogenic and natural or further divided into geological (geophysical), hydro-metrological, biological, environmental and technological (UNDRR 2017). Whereas social hazards such as burglary and terrorism were articulated in Hood and Jones' Hazards category, UNDRR excludes hazards arising of "human behaviour such as conflict or related social instability, which should be determined by national legislations or subject to interpretation by the international humanitarian laws" from the list of hazard-causing disasters (UNDRR 2017). However, the exclusion of social hazards from the list of hazards in the Sendai Framework portrays a rather political interpretation of risk, which undermines scientific autonomy. While the exclusion of some hazards tends to respect boundary of institutions dealing with conflict, it does not cause harm in any way to include social hazards as they, in principle, cause harm and cost to societies.

A word of caution in interchangeably interpreting hazards and disasters. Hazards are not disasters; hazards are inevitable but they do not necessary lead to harm or cost to a society. Exposure, if combined with vulnerability or coping capacity, may determine whether or not hazards may result in harm. Exposure is a condition of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas (UNDRR 2017). Hazard exposure may not result in harm or cost to a society. In a situation where people and assets are exposed to hazards, it may be dependent on level of vulnerability and coping capacity for the exposed to experience harm or a disaster. Vulnerability refers to "conditions, determined by physical, social, economic and environmental factors or processes which increase susceptibility of individual, a community, assets or systems to impacts of hazards" (UNDRR 2017). The opposite side of vulnerability is resilience, which refers to "the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recovery from effect of a hazard in a timely and efficient manner, including through preservation and restoration of essential basic services and functions through risk management" (UNDRR 2017). In a broader sense, some component of resilience may include coping capacity. Coping capacity encompasses ability of people, systems or organisations to manage adverse conditions, risk or a disaster. Coping capacities include awareness, resources and leadership for risk management during peacetime, during emergency or in an event of a disaster (UNDRR 2019).

Over the years, international efforts have been undertaken to address the elements of the risk environment to build resilience, i.e. reducing exposure and vulnerability and strengthening coping capacities. In 1979, the United Nations established International Framework of Action for the International Decade for Natural Disaster Reduction (IDNDR) (UNDRR 2019). The successes of the IDNDR would result in the Yokohama Plan of Action for a Safer World (1994–2004); Hyogo Framework for Action: Building Resilience of Nations and communities to disasters (2005–2015); and the Sendai Framework for Disaster Risk Reduction (2015–2030).

The Sendai Framework for Disaster Risk Reduction broadens scope of hazards in natural, technological and biological categories and places greater emphasis on small, large, slow or sudden-onset disasters (United Nations 2015b). The Sendai Framework's expansion of hazards and recognition of systemic nature of risks within the context of development are key to strengthening coherence among Sendai Framework and the other post-2015 frameworks. The other post-2105 frameworks include the Paris Agreement on Climate Change and Sustainable Development Goals.

Whereas the Sendai Framework has adequately addressed most of the hazards, it is widely criticised of choosing politics over science when it comes to climate change. Its exclusion of climate change from the disaster risk management process in pretext of avoiding political boundary missed an opportunity in addressing vulnerability in a comprehensive manner (Kelman 2015).

10.3 Climate Change's Impacts on Disaster Risk in Africa

Africa was chosen for this study for several reasons. First the authors are seasoned experts in disaster risk management who have been implementing disaster risk management programmes on the continent for decades. By virtue of their work on the continent, the authors found it easier to limit the study to Africa as they would find it easier to access wide ranges of data in comparison to the other continents. Second, observing first-hand the rising disaster risk across the continent, the authors took keen interest in understanding the drivers of the rising disaster risk as they observed what they referred to as a "neo-normal disaster risk paradigm" in Africa. The neo-normal disaster risk paradigm is referred to, by the authors, as a state of affairs in which occurrence of disaster events appears to be "normal" in a sense that rising disaster risks and associated disasters appear to be a normal part of daily life in many African communities. In the neo-normal disaster risk paradigm, disaster risk has been on the rise. However, actions to address the rising risk are undertaken as if everything is normal. The authors, then, interrogate the extent to which climate change might have been driving the rising risk on the continent.

Across the continent, disasters related to weather and climate have been on the rise (African Union 2020). Similarly, globally, climate-related disasters have also been on the rise since 1970 (UNDRR 2019). Whether the changing trends of climate-sensitive disasters can be attributable to anthropogenic climate change or vice versa has generated important scientific debates. Despite the rise in AGT, increase in exposure of people and assets to hazards in recent years is argued to be the main cause of increasing disaster trends and impacts (Visser et al. 2014). It is argued that the most recent rise, globally, in climate-related hazards such as head waves, cyclones, droughts, floods and wildfires among others might be due to natural climate variability (IPCC 2015). However, it becomes increasingly difficult to distinguish between climate-related disasters that might be attributable to anthropogenic climate change and those that might be blamed on natural variability.

In an attempt to address the growing concerns over the influence of anthropogenic climate change on climate-sensitive disaster risks, interest on event attribution science has witnessed unprecedented growth (Seneviratne and Zwiers 2015). Consequently, a number of event attribution studies in Africa have been undertaken in recent years. In Senegal, a study on attribution of anthropogenic climate change to the severe urban flooding in Dakar in 2012 was conducted and generated mixed, yet important views among the respondents (Young et al. 2019). When asked on the possible attribution of anthropogenic climate change to the flooding, majority of the respondents believed that the flooding was due to anthropogenic climate change. However, other respondents cautioned that attributing a single event to anthropogenic climate change may be difficult (Young et al. 2019). Similar study on influence of anthropogenic climate change on the Ethiopia's severe drought in 2015 could not establish a link (Philip et al. 2018). What then is driving the rising disaster risk on the continent over the past decades?

10.3.1 100 Years of Climate-Related Disasters in Africa: 1920–2019

The past 100 years in Africa witnessed increased climate-related disasters (Université catholique de Louvain 2020). Climate change and development-linked factors are seen as major drivers engendering the rising disaster trends (African Union 2020). However, distinguishing development-induced risks from anthropogenic climate change risks is key to understanding impacts of climate change on the rising climate hazards and related disasters in Africa. Yet, obtaining comprehensive data to inform such analysis is extremely difficult, particularly in Africa (African Union 2020). Across the continent there is a widespread inadequate data collection and management capacity in many African states (African Union 2020). Where such data exist, it is usually incomplete and may be difficult to make significant scientific conclusions. Nonetheless, ongoing efforts by the African Union and United Nations Office for Disaster Risk Reduction in supporting member states in Africa to report on the Sendai Monitoring online platform are making significant improvement in reporting by the member states. While improvement in reporting in the Sendai Monitor has been observed, most data related to disaster losses remain, to large extent, incomplete (African Union 2020). However, for the purpose of this analysis, some international databases that store significant amount of data on disaster losses and climate change were consulted.

The data for climate-related disasters and average global temperature for the past 100 years covering 1920–2019 has been obtained from EMDAT and NASA databases. The 100-year data was classified into 10 decadal time series for ease of analysis. In tandem with the decadal time series, AGT for the similar period has been presented in adjacent column. The decadal time series and AGT on one hand and the climate disaster events and resultant impacts on the other hand were then analysed in juxtaposition (Table 10.1).

Table 10.1 Analysis of climate-related disasters in tandem with AGT in Africa (1920–2019)

Decadal time series	Average global temperature (AGT)	Climate hazard/related disasters in Africa	Mortalities	Affected people
1920–1929	−0.23	2	27,000	0
1930–1939	−0.12	0	0	0
1940–1949	0.04	11	500,165	0
1950–1959	−0.04	7	879	0
1960–1969	−0.03	58	3853	10,645,539
1970–1979	0.04	84	120,745	28,297,390
1980–1989	0.25	173	557,699	92,050,877
1990–1999	0.39	264	9072	105,924,246
2000–2009	0.59	609	10,590	147,302,398
2010–2019	0.80	544	33,648	164,897,781

Source: EMDAT: 1920–2019 (Université catholique de Louvain 2020)

Inferring from the data captioned above, the decade 1920–1929, which was the coolest decade in the series, recorded only 2 disasters that gave rise to 27 mortalities. The mortalities were mostly in Cabo Verde and Algeria. Interestingly, no climate-related disaster was recorded during the decade 1930–1939, despite it being warmer than its predecessor. Other reasons for the lack of record may be due to historical events such as the Great Depression and World War II (WWII). Similarly, the lack of records might have been equally due to, perhaps miraculously, hazards that occurred during the decade had not necessary resulted in disasters.

The first 50 years (1920–1969) of the 100-year period under consideration witnessed highly variable climate, with sudden rise in AGT occurring every other two decades. For example, the first two decades (1920–1929 and 1930–1939) were the coolest period of the 100-year period. However, following the end of these coolest decades, the AGT jumped exponentially high by the decade 1940–1949. Furthermore, the two decadal series that followed (1950–1959 and 1960–1969) recorded a sudden and significant decrease in AGT.

By the end of the first 50 years (1920–1969) that witnessed significant variations in AGT, the last five decades (1970–2019) that followed consistently recorded upward AGT. During the last five decades of the 100-year period under consideration, three important characteristics have been observed. First, the AGT increased exponentially from 0.4 °C in the decade 1970–1979 to 0.25 °C in the decade 1980–1989. Similarly, the decade 1990–1999 further recorded increased AGT by 0.39 from 0.25 °C in the successor decade. The last two decades (2000–2009 and 2010–2019) were the hottest decades in the series. Second, climate hazards and disasters during the last five decadal time series increased exponentially—with the highest hazards/disasters recorded during the decade 2000–2009. Third, there was significant reduction in disaster mortalities, particularly during the last three decades of the last 50 years in the series. However, the decade 1980–1989 witnessed the worst disaster mortalities ever recorded on the African continent. From the decade 1990–1999 onward, Africa witnessed more disasters, albeit fewer mortalities and more people affected, which continued to grow by a large margin every decade that follows.

As can be observed from the tabular analysis presented above, the earliest decades witnessed fewer disaster events but more mortalities. The number of affected people in the earliest decades was not available; perhaps this could explain that such an indicator was not included in the earlier indicators. Conversely, the latest and the warmest decades recorded more disasters that have affected more people and, notwithstanding, fewer mortalities. The difference between fewer events resulting in more mortalities in the earlier decades and more events ensuing to fewer mortalities towards the end of the 100-year period could be due to increased awareness and better management of disasters during the latest decades (UNDRR 2019). However, some cautions ought to be taken when making interpretations on disaster losses in relation to intensity of hazards. Minor hazards may result in a disaster with massive loss of lives and assets. Yet a stronger hazard may create fewer losses when exposure is minimal. By virtue of population density crowded in areas prone to hazards, unregulated urbanisation is seen as a major risk driver. This

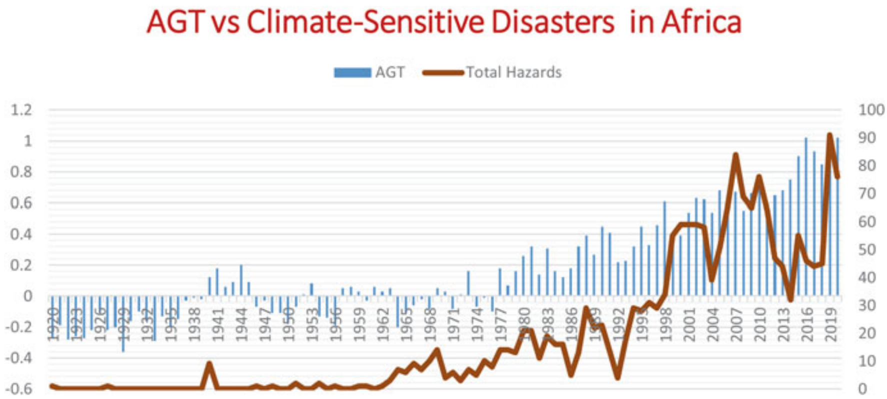


Fig. 10.2 Comparative analysis of the climate-related disasters in Africa against AGT (1920–2019). Source: NASA (2021) and Université catholique de Louvain (2020). The blue colour represents the average global temperature (AGT), and the brown colour represents the climate-related disasters during the period 1920–2019

situation can be best illustrated with Cyclone Idai that made landfall in Mozambique, Zimbabwe and Malawi in March 2019 and Cyclone Kenneth that followed 2 weeks later in Mozambique, in April 2019.

Beira, a city so important not only to Mozambique but to the countries in south-eastern Africa, due to its important port facilities, suffered colossal damage when the city was hit by Cyclone Idai. The cyclone also induced major disasters in Zimbabwe and Malawi. In Mozambique alone, over 600 people were reported dead (Emerton 2020), and several hundreds more were unaccounted for. The economic losses were estimated in billions of US dollars, and the social impacts were immeasurable. Several years later, innocent bystanders who were victims of the Cyclone Idai disaster were still languishing in displaced camps and may never return to normalcy or to what they would call a home. After Cyclone Idai in Mozambique, 2 weeks later, Cyclone Kenneth hit Mozambique again. The intensity was felt more in rural areas, coincidentally with less population density. By comparison, Kenneth was the strongest cyclone that ever made landfall on the African continent. Yet the death tolls and other related losses were far fewer than losses from the Cyclone Idai.

Thus, it can be argued that high population density and vulnerable assets exposed to hazards can create severe disasters, sometime with fairly less severe hazards. Further analysis of the occurrences of disasters induced by climate hazards in Africa is presented below (Fig. 10.2).

By contrast, and despite some downward movements in average global temperature during the first half of the 100-year period, climate hazards remained stable and, to some extent, variable. During the period 1920 to 1960, climate-related disasters remained significantly low, despite sudden rise in global temperature in 1941 as well as abrupt rise of disasters in 1940.

Surprisingly, while AGT was reducing during the period 1964–1968, albeit some minor variability, climate-related disasters were on the rise during the same period.

The rise in climate-related disasters was attributed to El Nino Southern Oscillation (ENSO) episodes during that period (NOAA 2021). Since 1977, AGT consistently moved upwards as well as climate-related disasters that followed the similar trend, albeit zigzag motion. Similarly, the sharper rise in climate-related disasters in 1986–1987 was attributable to ENSO, one of the strongest since 1940 (NOAA 2021). In the same vein, notable increase in climate disasters from 1993 through 2010 was in line with frequent occurrence of ENSO episodes (NOAA 2021).

As it can be observed from the AGT-climate-related disaster nexus in the graph captioned above, disasters did not necessarily follow the rise in AGT; instead, at some instances, disasters moved towards opposite direction. For example, from 1990 to 1992, there was sharp decline in disaster events, yet AGT was exceedingly increasing. Similarly, there was opposite direction movement of disaster events in 2013 and 2014, respectively, before the number of disaster events could skyrocket in 2015/2016 and 2017/2018, respectively. The rise in climate-sensitive disasters in 2015/2016 corresponded with 2015/2016 ENSO (African Union 2020).

10.3.2 The ENSO Events: 1920–2019

The occurrences of climate-related disasters were mainly driven by El Nino Southern Oscillation (ENSO). The fewer and weaker the ENSO events, the fewer the climate-related disasters. Similarly, the stronger and more frequent the ENSO episodes, the higher the increase in frequency of climate-related disasters (Fig. 10.3).

The first 40 years of the 100 years under consideration were characterised by fewer ENSO events. That seems to explain the flattening of the climate-related disasters' occurrences between 1920 and 1940. However, the strongest ENSO episode in 1940 resulted in sudden rise in number of climate-related disasters, particularly in Western Africa (Université catholique de Louvain 2020). The climate-disaster curve flattened again despite fewer ups and downs from 1941 to 1960. This was partly due to five weak ENSO episodes recorded during the 10-year period. By the end of 1964, the number of ENSO became more frequent as a result of two strong ENSO episodes in 1986/1987 and 2015/2016, respectively. Despite being

Fig. 10.3 ENSO timelines: 1920–2019. Source: National Oceanic Atmospheric Administration (NOAA 2021) and Australian Bureau of Meteorology (2021). The bars represent ENSO episodes. The thicker the bar, the stronger the ENSO episode

weaker, the ENSO episode in 1984 resulted in 300,000 mortalities and over 7.7 million people affected in Ethiopia. The World Vision put the death tolls to an estimated one million mortalities (Reid 2018).

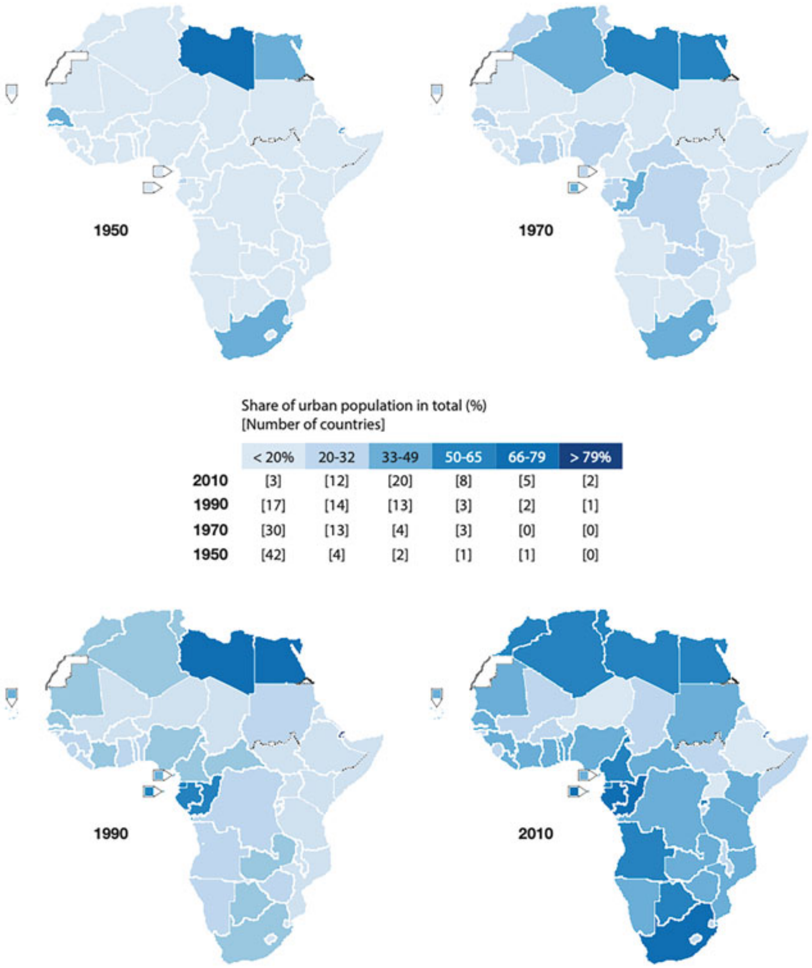
By contrast, Ethiopia was hit by stronger ENSO episode in 1986/1987 with resultant death tolls estimated at 367, and over seven million people were affected, a much lower impact than the impact of previous but weaker ENSO episode in 1984. This seems to suggest that the 1984 catastrophic famine, despite having been exacerbated by droughts, was mainly made possible by the conflict that hindered humanitarian access to the drought-affected populations (Reid 2018). Similar strong ENSO episode that hit the African continent in 2015/2016 resulted in lesser mortalities. In Ethiopia, only 100 mortalities were recorded. This was far lesser than previous stronger ENSO episodes in 1940 and 1987/1988, respectively. The reduction in losses could be attributed to increased improvements in early warning systems (Mera 2018) and improved risk protection measures (Hallegatte 2014).

10.3.3 ENSO and the Anthropogenic Changing Climate

ENSO naturally occurs between 3 and 8 years (Desonie 2008) or 3 and 5 years (Giddens 2009) and has been a cause of many climate events over millennia (Contescu 2012). However, in recent years, ENSO episodes have increased in frequency (NOAA 2021). The last 30 years of the 100-year period witnessed increased frequency of ENSO events. In Ethiopia, all droughts were ENSO driven and have continued to become increasingly frequent, albeit weaker (Mera 2018). Nevertheless, there is no established scientific correlation yet between ENSO occurrences and anthropogenic climate change (Contescu 2012). However, future ENSO events under high concentration of greenhouse gases in the atmosphere may increase further in frequency and magnitude (NOAA 2021).

While the influence of anthropogenic climate change on the frequency of the occurrences of ENSO episodes cannot be ruled out, the rise of climate-related disaster events in Africa towards the end of the 100-year period was likely due to increased exposure as a result of increased population and urbanisation. Urbanisation and population growth on the continent were on the rise since the 1950s (OECD 2020). By 1950, only 27 million African lived in urban centres; however, by 2010, the African urban population has grown to 567 million (OECD 2020). Yet by 2050, the urban population in Africa is projected to double (OECD 2020). The comparative diagram by OECD patently explained the Africa's urbanisation dynamics (Fig. 10.4).

The urbanisation and population growth in poorly planned settlements are expected to further worsen hazards' exposure. The Africa Biennial Report 2015–2018 highlighted substantial increase in hazard exposure in most African regions (African Union 2020). The rise in climate hazards coupled with growing pests' infestations, epidemics, industrial accidents and unregulated urbanisation and development (African Union 2020) seems to have a combined devastating impact



	< 20%	20-32	33-49	50-65	66-79	> 79%
2010	[3]	[12]	[20]	[8]	[5]	[2]
1990	[17]	[14]	[13]	[3]	[2]	[1]
1970	[30]	[13]	[4]	[3]	[0]	[0]
1950	[42]	[4]	[2]	[1]	[1]	[0]

Fig. 10.4 Africa's urbanisation trends—1950–2010. OECD/SWAC 2018, Africapolis (database): Geopolis 2018

(IFRC 2020). Coupled with increase in population density and widening inequalities, "more people and development itself will be exposed to climate hazards" (IFRC 2020). Consequently, disaster risks will become more multidimensional and overlapping as witnessed with COVID-19, desert locust infestation and flood—all occurring simultaneously in one area (IFRC 2020), hence creating a complex neo-normal disaster risk paradigm.

10.3.4 Neo-normal Disaster Risk Paradigm

Neo-normal disaster risk paradigm summarises contemporary and complex realities in managing risks in an increasingly complex world and in African context. The neo-normal disaster risk paradigm is characterised by being overtaken by events, heightening vulnerability and increasing hazard exposure amidst dwindling coping capacities.

In the neo-normal disaster risk paradigm, the “dormancy of risk is over, the invisible hazards are now visible” (Beck 1992). Beck listed the most precarious ones. They are the “transformation of forest into skeletons, inlands waterways and seas crowned with foams, animal bodies smeared with oil, erosions of buildings and artistic monuments by pollutions, the chain of toxic accidents, scandals and catastrophes” among others (Beck 1992: 55). Beck was describing a far better risk situation than the neo-normal disaster risk paradigm characterising postmodern society. In his time, Beck was concerned of pollution and industrial accidents. Today, industrial accidents and pollution still exist, albeit some improvements. However, the assertion that Beck was describing a better situation than today was due to the fact that more disaster events and associated losses are being recorded and more nature is being destroyed in an alarming rate. Since the 1990s, over 420 million hectares of forest have been lost through other land uses (FAO 2020). Recent disasters in Africa are some of the worst events never recorded on the African continent. How one would wish getting Beck’s insight after having seen half a million dead humans laying bare in Haiti in 2010 or the victims of Cyclone Idai being flushed by heavy debris several miles from Mozambique to mix with corpses of similar victims from Zimbabwe and other many examples of human misery in postmodern society. In his conversation with Culver in 2011, Beck was asked by Culver: “are we yet in risk society now”? (Culver et al. 2011). His response was that “we were in a stage where risk has escaped the control of institutions” (Culver et al. 2011).

10.3.4.1 Being Overtaken by Events

In the neo-normal disaster risk paradigm, it is not only a question of addressing “prevention of new risks, reducing existing risks, managing residual risks and building resilience” (United Nations 2015b) but a choice between prioritising responding to ongoing events and coming back later to respond to disaster risk in peacetime. Yet there may never be “peacetime” as the space between recoveries from one disaster event to another has been significantly narrowing in recent years. In 2020 alone, many countries witnessed, albeit simultaneously, COVID-19, flooding and desert locust infestations. In some countries, there was confluence between COVID-19, flooding or drought and desert locust invasion, which further compounded vulnerabilities and systemic risk (IFRC 2020). Hence “understanding the degree of cascading risk and developing ways to isolate, measure and manage or prevent systemic risk is becoming challenging" (Gordon 2020). A systemic risk refers to cascading events with domino effects across different sectors or territories and has potential consequences to result in existential threat or an entire system collapse (Silmann et al. 2022). The COVID-19 pandemic has helped in understanding systemic risk. For example, COVID-19, a virus that was first reported in Wuhan, quickly spread across the world and cascadingly become not only a health system disaster but economic and socio-economic catastrophe. COVID-19 also confluence with cyclones, flash flooding and other sudden-onset events that created mass population moments further quickened spread of the virus among the vulnerable population (African Union 2021a, b). Similarly, COVID-19 diverted attention and resources that would have been, otherwise, used for responding to other disasters (African Union 2021a, b).

Rooted in inherent systemic inefficiencies underpinning risk management in many African states, being overtaken by disaster events in cyclic passion is increasingly becoming normal. Further compounding this behaviour is habitual failures of hindsight (Toft and Reynolds 2005). One of the reasons that engrain cyclic failure in learning from past events is profound failure in undertaking comprehensive disaster forensic to inform post-disaster recovery investment and rebuilding of better and resilient society that is better prepared and resilient to future risks and uncertainties. Other factors motivating this habitual failure of hindsight include erroneously adopting irrelevant strategies for addressing complex risks of the twenty-first century (Beck 1992). A case in point, believing in disaster management funds to respond to future disasters without investing in understanding, reduction and mitigation of risks over time does not only perpetuate risk but "sanitising the world of hazards" (Toft and Reynolds 2005). These traditional and erroneous strategies rooted in pre-industrial societies are irrelevant in postmodern society (Beck 1992).

10.3.4.2 Heightened Vulnerability, Exposure and Dwindling Coping Capacities

Owing to increased disaster events, socio-economic resilience of communities has been weakened if not completely eroded as the gaps between different events don't allow for full recovery because of "short recovery intervals and large financial gaps" (Pardo 2021). To depict this situation, the African risk profile will be discussed. The risk profile is presented according to the Regional Economic Communities (REC), the regional organisations which form the building block of the African Union. These include East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS) and Intergovernmental Authority on Development (IGAD), Arab Maghreb Union (UMA) and other North African states that are not members of UMA, and Southern African Development Communities (SADC) (Fig. 10.5).

The methodology that informed the map was adopted from Index for Risk Management (INFORM). The INFORM methodology categorises risk into five:

REC	2015	2016	2017	2018
EAC	5.9	6.0	6.4	6.2
ECCAS	3.2	4.9	5.5	5.4
ECOWAS	4.5	4.4	4.9	5.0
IGAD	6.5	6.5	6.8	6.8
North Africa	4.3	4.3	4.6	4.5
SADC	4.3	4.1	4.3	4.4
Africa	**4.8**	**5.0**	**5.4**	**5.4**

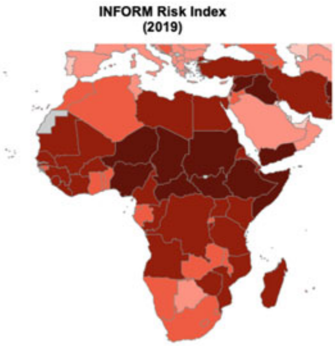


Fig. 10.5 African disaster risk profile. Source: Toft and Reynolds 2005's Africa Biennial Report on DRR (2020)

REC	2015	2016	2017	2018
EAC	4.8	4.8	5.9	5.5
ECCAS	3.5	5.5	5.4	5.5
ECOWAS	2.7	2.7	3.6	3.7
IGAD	5.6	5.5	6.2	6.1
North Africa	4.2	4.2	5.6	5.3
SADC	3.2	2.4	3.0	3.4
Africa	**4.0**	**4.2**	**5.0**	**4.9**

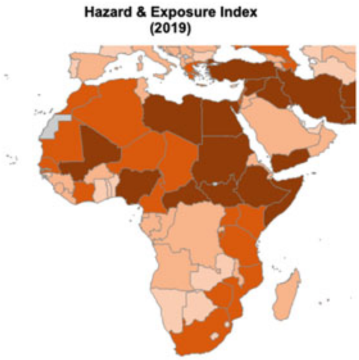


Fig. 10.6 Hazards and exposure. Very low = 0.0–1.4, low = 1.5–2.6, medium = 2.7–4.0, high = 4.1–6.0, very high = 6.1–10.0

very low risk (0.0–1.9), low risk (2.0–3.4), medium risk (3.5–4.9), high risk (5.0–6.4) and very high risk (6.5–10.0).

Analysing from the statistics captioned above, the overall risk index for the continent ranges from 4.8 to 5.4 during the 4-year period. In average the risk profile stands at 5.15. This indicates that Africa has a high-risk profile. In addition, exposure, vulnerability and lack of coping capacity are also high (Fig. 10.6).

The overall continental exposure to hazards, as it can be observed from the above diagram, ranges from 4.0 to 5.0 during the 4-year period—implying high exposure (Fig. 10.7).

The continent's vulnerability ranges from 5.0 to 5.5, falling within the threshold of high vulnerability index. The high vulnerability index seems to be a strong factor underneath rising disaster events on the continent (Fig. 10.8).

The overall lack of coping capacity for the continent is high.

REC	2015	2016	2017	2018
EAC	6.3	6.6	6.5	6.5
ECCAS	3.5	5.5	5.4	5.5
ECOWAS	5.5	5.5	5.3	5.2
IGAD	6.6	6.9	6.8	6.8
North Africa	3.5	3.4	3.3	3.3
SADC	4.8	4.8	4.6	4.7
Africa	**5.0**	**5.5**	**5.3**	**5.3**

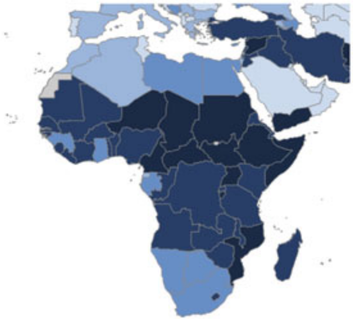


Fig. 10.7 Vulnerability. Very low = 0.0–1.9, low = 2.0–3.2, medium = 3.3–4.7, high = 4.8–6.3, very high = 6.4–10.0

REC	2015	2016	2017	2018
EAC	6.9	6.8	6.8	6.8
ECCAS	5.4	7.0	6.9	6.9
ECOWAS	7.1	6.8	6.7	6.6
IGAD	7.7	7.6	7.5	7.5
North Africa	5.9	5.8	5.7	5.6
SADC	6.2	6.1	5.9	5.9
Africa	**6.5**	**6.7**	**6.6**	**66**

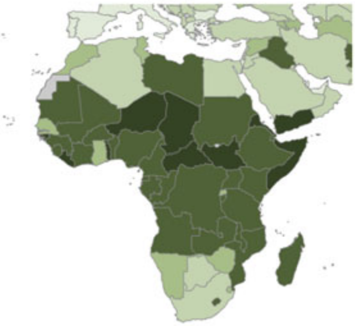


Fig. 10.8 Lack of coping capacity. Very low = 0.0–3.1, low = 3.2–4.6, medium = 4.7–5.9, high = 6.0–7.3, very high = 7.4–10.0

Rising inequalities, brought about by development or what Beck referred to as reflexive modernity, further add more complexities and induce vulnerabilities, particularly in urban areas. By reflexive modernity, Beck meant to sketch what he referred to as manufactured uncertainties which he depicted as by-products of radical modernisation (Culver et al. 2011). For example, in an attempt to create better housing and cities, inadvertently this creates congestion and invasion of more nature as population moves to the centre to access service. According to Beck, "environmental problems are not just environmental problems; they are induced by institutions of modernisation" (Culver et al. 2011). This is true of the current urbanisation dynamics. Current and future urban development trends tend to promote rural-urban migration as governments, inadvertently, or perhaps deliberately, place most of the critical services, including health services, water and hygiene and sanitation facilities, education services and other important needs, in urban centres. Likewise, new concepts such as "smart cities or resilient cities" point to future trends that build on the current urbanisation practices, which amplify rural-urban migration—further widening inequalities and vulnerability. Consequently, the villages are forced to move to cities, further driving the rural migrants to further vulnerability. In response to the pressure, urban slums grow as more people live in congested spaces—facilitating poor hygienic conditions (Srivastava 2020). Therefore, resilience measures must first address these inequalities and development-engendered vulnerability to reduce exposure and prevent development-induced vulnerability, for example, by ensuring balance in access of services by both urban and rural populations.

10.3.4.3 Neo-normal Disaster Risk Paradigm: A Prophecy Comes True

The neo-normal disaster risk paradigm, in the context of "risk society", is a prophecy that has come true. The risk society theory postulates the notion of "modernity" as a profound social transformation from industrial society to risk society or "simple to reflexive modernity" (Beck 1992; Walker 2004).

Industrialisation, in the view of risk society, was meant to create wealth; it turns out it is killing nature, and worrisomely, the risks produced in late modernity surpass wealth and cause irreversible damage as industrialisation becomes reflexive in its transitions to modernity (Beck 1992). In reflexive modernity era, hazards become increasingly reflexive in process of modernisation and defy the attempts by governments and the elites to control them (Beck 1992).

Importantly, Beck's concern of industrialisation that is generating wealth in expense of risk is not only a true reflection of climate change today but an appealing reality that must be used to inform loss and damage negotiations—in which the industrial nations trench in to defy their rightful roles. Recent events such as chemical accidents in Lebanon, wars and flooding across the globe have not only reignited the debates about the risk society theory but have propelled the paper to one that is highly cited in academic literature (Culver et al. 2011).

Resonating with Beck's risk society debates, Perrow, in his book *Normal Accidents: Living with High-risk Technologies*, contends that technological risks are multiplying. He emphasised that as "technology develops, as wars increase, as human invade nature, there is a tendency of creating complex systems and organisations that increase risks to operators, passengers, innocent bystanders and future generations" (Perror 1999). Perrow's list of high-risk technologies resonates with Beck's reflexive modernity as the duo inclined towards socio-technical hazards and risks. Perrow's list of high-risk technologies includes dams, nuclear plants, aircrafts and airports among others. In his opinion, Perrow's high-risk technologies are highly coupled, inevitable and even normal (Perror 1999).

Perrow's analysis of normality, coupling or redundancy is highly relevant concepts to today's neo-normal disaster risk paradigm. By uncoupling and introducing redundancy in designs and ensuring equity and fairness in development endeavours, the neo-normal disaster risk paradigm can be uncoupled and de-normalised. By uncoupling the neo-normal disaster risk paradigm, development must build resilience (redundancy) and ensure no one is left behind. Similarly, while in agreement with "reflexive modernity" and "normal accidents" debates, there is a need to clarify that "modernity" in itself is not evil; what is evil is modernity that is not risk-informed.

10.3.5 Re-conceptualising Resilience in Neo-normal Disaster Risk Paradigm

Contemporary measures being put in place to respond to the neo-normal disaster risk paradigm are too little, too fragmented, too late and too insufficient to counter the risk (IFRC 2020). In Africa, despite major progress being made by African governments, the continent's risk profile has remained high. Over the years, significant improvements have been made in building institutions. Many African states, albeit having so many competing priorities, are making investments on resilience building (African Union 2020). However, resilience initiatives are largely reactive in nature, a situation likened to an army that prefers to wait an enemy force to attack first rather than confronting the enemy from afar. In so doing, the army digs itself in defensive positions. Taking defensive position represents a metaphor that is akin to a tortoise retreating its head to its shelf as it senses danger—hence a hunter would comfortably collect the tortoise as it could not see its predator.

To further demonstrate the contemporary resilience challenges, a study undertaken by the AU Commission on the status of multi-hazard early warning system in Africa found a shocking decline in weather and climate observational stations, which are very critical for early warning, early actions and disaster preparedness and response. The diagram below depicts the rate of decline (Fig. 10.9).

The decline in observational weather stations was mainly due to challenges relating to maintenance of equipment, especially in remote areas. However, investments are being made to modernise the hydro-meteorological observational networks. Such services are highly critical for resilience building and implementation of effective early warning systems (African Union 2021a, b).

In addition to establishing agile early warning systems, governments would need to invest in sustainable and innovation solutions and resilience measures that generate dividends. An effective resilience action must have triple dividends: (1) prevents and reduces disaster risks and losses, (2) generates economic benefits and (3) promotes environmental well-being (Surminski and Tanner 2016). Converting risk-prone areas into development and investment opportunities can contribute to unlocking economic potential through increasing land value and more investment (Surminski and Tanner 2016).

In addressing resilience in the neo-normal disaster risk paradigm, the disaster risk management and/or climate change community and, by extension, the larger development community must review implementation of resilience concepts such as mainstreaming of disaster risk reduction (DRR) and climate change adaptation (CCA) in development programmes. Over the years similar applications and

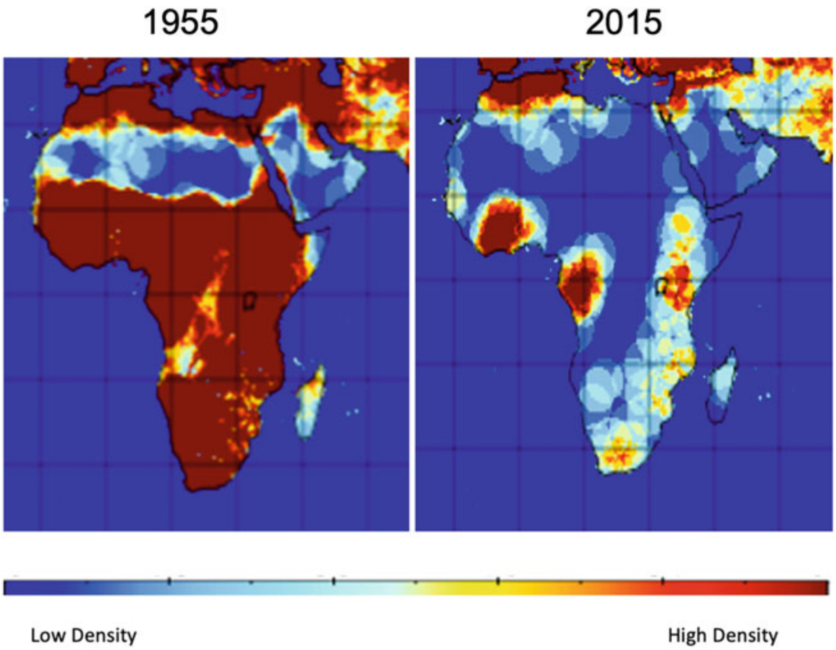


Fig. 10.9 Fully operational hydro-meteorological observation stations per 1,000,000 km^2. Source: Status of Multi-Hazard Early Warning System in Africa -African Union (2021)

practices for mainstreaming the duo in development processes have continued for years if not decades, yet disaster losses continue to rise and undermine development gains. Development projects, for purposes of meeting policy requirements for securing financing, would tick boxes to meet the "mainstreaming" per se. As in production markets, some products have 10 or even 20 or more years of warranty, development projects must incline towards this practice if they have to achieve resilience. That way, a development project may not close until the warranty period expired.

A paradigm shift is, therefore, needed to re-politicise disaster risk governance arrangements to make them robust enough to respond to the current risk management context (Gordon 2020), including inter alia development of new political instruments that make CCA and DRR mandatory for any development project or programme and ensure enforcement thereof.

10.3.6 Re-politicising CCA and DRR to Counter Neo-normal Disaster Risk Paradigm

The most effective way to reduce growing climate risks and tame the neo-normal risk paradigm in Africa is to reduce vulnerability and exposure through effective CCA and DRR actions that are synergistically implemented, inclusive and tailored to address root causes of vulnerability, including exposure (IFRC 2020). Two hypothetical projects have been illustrated in the next paragraph to further emphasise this point.

Project A was a road construction project that was the only lifeline for several rural centres whose livelihoods and survivals were mainly dependent on the road. Conversely, the areas were rich in minerals and contributed to 50% of the growth domestic products (GDP) of the entire nation. This project took into account CCA and was considered climate-proof. Two years later, a 7.2 magnitude earthquake on Richter scale hit the area causing complete damage to the road and cutting off the rural centres. The population suffered high fatalities due to delayed response as the road was completely damaged. The emergency operations and direct economic losses emanated from the disaster were estimated to be 10 billion USD. Yet, the country was dependent on external debt to finance emergency operations and recovery efforts, to the tune of 1 billion USD. The country also lost 75% of its GDP, making it one of the poorest. Due to rising poverty, crime rates increased exponentially. Citizens had to leave in poor hygienic conditions, and the country witnessed one of the worst cholera outbreaks that killed 1200 people.

Project B was undertaken in a separate country in one of the dry lands of Africa. Due to frequent droughts, there was chronic water crisis in the countries' ten villages at its northern border. To mitigate the effects of droughts, ten water pumps were constructed in the ten villages. To be "fair", each village was assigned one water pump. The population of the villages was not used as a criterion for allocation of the water pumps. According to the national census that was conducted 3 years earlier, one of the villages had catchment population of 15,000. The governance arrangement in the villages is done in such a way that each village is led by a Chief. The ten Chiefs report to the overall Chief who has overall oversight for the ten villages. The national government coordinated the implementation of the project with the overall Chief. The team had ensured that the pumps were built within the water table and as per the assessment. The construction of the pumps also took into account future climate change predictions.

Coincidentally, the overall Chief comes from the smallest village with a population of only 300 people. As days passed by, the village with the population of 15,000 was undergoing violent conflicts due to competition over limited water facility, which the community experienced for the first time. In order to find solutions to the conflict, the villagers contemplated and realised that their village, despite it having the largest population, was given only one pump. Yet the village with the smallest population, where the overall Chief lived, had one pump that was fairly enough for them. The village with the largest population was angry and had to plan an attack on the paramount Chief for being unfair. The fighting ensued and the peaceful villages joined the either side of the two fighting villages. The conflict displaced several thousands of people, mostly women, children and elderly to a nearby town where they were kept in displacement camps, unfortunately, located in flood-prone area. A flash flood occurred, killing 350 of them and further displacing the entire population. Back home, the fighting continued for years until the entire area villages were abundant and the water pumps were left desolate and later worn out due to lack of maintenance.

The key message emanating from the two projects is that CCA or DRR actions that do not take into account other risks are as worst as the vulnerability they tend to address—hence, they instead induce disasters. Oftentimes CCA and DRR actions focus on physical risks and do not consider conflict sensitivities. Learning from the two projects, even if DRR and CCA were to be fully incorporated in development processes, without considering other social vulnerabilities and conflict sensitivities, development project will still create new risks and disasters. In the project B, CCA was fully incorporated in the design of the water pumps; however, the project disregarded potential unintended consequences that later culminated in destruction of social cohesion of peaceful communities.

The two projects captioned above further emphasised the need to ensure better integration and collaborations between CCA, DRR and peace building stakeholders. Present-day institutional settings for CCA and DRR further complicate strengthening synergies as they are positioned in separate institutions with no or little coordination. This disintegration means that CCA and DRR have been implemented separately and "both have failed to reduce vulnerability" (Thomalla et al. 2006). In the words of Antonio Guterres "If I had to select one sentence to describe the state of the world, I would say we are in a world in which global challenges are more and more integrated and the responses are more and more fragmented, and if this is not reversed, it's a recipe for disaster" (Gordon and Williams 2020). The World Disaster Report 2020 put it precisely that "the conversations are in silos—they use different terminology, attend different events and develop parallel frameworks—resulting to different priorities being developed; different conclusions being drawn; and different areas being perceived as someone else responsibility" (IFRC 2020). In fact, CCA in actual sense means climate disaster risk reduction. As such CCA actions can be delivered by the broader DRR actions (Booth 2020). Whereas this seems a reasonable technical recommendation, institutional politics may render consideration of CCA as a component of DRR a nonstarter. Instead many institutions are increasingly placing DRR as a component of climate change adaptation. This implies that all hazards are seen as climate change induced. This does not only portray negligence in understanding broader mandate of disaster risk reduction but a dangerous politicisation of CCA and DRR, and perhaps, a daring attempt in overselling climate change narrative (Storch 1999). For example, project A has illustrated that even if all climate risks are accounted for in a development programme, the resilience of such investments cannot be guaranteed if all other risks are not factored in the programmes.

Hence, a re-politicised CCA and DRR governance, where CCA and DRR are structured under integrated disaster risk management, would ensure comprehensive and coordinated implementation of disaster and climate risk reduction programmes, including coordinated implementation of the post-2015's agenda: Sendai Framework for Disaster Risk Reduction, Paris Agreement and Sustainable Development Goals, to build resilient societies.

10.4 Conclusion

This chapter examined rising disaster risks in Africa and the role anthropogenic climate change might have played in the rising disaster risks on the continent. A 100-year disaster statistics in Africa covering the period 1920–2019 was analysed in juxtaposition with average global temperature for the same period. The rising climate-related disasters in Africa are mainly driven by ENSO episodes that have increased in recent years. While the influence of climate change on the frequency in the occurrences of ENSO episodes cannot be ruled out, the rise in the climate-related disaster events in Africa towards the end of the 100-year period is likely due to increased exposure as a result of increased population growth, which is being characterised by rapid and unregulated urbanisation.

In recent years, nearly all the deadliest disaster events since 2015 in Africa have occurred in urban areas. With the growing population density and widening inequalities, more people will be vulnerable and exposed to climate hazards as disaster risk will become multidimensional and overlapping as witnessed with COVID-19, desert locust infestation and flood, all occurring simultaneously in one area (IFRC 2020), hence creating a complex neo-normal disaster risk paradigm.

Neo-normal disaster risk paradigm is characterised by being overtaken by events amidst heightened vulnerability, hazard exposure and dwindling coping capacity. Inexcusably, the current resilience measures are inadequate; hence, a paradigm shift is required to embracing and investing in resilience actions that yield triple dividends to tame the neo-normal disaster risk paradigm characterising disaster risk management in Africa.

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