Khartoum
Disaster Risk Reduction Action Plan
2019 -2023

UNISDR
United Nations Office for Disaster Risk Reduction

Executive Summary

Khartoum State is the most important state of the 18 states of Sudan. It contains Khartoum the capital city and is the major trading, financial and political center of Sudan. The State is vulnerable to natural disasters, especially drought, flash floods, floods, torrential rains, earthquakes, dust storms and other environmental hazards. It is also subjected to smaller scale but frequent hazards such as fires and epidemics. Those hazards affect the livelihood of people, damage infrastructure, develop health risks, cause economic losses, and disrupt development plans. Sudan developed a national Disaster Risk Reduction (DRR) strategy for 2016-2030, similarly Khartoum State developed its own DRR strategy. This document is developed as the action plan for disaster risk reduction for the Khartoum State, which is aligned with both the national and state strategies. The action plan was developed with the participation of the key stakeholders for Khartoum State. The work on the action plan is part of the "Making cities sustainable and resilient: implementing the Sendai Framework for Disaster Risk Reduction 2015-2030 at the local level," which is a three-year initiative by the United Nations Office for Disaster Risk Reduction (UNISDR) and the United Nations Human Settlements Programme (UN-Habitat), supported by the European Commission. Four Arab cities, among 20 cities globally were selected to participate in the initiative, including Khartoum, Republic of Sudan; Ismailia Governorate, Egypt; Nablus, Palestine; Nouakchott, Mauritania. The methodology adopted for preparing the plan is based mainly on the use of UNISDR scorecard assessment, in addition to the literature review and input from Khartoum focal point (the Ministry of Infrastructure and Transport) for the initiative mentioned above. The scorecard is structured around the Sendai ten essentials, which provide an operational framework of Sendai Framework at the local level. No

clear law in Sudan governs activities related to Disaster Risk Reduction (DRR). The Khartoum State Strategy for Disaster Risk Reduction (KSSDRR) Called for a new institutional structure for DRR to enhance the capabilities of the State in DRR and prepare for effective response. The result of the Khartoum assessment indicates relative strengthen in institutional capacity for resilience at least in some areas, especially the exposure of the public to education and awareness materials/messaging, learning from other cities, private sector links, engagement of the insurance sector. It also reflects that there is some capacity for recovery and build back better, safeguarding natural buffers to enhance the protective functions offered by natural ecosystems and pursuing resilient urban development and design. It also indicates that there is no clear understanding of future risk scenarios and that infrastructure resilience is on the weak side. It shows that understanding and strengthening societal capacity and the financial capacity for resilience is significantly weak. The action plan has a vision that "Khartoum is safe and resilient through the reduction of risks and leveraging of capacities and opportunities across all levels of the stakeholders. The mission is to strengthen resilience and reduce disaster risk, vulnerability and impacts of natural and non-natural disasters on Khartoum, integrate DRR in development planning and make DRR everybody's responsibility through an efficient coordination process. The key strategic objectives include raising awareness and providing knowledge to the stakeholders, integration of risk reduction in development plans, policies, and oversight, strengthening of capacities for natural and other disaster risk management, create safe and resilient communities to disasters across the State, enhance governance and coordination in disaster risk reduction, build resilient and robust disaster management and provide early warning and emergency communication. The action plan has 68 actions, distributed under the ten essentials. The plan also includes objectives, indicators and targets, timeframe, institutional responsibilities, and sources of funding. Essential 1, concerned with organizing for resilience, has 5 actions addressing data and information, strategy and programs, monitoring implementation of the action plan, and laws. Essential 2, on current and future risk scenarios, includes 5 actions on the assessment of all potential hazards, developing risk scenarios, risk mapping, and disaster loss data. Essential 3, dealing with strengthening financial capacity for resilience has 7 actions focused on outreach for the deployment of BOT, BOOT and PPP Systems, national investment law, incentives, and guarantees for investment in DRR, financial plans, and awareness and incentives for insurance. Essential 4, on pursuing resilient urban development and design, encompasses 7 actions

addressing inventory of displaced persons, enforcement and modernization of building laws, land uses diversions, laws on agricultural land investment, water harvesting projects, laws for urban design and the use of modern environmental technologies, green buildings, and green cities, and building codes and regulations. Essential 5, for safeguarding natural buffers offered by natural ecosystem, includes 5 actions to enforce laws and policies, increase protected areas, ecosystem initiatives and projects, monitoring and evaluation programs for land use, environmental impact assessment, and integrating the concepts of the new urban agendas and sustainable development goals into all laws, legislation and policies. Essential 6, focusing on strengthening institutional capacity for resilience, has 5 actions to review and develop relevant institutional laws and strengthen organizational structures, establish exchange programs for disaster resilient, develop and implement training and awareness programs, introduce DRR in the educational system. For Essential 7, designed to understand and strengthen societal capacity for resilience, the plan includes 5 actions to establish coordination mechanisms between government authorities and the civil society, identify roles and responsibilities and strengthen community bodies and activists, establish a resilience social network, and identify and meet the needs of the most vulnerable groups. Essential 8 on increasing infrastructure resilience, has the largest number of actions (14 actions), which includes preparing flood hazard maps, completing the drainage networking, constructing sustainable earth dams and the Nile barricades, implementing preventative maintenance programs, and developing and upgrading Khartoum water and sewage system and networks. It also encompasses the construction of water treatment and solar energy plants, improving the transit services network, and completing and upgrading existing road networks. Further, it includes rehabilitation and construction of new health service centers, establishing an information center for healthcare services, and rehabilitation and construction of new educational service buildings. Essential 9, dealing with ensuring effective preparedness and disaster response, has the second largest number of actions (11 actions) focusing on establishing a multi-hazard early warning center, mobilizing telecommunications networks to disseminate alerts, preparing disaster response plans, establishing a risk management coordination office, and tightening coordination and automating operating procedures. Other actions include strengthening the capacity of civil defense, increasing knowledge about the needs of affected people during disasters, providing sustainable food and shelter for needy people affected when disasters happen, establishing safe shelters, in addition to defining roles and responsibilities, organizing work and accountability for responding to disasters, and ensuring sustainable and timely fuel supply in case of emergency. Essential 10, concerned with the expedite recovery and build back better, has only 2 actions; preparing a comprehensive plan to deal with economic and infrastructure needs and post-disaster groups and establishing a state disaster-risk reduction mechanism for the stakeholders. In the end, the plan proposes a framework for monitoring and evolution.

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1. Introduction

Sudan is exposed to a wide range of natural hazards including floods, flash floods, drought, earthquakes, fires, environmental hazards and others. In recent years, it is noted that intensity and frequency of natural hazards are increasing leading to different kind of disasters. There is an accelerated degree of vulnerability to disaster risks from natural hazards. This situation is compounded by poverty, rapid and unplanned urbanization, climate change, weak coping capacity, inadequate governance for disaster risk reduction, unsustainable uses of natural resources and environment deterioration. The impact of a disaster is devasting to human lives and livelihoods, properties and infrastructure, ecosystem and the economy. Sudan is committed to reducing the risk of disasters and has joined international conventions and forums, such as the Hyogo Framework for Action 2005-2015 and the Sendai Framework for Action 2105-2030.

Khartoum is an important state of the 18 states of Sudan. It contains Khartoum the capital city of Sudan and is major trading, financial and political center of Sudan. Like many areas of Sudan, the State is vulnerable to natural disasters, especially drought, flash floods, floods and torrential rains. It is also subjected to smaller scale but frequent hazards such as fires and epidemics. Further, other climate change related issues, such as dust storms, thunderstorms, heat waves are threating Khartoum. Those natural hazardous are expected to intensify in the future, which puts people and their properties at risk. Rapid population growth and migration make it difficult for authorities to take necessary measures to protect people from disasters (NCCD and UNDP 2016).

1.1. About the Strategy and Action Plan

Authorities in Sudan and in Khartoum recognize the need to have a strategy and action plan that support preventing and reducing exposure and vulnerability to disaster risks, increase preparedness, strengthen response and recovery, and achieve sustainability. Disaster risk reduction is a cost-effective investment in prevention of future losses. Sudan thus developed a national disaster risk reduction strategy for 2016-2030. In the meantime, Khartoum also developed a state strategy for disaster risk reduction. This document is developed as the action plan for disaster risk reduction for the Khartoum, which is aligned with both the national and state strategies. The action plan was developed with the participation of the key stakeholders; further details will be provided in the methodology section.

1.1.1. Sendai Framework

The Sendai Framework for Disaster Risk Reduction (DRR) is a 15-year (2015-2030), non-legally binding, voluntary, agreement designed to reduce existing levels of risk and prevent emerging risks. It is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. It notes that the primary responsibility of DRR is for the states, but shared responsibility of all the stakeholders including local government, the private sector, and other stakeholders. The scope includes slow-onset, human-made and biohazards; and geographically cover local, national, regional and global levels. The goal as stated in paragraph 17 “Prevent new and reduce existing disaster risk through the

implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience." Sendai Framework has four priorities for Action; Priority 1. understanding disaster risk, Priority 2. strengthening disaster risk governance to manage disaster risk, Priority 3. investing in disaster risk reduction for resilience Priority 4. Enhancing disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction.

1.1.2. Making Cities Resilient Campaign

The Making Cities Resilient Campaign (MCRC) - launched in May 2010 to address issues of local governance and urban risk. While UNISDR leads the Campaign, it is more self-motivating, partnership and city-driven. It aims to raise the profile of resilience and disaster risk reduction among local governments and urban communities worldwide. The objectives of the Campaign are 1) know more: raise awareness of citizens and governments at all levels of the benefits of reducing urban risks, 2) invest wisely: identify budget allocations within local government funding plans to invest in disaster risk reduction activities, and 3) build more safely: include disaster risk reduction on participatory urban development planning processes and protect critical infrastructure.

"Making cities sustainable and resilient: implementing the Sendai Framework for Disaster Risk Reduction 2015-2030 at the local level" is a three-year initiative by the United Nations Office for Disaster Risk Reduction (UNISDR) and United Nations Human Settlements Programme (UN-Habitat), supported by the European Commission. The initiative selected 20 high-risk partners cities from around the globe to work with as a first phase to strengthen capacities to develop and initiate the implementation of disaster risk reduction and resilience plans at the city level. Four Arab cities were selected to be part of this initiative, which are Khartoum, Republic of Sudan; Ismailia Governorate, Egypt; Nablus, Palestine; Nouakchott, Mauritania.

1.2. Methodology

The methodology adopted was mainly based on the use of UNISDR scorecard assessment, in addition to the literature review and input from Khartoum focal point (the Ministry of Infrastructure and Transport) for the initiative mentioned above. The Scorecard provides a set of assessments that allows local governments to monitor and review progress and challenges in the implementation of the Sendai Framework for Disaster Risk Reduction: 2015-2030 and assesses their disaster resilience (UNISR 2017). The scorecard is structured around the ten essentials, which provide an operational framework of Sendai Framework at the local level. It was developed with the launch of the Campaign to accelerate the implementation of the Sendai Framework for Disaster Risk Reduction (2015-2030) at the local level. The ten Essentials map directly against the Sendai priorities of action and its indicators for monitoring actions on disaster risk reduction. There are two versions of the scorecard; level 1 (Preliminary level), responding to key Sendai Framework targets and indicators, and level 2 (Detailed assessment), which is a multi-stakeholder exercise with 117 indicator criteria, each with a score of 0 – 5.

Two workshops were conducted in Khartoum for the scorecards. The first was for the preliminary scorecard in 2017, and it was intended for awareness raising, building capacity and practicing the work on the scorecard. The second workshop conducted in December 2018 was dedicated to the

detailed assessment scorecard and developing a DRR action plan for Khartoum. Much of the action plan was based on the outcomes of the detailed scorecard assessment and on collecting knowledge and information from the internet and other relevant sources. We also collected information through the focal point, who interacted with other relevant entities. All the key stakeholders relevant o Khartoum State -government agencies and institutions, civil society, academia and private sector- participated in the workshop. It was a true multi-stakeholders event. The workshop was for four days. One day was devoted to providing the concept and definitions and preparing the participants for the assessment. The other three days were to work on the scorecard assessment, develop the action plan elements, and to define the strategic objectives and outcomes.

1.3. About Khartoum

Khartoum State is located at the confluence of Blue and the White Niles known as "al-Muqran," where the two rivers converge to form the main Nile River. The State is the heart of Sudan. It contains the capital city "Khartoum" and is the major trading, commercial, culture, the financial and political center of Sudan. Khartoum city was founded in 1823 as the capital AngloEgyptian Sudan. In 1956, Sudan got its independence. Khartoum remained the capital of Sudan (SUST 2019).

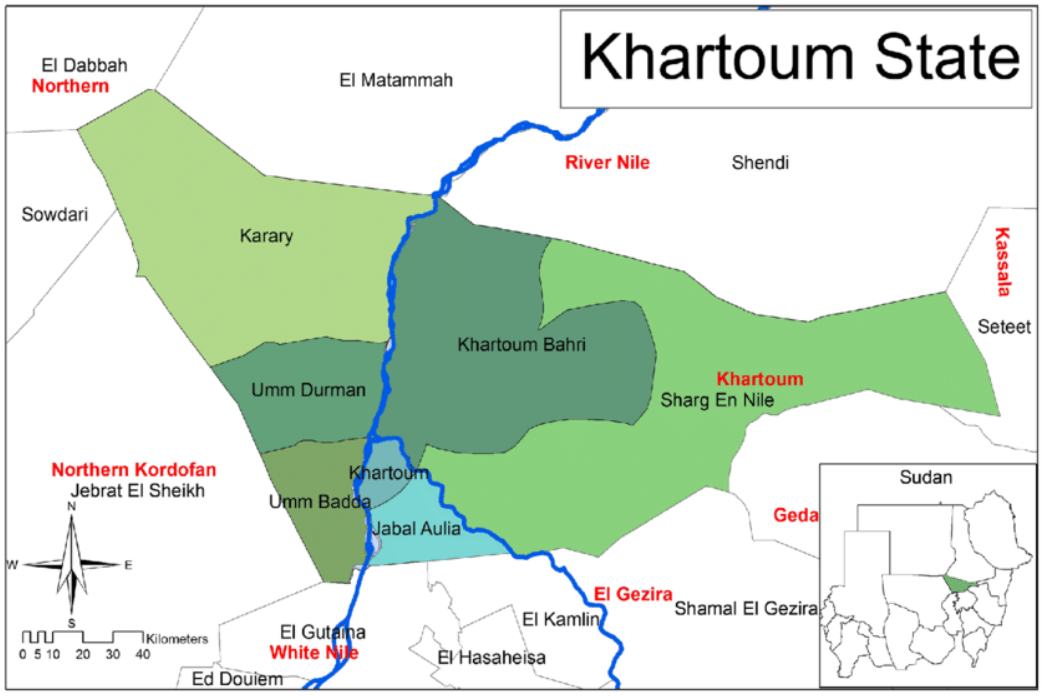


Figure 1. Map of Khartoum State and its Seven Localities

The total area of Khartoum State is 28.165 km.^{2} It lies between latitude 15-16 N and longitude 31.5 -34 East with a length of 250 km (SUST 2019). Geographically, the State is divided into three blocks, which are further subdivided into seven localities. The first block includes two localities; Jabal Awliyā' and Khartoum Localities. The Second block is also comprised of two localities; Khartoum Bahri and Sharq an-Nīl Localities. The third block includes three localities; Omdurman, Ombadda and Karari Localities (Figure 1).

Khartoum is in an arid climatic zone with an average annual rainfall of 250 mm. The rainfall amount, intensity and frequency are characterized by very high variability which results in occasional flash floods (Central Statistical Bureau 2016). The driest weather is in January, February, March, and December when an average of 0 mm of rainfall occurs. The wettest weather is in August when an average of 75.2 mm of rainfall occurs. Temperatures in the spring are in the range of 20 to 35 months, in the summer from 25 - 40 degrees. It drops in the winter to between 15 - 25 degrees (Central Statistical Bureau 2016).

The total population of Khartoum is 8.4 Million (Central Statistical Bureau 2016), distributed across the seven localities of Khartoum (see Table 1). Umm Badda locality has the largest population, 24 % of Khartoum population, followed by Jabal Aulia locality, 22 %. Omdurman locality has the smallest population of Khartoum localities (7 %), followed by Khartoum Bahri locality (8%). The population density in Khartoum is 283.8 Person per Square Kilometer (Figure 2).

Table 1. Population by Locality

	Locality	Population
1.	Khartoum الخرطوم	1.000.000
2.	Khartoum Bahri الخرطوم بحري	646.874
3.	Omdurman أم درمان	593.063
4.	Umm Badda أمبدة	1.988.000
5.	Sharq En Nil (East fo the Nile)شرق النيل	1.184.000
6.	Jabal Aulia جبل أولياء	1.850.000
7.	Karari كرري	1.114.074
		8.376.011

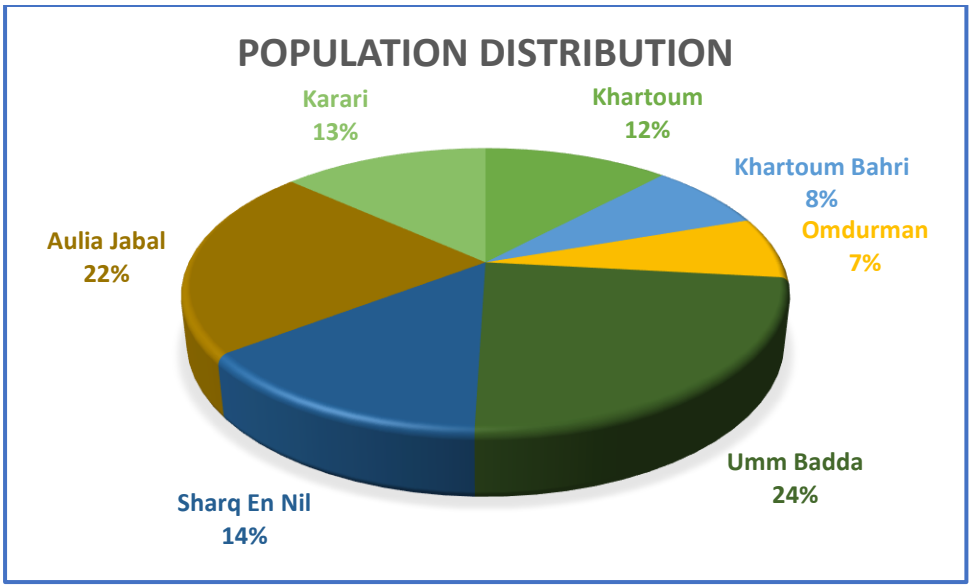


Figure 2. Data Source: Central Statistical Bureau 2016

Recognized tribes inhabit the outskirts of the cities and rural areas. In the cities of the State of Khartoum, most of the people work as government employees, or in the private sector and banks. Those are in addition to businessmen who work in trade, industry and real estate. The rural population work mostly in agricultural and grazing activities. Along the River Nile banks, some people work in pottery, bricks or fishing

The economy of the State is diversified. Figure 3 shows the structure of the GDP and the contributions of the various sectors in the GDP between 2010 and 2014, according to current prices. Based on 2014 data, the biggest contribution to the economy in Khartoum comes from the manufacturing and handicrafts sectors (26 %), followed by the agriculture sector (22%), then the commerce, restaurants and hotels (19%), Figure 4. The contribution of what is known as FISIM (Financial Intermediation Services Indirectly Measured) was negative between 2010-2014. The water and electricity and the mining sectors have a very small contribution, less than 1% (Central Statistical Bureau 2016).

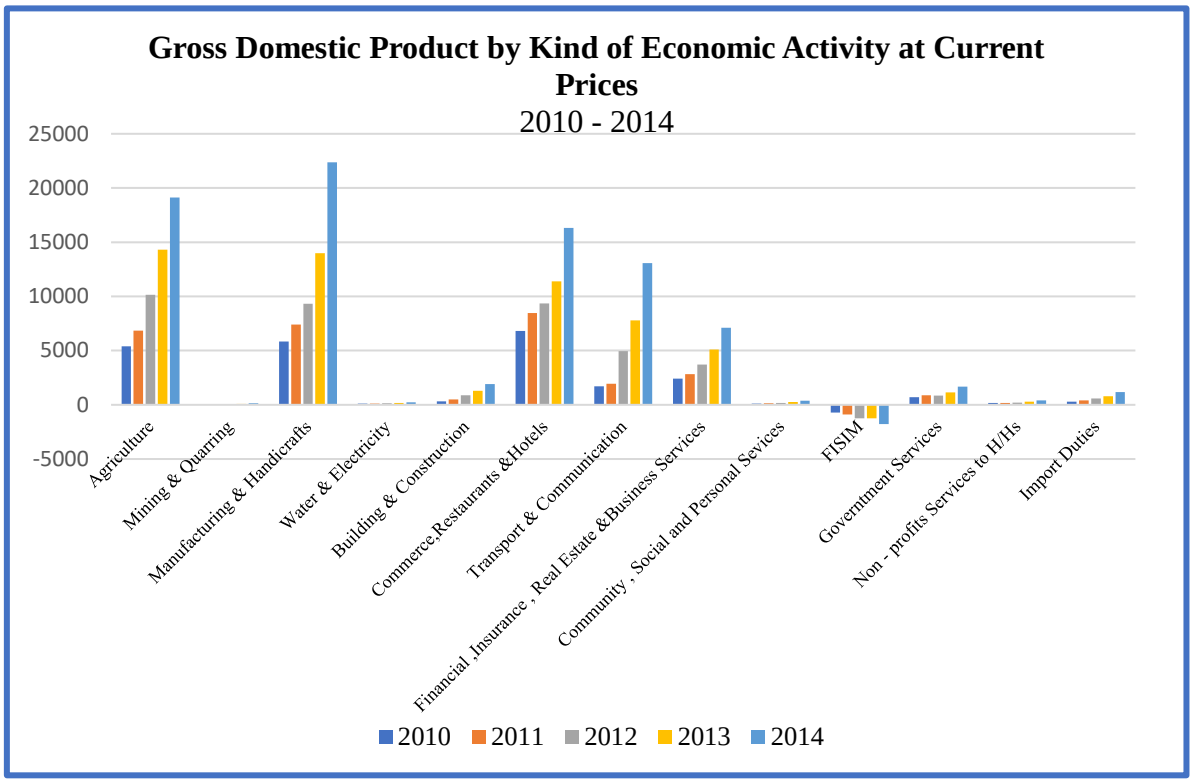


Figure 3

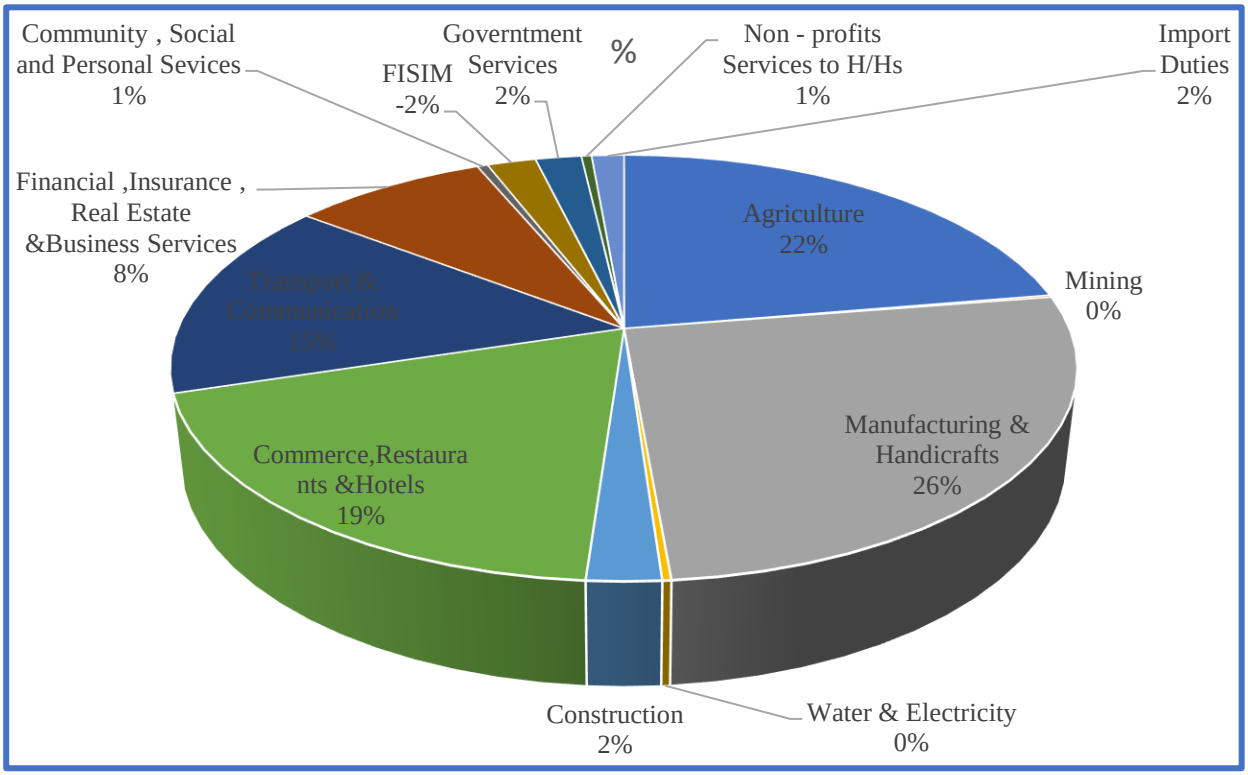


Figure 4. Percentage of the Sectors Contribution to the Sudanese GDP, 2014

The Sudanese economy in overall has been suffering for years for many reasons. In 2018, the African Development Bank (ADB) indicated (ADB) that inflation went up an estimated 43%, mainly because of a sharp devaluation of the Sudanese pound and fiscal deficit monetization (ADBG 2019). At the time of the preparation of this action plan, Sudan went through a revolution and is now in an interim situation until a new election and civil government to be installed in place.

1.4. Disaster Risk in Khartoum State

A wide range of hazards is threating Khartoum State including floods, flash floods, droughts, epidemics, earthquakes, environmental hazards, radiation hazards, and fires. In addition to the complication caused by vulnerability. Those hazards affect the livelihood of people, damage infrastructure, develop health risks, cause economic losses, and disrupt development plans. This section is meant to highlight those risks to provide the background on the need for the action plan, and what kind of risks the plan needs to address.

1.4.1. Floods

Floods are one of the most common natural hazards that threaten the Khartoum State. Over the past 60 years, the State has been subjected to catastrophic floods, including those that occurred in 1946, 1988, 1996, 1998, 2003, 2007 and 2013 (Siyam 2018). The floods are a yearly visitor, with the latest occurred in 2018. Floods, however, vary in frequency and intensity from year to year. In recent history, floods increased in frequency and intensity, so is the number of human lives affected.

A significant proportion of the annual surface runoff comes from the Blue Nile flowing to Sudan from Ethiopia and converges with the White Nile in Khartoum to form the Nile River. The Blue Nile contributes nearly 75 % of the water in the Nile; in only three months, July to September.

There are three sources and types of flood hazards in Khartoum State, river floods, flash floods, and medium to high rainfalls. River floods are a threat to lives and properties along the river banks, cause loss of valuable fertile lands, affect the quality of water supply, disrupt normal activities and cause economic losses (Siyam 2018). Between 2005 and 2015, floods in Sudan occurred 119 times killing 50 persons, destroying 9450 houses, damaging 11033 houses, killing 1511 of livestock and damaging 168049.61 hectares of crops. Khartoum State was in the middle range of the States affected. Al Gezira State recorded the highest number of deaths, followed by the State of North Kordofan (NCCD 2016).

Flash floods result in loss of lives, homes and properties, crops and livestock in farmlands. It also causes health hazards (spread of diseases), and leads to deteriorating living conditions, especially in waterlogged areas. Besides, it causes interruption and shortage of services, significant economic losses and disturbance to normal life activities (Siyam 2018). Between 2005 and 2015, flash floods in Sudan occurred 335 times. The State of Blue Nile registered the largest number of affected people, while Khartoum State accounted for the largest death toll (NCCD 2016).

On the other hand, medium to high rainfalls cause traffic jams, accelerate deterioration of roads due to bad drainage, disturbance of normal activities and shortage of services especially public transportation. It became a source of health hazards due to localized waterlogging and the creation of the bad smelly environment. It also causes disturbance of normal activities and shortage of services especially public transportation (Siyam 2018). In the ten years between 2005 and 2015, Sudan reported 936 rain occurrences, resulting in 483 deaths, 55,775 houses destroyed, and 82,811 damaged. Khartoum, North Kordofan and White Nile received the most intensive rate of rainfall (NCCD 2016).

When two or more of the flood types mentioned above occur concurrently, they cause catastrophic disasters with widespread impacts. The impact of natural hazards is complicated by the vulnerability and exposure of humans, properties and natural ecosystems. Factors, such as poverty, poor urban planning (Figure 5), weak coping capacity, awareness, human practices, and existing flood management mechanisms exacerbating the risk of disasters from natural hazards. The current flood management mechanisms are mostly focused on rescue and relief management arrangements rather than on disaster risk reduction.

Floods are not only about disasters, but they also have a positive side as it brings rich silt to enrich and increase soil fertility along the banks and tributaries of the river systems in Sudan. Proper planning and sound engineering solutions could make useful uses of the floods (MSSDHAC 2017).

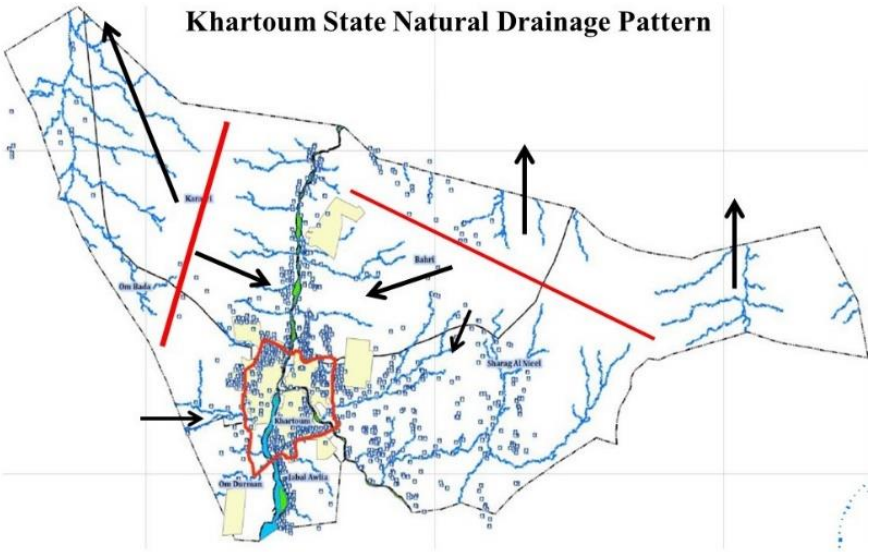


Figure 5. Settlements along the Drainage Network

1.4.2. Droughts

It is essential to understand drought in Khartoum State to consider it in the bigger context of Sudan as a whole. Drought is a frequent and sizeable natural disaster facing Sudan. It is estimated that 690,000 sq. Km of Sudan is drought prone. This area produces 90% of the cultivated food crops and 85% firewood.

Sudan experienced many cycles of significant drought; the most devastating ones were in 1913, 1940, and 1954 which covered many parts of the country. The droughts caused severe shortages of food, social disruption, displacement, wide-spread health and nutritional problems (NCCD 2016). In general, Sudan is characterized by insufficient and highly variable annual precipitation. Local drought could extend for years, which leads to deteriorating people livelihood and natural resources. Drought frequently hits Western Sudan Kordofan and the Darfur States, in addition to Northern State, Naher El Neil State, Khartoum and Gezira States. Eastern parts which include Kassala state and the Red Sea State.

Khartoum State is no exception. It has faced waves of drought since the 1970s, which have exacerbated rural poverty and precipitated large-scale displacement to the northern cities (NCCD and UNDP 2016). Khartoum State, especial the capital area, is pressured by people displaced by drought, who trek towards Khartoum. They settle in in an unplanned manner in the regions that could be subject to floods. The services of the capital usually are no able to cope with the increased flux of people.

1.4.3. Epidemics

If we consider disasters, natural and human-made, epidemics come second to fires as the top disasters in Sudan. Major infectious diseases can be clustered as (1) food and waterborne diseases, such as bacterial and protozoal diarrhea, hepatitis A and E, and typhoid fever, (2) vector-borne diseases, such malaria, dengue fever, and Rift Valley fever, (3) water contact disease, such as schistosomiasis, (4) respiratory disease, such as meningococcal meningitis, and (5) animal contact disease, such as rabies diseases include Malaria, Diarrhoea, Bilharzias, Pneumonia. The cycle of epidemics in Sudan, a minor disease outbreaks every five years, and a major one every ten years (MSSDHAC 2017).

Between 2005 and 2015, the years of 2012 and 2013 were the most significant years of epidemic occurrences. The highest loss of life was in the years 2005, 2012 by 441 and 228 persons, respectively. Khartoum State was the highest State impacted by epidemics (NCCD and UNDP 2016).

1.4.4. Environmental hazards

In addition to floods and drought, Sudan suffers from several other critical environmental issues including the urban sprawling, chronic solid waste management problems, sewage waste, declining forest cover, soil erosion, overgrazing, land degradation and desertification. Other issues include Industrial pollution, shortage of drinking, unsafe drinking water, conflict, and effects of chemicals. Climate change is also a critical environmental issue, the average temperatures increased, and the wind speed increased, which lead to sand dunes that attack fertile land and encroach on urban areas. The increased temperature and wind could cause wildfire in many areas, including natural pasture areas all over the country and date palm orchards, particularly in the Northern and River Nile states. (MSSDHAC 2017).

1.4.5. Earthquakes

Sudan is located within the stable African plate, with low to moderate seismic activities. The area of the Red Sea and its surrounding is subjected to significant seismic hazards due to its geologic setting. On the other hand, the area of the main Nile River system has some weak points, which could amplify ground motion in case of an earthquake. There are some recorded earthquakes activities in Sudan since 1850. Nevertheless, information about the intensity and locations of seismic activities are mostly recorded from sources outside of Sudan. The country lacks adequate seismic networks to record seismic activities information. Several big earthquakes have been recorded in the recent years in Sudan, but not sufficient information is being collected and analyzed in Sudan regarding (MSSDHAC 2017).

1.4.6. Radiation hazards

Sudan uses radioactive materials in many fields including the medical field for diagnostic and therapeutic purposes; the industrial field, mainly in the oil, food and beverages industries; and in agriculture and research. Radiation sources are spread in 9 states in Sudan including Khartoum State. The risks associated with the use of radioactive materials include exposure of people or workers to high dose rates or the spread of contaminants, which could contaminate the environment or cause internal exposure.

The Sudanese Nuclear and Radiological Regulatory Authority (SNRRA) has control over the radiation sources in Sudan to ensure the safety and security of the use of these materials. Sudan also joined a regional project to strengthen and harmonize national capabilities for response to radiation emergencies. Moreover, Sudan signed two international conventions to request assistance or notify the international community or neighboring countries that could be affected by radiation incidents in Sudan (NCCD and UNDP 2016).

1.4.7. Fires

Both natural and human factors cause fires. In Sudan, fires are the top concern and the most common hazard. Between 2005 and 2015, it represented 42 % of all hazardous occurrences. Khartoum State is the most affected State by fires and recorded the highest rate of human loss by this hazard. Fire occurrences were reported from all kind of places; government building,

residential areas, commercial shops and facilities, industrial areas, agriculture fields and forests. Despite a decentralize approach lead by National Civil Defense, managing fires remains a pressing challenge for Sudan and Khartoum State as part.

1.4.8. Vulnerability

Vulnerability is defined as the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards. Khartoum State population are vulnerable to several types of risks, mainly flash and river floods. The social, economic, physical and ecological setup vulnerabilities are expressed in Table 2 in the form of indicators.

Table 2: Indicators and aspects of vulnerability in Khartoum State (Source: HCEURB) 2015

Social	Economical	Physical	Ecological
• Minority groups, • the aged, orphans, • nursing • mothers and their offspring, • disabled	• Poverty • Urbanization • Unplanned settlement • Unsafe building techniques • Lack of access to basic services • Diseases and epidemics • Environmental degradation • Increases risk of informal settlement	• Access to suitable land, • Land use planning, • Housing design, • Building standards, • Materials used for building houses, • Engineering accessibility to emergency services and other related aspects	• The extent of natural resource depletion • The state of resource degradation • Loss of resilience of the ecological systems • Exposure to toxic and hazardous pollutants

1.5. Legal Framework

1.5.1. Constitutional rights

The Interim National Constitution of Sudan gives an overall arching right to all people of Sudan to have a clean and safe environment as stipulated in articles 11(1).

On the other hand, the president of the Republic of Sudan has the supreme authority to declare the State of Emergency in the country, as of article 210 (1). The President can declare a state of emergency in the country, or any part thereof, with the consent of the First Vice President, upon the occurrence of imminent danger, whether it is war, invasion, blockade, natural disaster or epidemics, as may threaten the country.

1.5.2. Legislation

No clear law in the country governs activities related to Disaster Risk Reduction. Many sectoral laws contain Legal affairs related to Disaster Risk Reduction. The scattered law situation hinders the coordination, planning, and implementation of DRR in the country.

The law of the civil defense Act 2005 established the National Council for Civil Defense (NCDC) as the highest organ for disaster management within specific duties and responsibilities. The law seems to have a real impact on the disaster risk matters on the national base. There is also the voluntary and Humanitarian Work (Organization) Act, 2006, which regulates the work of humanitarian organizations (HCEURP 2015).

1.5.3. Institutional Setup

1.5.3.1. The Current Institutional Setup

The State of Khartoum DRR institutional setup is an integral part of the national DRR institutional setup. The National Council of Civil Defense (NCDC) is the main decision-making body during emergencies and adopted the disaster management policies for the Country. It has a federal component and a state component (Figure 6). The State level has a state council, state operations, provincial operations and locality operations. At the federal level, there is a Central Operations Chamber linked to the NCCD and is comprised of technical experts.

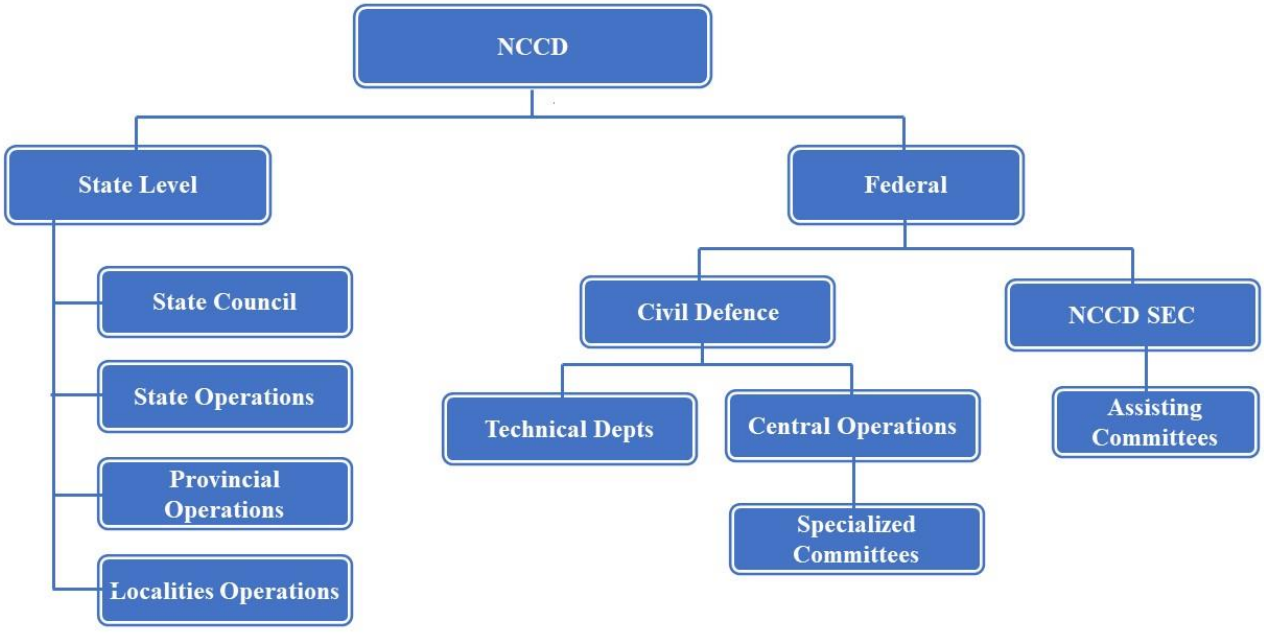


Figure 6. Structured and Linkages of the National Council for Civil Defence

On the other hand, each state has its own Operation Chamber chaired by the state Governor and linked to the Central Operations Chamber (UNDP and NCCD 2016). The primary duties and responsibilities of the NCDC are (1) coordination of plans and civil defense operations between different authorities at the federal level, (2) targeting national efforts towards disasters

management and reduction of effects, (3) approval and monitoring of national plans for civil defense, and (4) approval of annual budgets for the program. It also has some other additional mandates (UNDP and NCCD 2016).

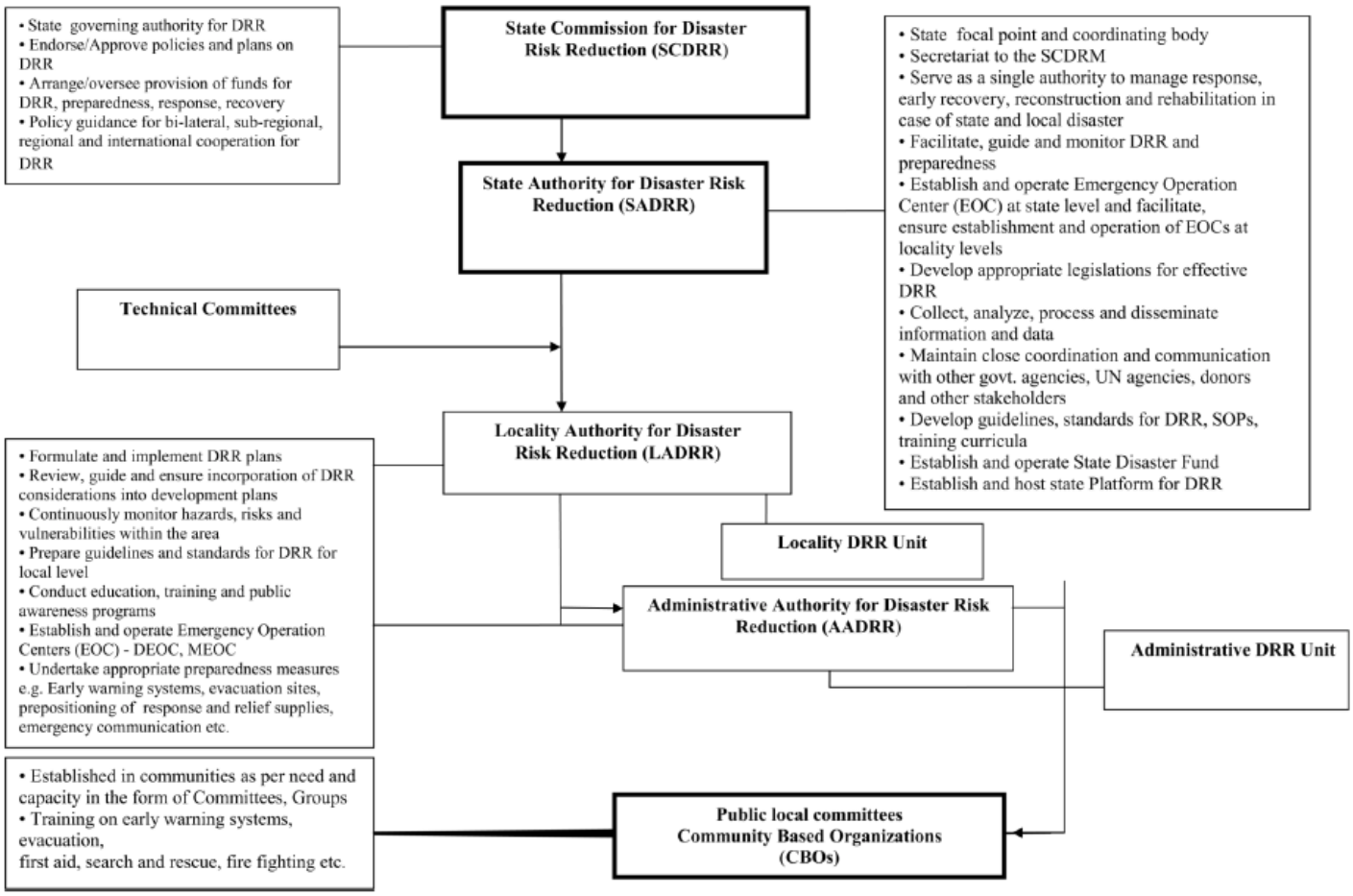
Each state prepares its contingency plan, including estimated budget and needs, in consultation with the line ministries at the States' levels, and civil societies including community level. Plans are usually forwarded to the Central Operations' Chamber at the center for an initial review by the Technical officials from the line Ministries (HCEURP 2015).

1.5.3.2. New Proposed Institutional Sep Up for DRR in the state

The current institutional setup is not meeting the needs for DRR, and it has apparent shortcomings as it is focused on the emergency response and relief efforts and is not engaging all the key stakeholders. It is not tuned to disaster risk reduction through preparedness, mitigation and mainstreaming disaster risk reduction into the development efforts of the state (HCEURP 2015).

The Khartoum State Strategy for Disaster Risk Reduction (KSSDRR) called for a new institutional structure for DRR to enhance the capabilities of the State in disaster risk reduction and prepare for

Figure 7 **Institutional Structure for Disaster Risk Reduction and their Roles**



effective response. The objective is to empower the DRR process, decentralize the responsibility, involve and engage all stakeholders and coordinate the actions at all state levels. It is also intended to strengthen the capacity to integrate DRR into the state governance and development efforts and force/facilitate program-level synergy and coordination.

The new proposed institutional setup has two level; an overall national framework and a State component. In this plan, only the State component is presented (Figures 7). It includes:

State Commission for Disaster Risk Reduction (SCDRR)

The SCDRR will comprise of all cabinet ministers, Chief of the State Army Staff, Inspector General of State Police, and at least two representatives of Civil Society. The Governor will chair it. The key functions of the SCDRR will be to endorse State policies on disaster risk management. The SCDRR will also approve the National DRR Plan, sectoral plans for DRR, and the national programs for the reduction of specific natural hazards, provision of funds for DRR, preparedness, response and recovery measures, and provide policy guidance for bi-lateral, sub-national, regional and international cooperation in areas of disaster risk management.

State Authority for Disaster Risk Reduction (SADRR)

The SADRR will be the executive arm of the SCDRR and will be responsible for coordinating, facilitating and monitoring implementation of disaster risk management strategies in the State. It is meant to be the single authority within the administrative organization of the higher council for the environment, Urban and Rural Promotion (Khartoum State) to manage response, early recovery, reconstruction and rehabilitation in case of a disaster.

Locality Authority for Disaster Risk Reduction (LADRR)

Locality governments shall be responsible for establishing LADRR. Among the critical roles of the LADRR is to create a Disaster Risk Management Unit for the Locality as an operating arm and secretariat of the LADRR. It will lead the formulation of the district disaster-risk management plan in collaboration with the district level line agencies of the central government, district level NGOs, private businesses, and other stakeholders engaged in district level development planning. It will lead the coordination and implementation of the DRR plans, capacity building, awareness, education, early warning, monitoring and other related activities.

Administrative Unit Authority for Disaster Risk Reduction (AUADRR)

AUADRR will be established in urban areas and cities by the Administrative Unit governments. It will serve as the local Administrative platform for DRR. Further, It will formulate the Administrative Unit disaster-risk management master plan, emergency response plan and conduct drills as a part of the LDRR. It will review development plans at the municipal level and guide mainstreaming disaster risk reduction measures in these plans. Further, it will promulgate bylaws, Implement the system of financial incentives, conduct training and awareness raising at the municipal level, monitor hazards, risks and vulnerable conditions, Prepare guidelines and standards

for local stakeholders on disaster risk reduction, follow on safety standards compliance and establish and operate administrative unit emergency operation center (AUAEOC).

Local Public Committees (LPC) and Community Based Organizations (CBOs)

The proposed institutional setup puts Local Public Committees (LPC) and Community Based Organizations (CBOs) at the forefront in the management of disaster risks. It represents the grassroots work for DRR and should be a critical component in the DRR governance framework. These entities will be comprised of elected representatives from village and ward levels. It will play a vital role in the coordination and preparedness for DRR and allocation of resources for local development works.

Inter-ministerial Standing Committee

The inter-ministerial standing committee is to ensure the integration of DRR into the development programs and a mechanism for exchange of experiences and building capacities of the line ministries and departments.

Hazard-specific Working Groups

Those groups will be created to develop related hazard reduction program for the State and to promote the implementation of such programs.

Sectoral Working Groups

To cover specific sectors, these Working Groups will be the State equivalent of the UN-led Clusters for planning and programming humanitarian response.

2. Current Situation and Trends: Challenges

This section presents the current status of the capacity of Khartoum State in disaster risk reduction, derived mostly from the assessment using the UNISDR scorecard. In the scorecard, the score of the 117 indicators is based on selecting a score from 0 to 5. Nevertheless, additional insight is given based on interactions with the stakeholders and the literature review.

The overall score from the scorecard is 245 out of 590, about 41.5 %, which falls near the average of most cities. We can consider the overall capacity of Khartoum State in disaster risk reduction to be average. Figure 8 and 9 gives an overview of the current status of the capacity for disaster risk reduction in Khartoum based on the results of the UNISDR scorecard. For each essential, the actual score was calculated as a percentage of the possible total score if the assessment area has been given a full score of 5. The Essentials, which scored more than 50 percent is colored green, representing the top scores. Those scored between 40 and 50 percent are colored blue. Moreover, the ones scored between 30 and 40 percent are given dark yellow.

Essential 6 is the top scoring essential reflecting relative strengthen in institutional capacity for resilience at least in some areas, especially the exposure of the public to education and awareness

materials/messaging, learning from other cities, private sector links, engagement of the insurance sector. It does not mean that everything is perfect, as the score is only 66 %. Further, some assessment areas are weak as indicated in the subsequent detailed analysis. Essentials number 1 and 9 come in the same category with scoring 58 and 54, respectively. This result suggests that organizing for disaster resilience and effective preparedness and disaster response are relatively positive. Nevertheless, they score just above 50 percent, which means that even though they are among the top scoring essentials, there is still a significant gap in those two areas.

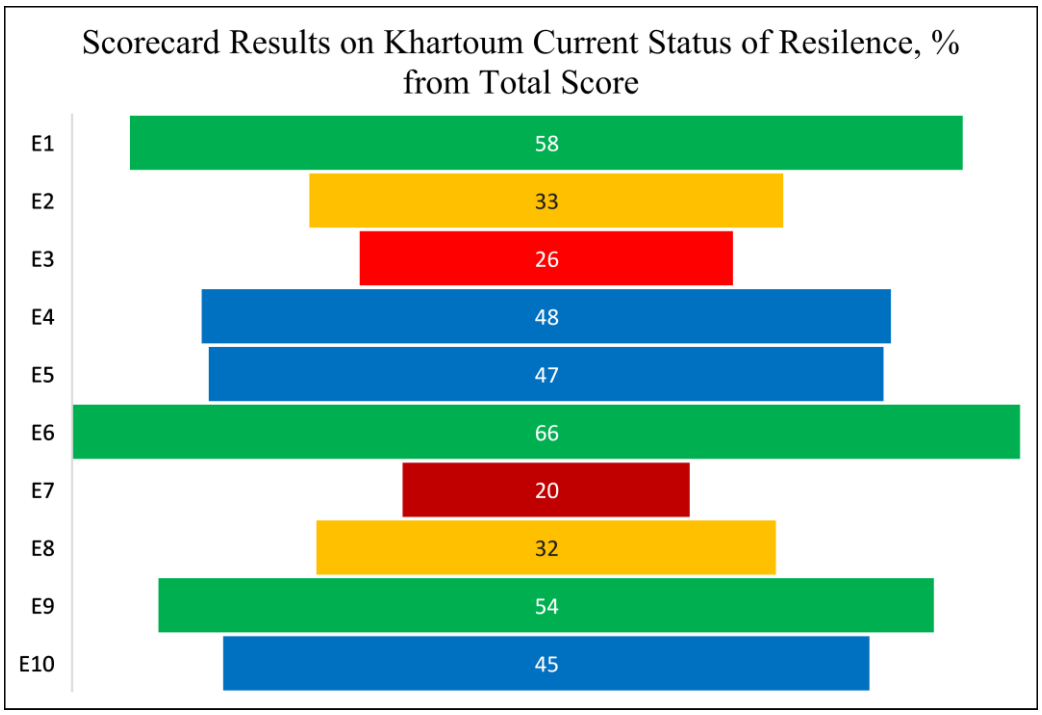


Figure 8

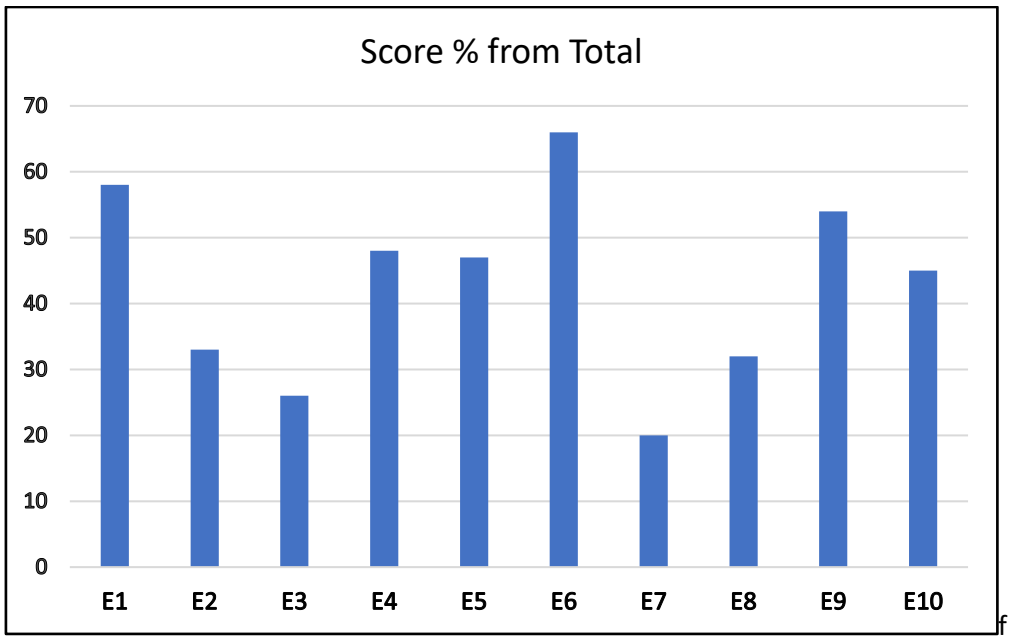


Figure 9

Essentials 10, 5 and 4 scored 45, 47 and 48 percent, respectively. It reflects that there is capacity for recovery and build-back better, safeguarding natural buffers to enhance the protective functions offered by natural ecosystems and pursuing resilient urban development and design. Nevertheless, this capacity stands for less than 50 percent of the maximum scoring potential. There areas that are weak and needs attention. It is highlighted later under each of the essentials in the next section.

Essential 2 and 8 scored 33 and 32 percent, respectively, which indicates that identifying, understanding and using current and future risk scenarios, as well as infrastructure resilience, are on the weak side. The capacity does not exceed one-third of the maximum capacity potential. Those areas require significant attention, even if they are not the lowest capacity per all essentials.

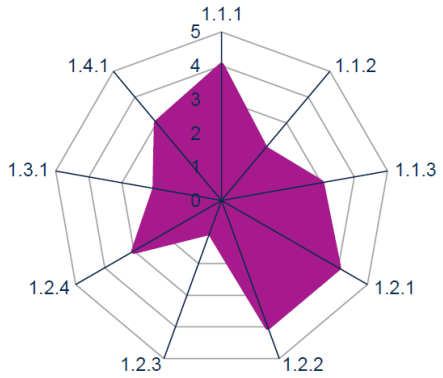
Essentials 7 and 3 shows the weakest capacity of all the 10 essentials. Understanding and strengthening societal capacity and the financial capacity for resilience are significantly inadequate, scoring 20 and 26 percent, respectably. Financial capability is critical for advancing the work in disaster risk reduction. Similarly, understanding and strengthening societal capacity is key to the successful implementation of disaster risk strategies and action plans.

The following provides some more detailed analysis of each essential:

2.1. Essential 01: Organize for Resilience

Put in place an organizational structure and identify the necessary processes to understand and act on reducing disaster risks.

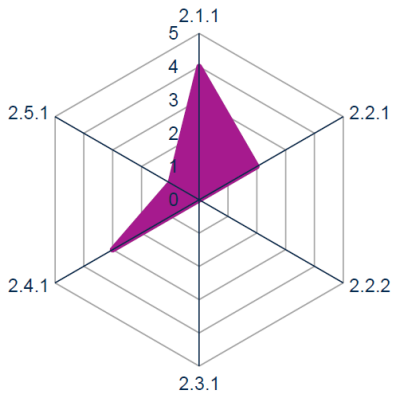
1.1.1	Risk consideration in plan making.	4
1.1.2	Consultation in plan making.	2
1.1.3	Review of strategic plans.	3
1.2.1	Pre-event planning and preparation.	4
1.2.2	Co-ordination of event response.	4
1.2.3	City resources for managing organisation, co-ordination and participation.	1
1.2.4	Identification of physical contributions.	3
1.3.1	Integration of disaster resilience with other initiatives.	2
1.4.1	Extent to which data on the city's resilience position is shared with other organizations involved with the city's resilience.	3



For Essential 1, Khartoum scored 26 out of 45 possible maximum scores, about 58 %. The scores of 3 and 4 are repeated 6 times out of 9, which gives an overall positive indication for an opportunity. Best areas for performance are risk consideration in plan making, Pre-event planning and preparation, Co-ordination of event response. Nevertheless, we have three areas scored 1 and 2, with City resources for managing organizations, coordination and participation has the lease score of 1.

2.2. Essential 02: Organize for Resilience

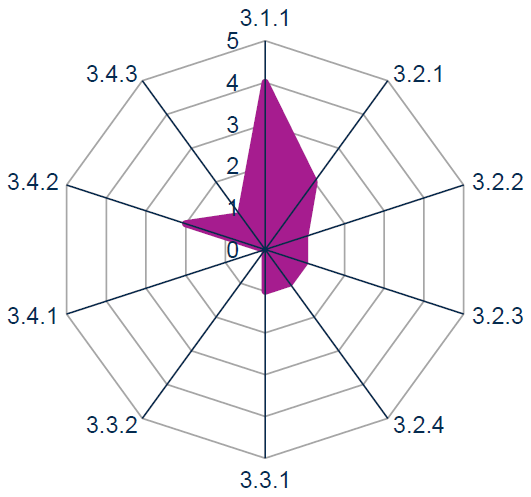
2.1.1	Knowledge of hazards (also called perils, or shocks and stresses) that the city faces, and their likelihood.	4
2.2.1	Knowledge of exposure and vulnerability.	2
2.2.2	Damage and loss estimation.	0
2.3.1	Understanding of critical assets and the linkages between these.	0
2.4.1	Hazard maps.	3
2.5.1	Update process.	1



For Essential 2, Khartoum scored 10 out of 30 possible maximum scores, about 33 %. Two areas scored 4 and 3, respectively; knowledge of hazards and hazard maps, which indicates there is a reasonable understanding of the hazards and those hazards are mapped to some extent. There is an opportunity to build on the existing knowledge to better understand the hazards threating the city. However, there is not enough knowledge of the exposure to hazards and the vulnerability to those hazards. There are also apparent gaps that needs to be addressed; including the process and the capacity to estimate damage and loss and understanding of critical assets and the linkages between these.

2.3. Essential 03: Strengthen Financial Capacity for Resilience

3.1.1	Awareness and knowledge of all possible methods of financing and funding, as required. The city is actively pursuing financing and funding, as required.	4
3.2.1	Adequacy of financial planning for all actions necessary for disaster resilience.	2
3.2.2	Capital funding for long run engineering and other works that address scenarios and critical assets identified in Essentials 2 and 8.	1
3.2.3	Operating funding to meet all operating costs of disaster resilience activities.	1
3.2.4	Contingency fund(s) for post disaster recovery (may be referred to as a "rainy-day fund").	1
3.3.1	Domestic insurance coverage.	1
3.3.2	Non-domestic insurance coverage.	0
3.4.1	Incentives to businesses organizations to improve disaster resilience – disaster plans, premises etc.	0
3.4.2	Incentives to non-profit organizations to improve disaster resilience – disaster plans, premises etc.	2
3.4.3	Incentives to homeowners to improve disaster resilience – disaster plans, premises etc.	1

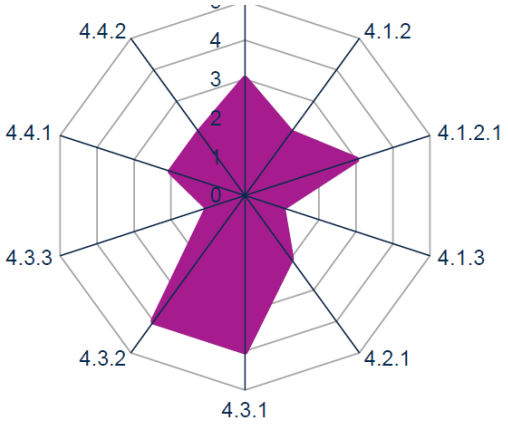


For Essential 3, Khartoum scored 13 out of 50 possible maximum scores, about 26 %, which indicates general weakness in funding aspects. Funding seems to be one of the reasons that hamper progress in disaster risk reduction. However, the area related to awareness and knowledge of all possible methods of financing and funding scored 4, which is a good indication of what are the funding requirements to pursue avenues of disaster risk reduction. There are apparent weaknesses in 7 areas, which include the adequacy of financial planning for all actions necessary for disaster resilience, capital funding for long run engineering and other works that address scenarios and critical assets identified in Essentials 2 and 8. It also includes operating fund to meet all operating costs of disaster resilience activities, contingency fund(s) for post-disaster recovery (may be referred to as a "rainy-day fund"), and domestic insurance coverage. In addition to weak incentives to non-profit organizations to improve disaster resilience – disaster plans, premise and others, as

well as the incentives to homeowners to enhance disaster resilience – disaster plans, premises, and others. There are also two distinct gaps related to non-domestic insurance coverage, incentives to businesses organizations to improve disaster resilience – disaster plans, premises, etc.

2.4. Essential 04: Pursue Resilient Urban Development

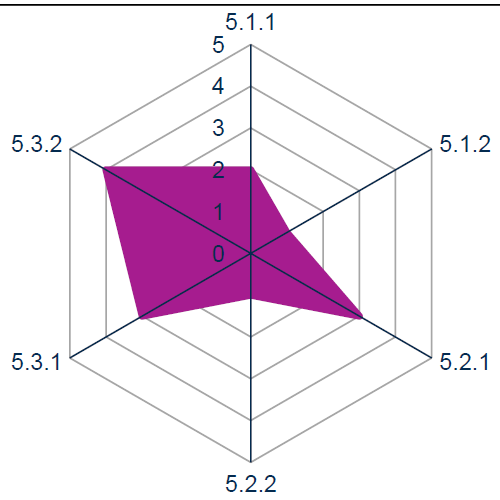
4.1.1	Potential population displacement.	3
4.1.2	Economic activity at risk.	2
4.1.2.1	Economic activity at risk.	3
4.1.3	Agricultural land at risk.	1
4.2.1	New urban development.	2
4.3.1	Existence of building codes designed to address risks identified in Essential 2.	4
4.3.2	Updates to building codes.	4
4.3.3	Sustainable building design standards.	1
4.4.1	Application of land use zoning.	2
4.4.2	Application of building codes.	2



For Essential 4, Khartoum scored 24 out of 50 possible maximum scores, about 48 %. We have two areas scored 4; the existence of building codes designed to address risks identified in Essential 2, and updates to building codes. There are also two areas scored 3; potential population displacement, which is less than 2.5 % and economic activity at risk, less than 2.5% of business output at risk. Meanwhile, there are 6 areas in the weak scores 1 and 2 including 2.5-5% of employment at risk and 5-7.5% of agricultural land at risk. There is scattered use of urban design solutions and little use and little interest in sustainable building design standards. Land use zoning is 70-80% implemented and enforced and building codes are 70-80% implemented on applicable structures.

2.5. Essential 05: Safeguard Natural Buffers to Enhance the Protective Functions Offered by Natural Ecosystems

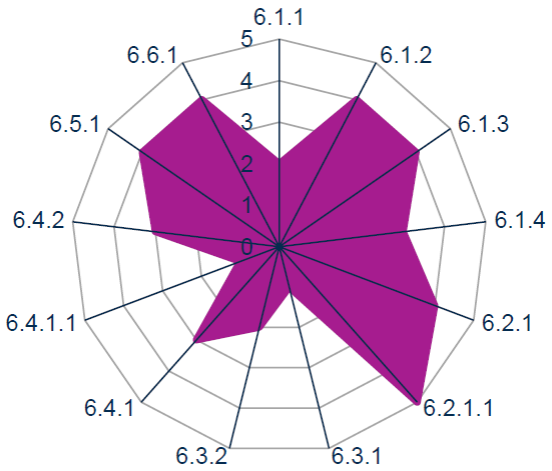
5.1.1	Awareness of the role that ecosystem services may play in the city's disaster resilience.	2
5.1.2	Ecosystem health.	1
5.2.1	Impact of land use and other policies on ecosystem services.	3
5.2.2	Green and blue infrastructure is routinely embedded into city projects.	1
5.3.1	Identification of critical environmental assets.	3
5.3.2	Transboundary agreements.	4



For Essential 5, Khartoum scored 14 out of 30 possible maximum scores, about 47 %. One area scored 4. There are some transboundary agreements in place with some organizations. Two areas scored 3; land use policies are broadly supportive but are not adequately enforced, the city's mapping of ecosystem assets extends beyond its borders. There are 3 weak areas score 1 and 2. In terms of ecosystems identification and management, some vital ecosystem services are omitted from monitoring altogether. About ecosystem health, severe generalized degradation is known or suspected. Finally, the city is familiar with the idea of blue and green infrastructure and is an occasional user.

2.6. Essential 06: Strengthen Institutional Capacity for Resilience

6.1.1	Availability of skills and experience in disaster resilience – risk identification, mitigation, planning, response and post event response.	2
6.1.2	Private sector links.	4
6.1.3	Engagement of the insurance sector.	4
6.1.4	Civil society links.	3
6.2.1	Exposure of public to education and awareness materials/messaging.	4
6.2.1.1	Exposure of public to education and awareness materials/messaging.	5
6.3.1	Extent to which data on the city's resilience position is shared with other organizations involved with the city's resilience.	1
6.3.2	Extent to which data on the city's resilience position is shared with the community organizations and public.	2
6.4.1	Availability, take-up of training focussed on Risk and Resilience (Professional Training).	3
6.4.1.1	Availability, take-up of training focussed on Risk and Resilience (Professional Training).	1
6.4.2	System / process for updating relevant training.	3
6.5.1	Accessibility of education and training to all linguistic groups in the city.	4
6.6.1	Effort taken to learn from what other cities, states and countries (and companies) do to increase resilience.	4

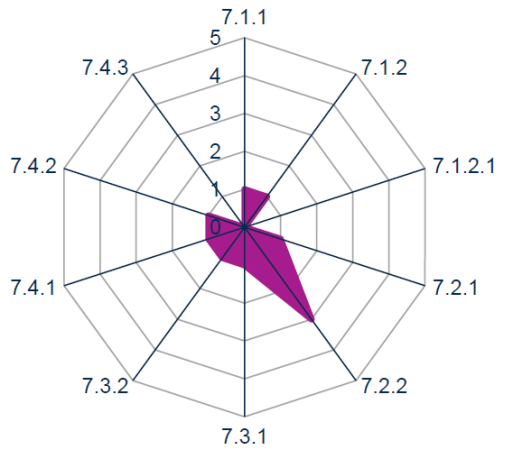


For Essential 6, Khartoum scored 40 out of 65 possible maximum scores, about 66 %, representing one of the best scores for an essential. One area received a score of 5, representing a significant strengthening in public education and awareness, specifically exposures per member of the public per month to messaging, averaged 1 or more exposures per person per week, citywide. Five areas received a score of 4. The city utilizes and engage the private sector and has MoUs and regular meetings, but these could be improved. There is some engagement of the insurance sector but missing a thorough process for cross-sector engagement. In terms of exposure of the public to education and awareness materials/ messaging, Khartoum campaign uses at least 5 media/channels. Ninety-five percent of the population has access to education and training irrespective of language. There are also regular exchanges learning activities executed with other cities and other practitioners but may be in the context of separate meetings with the sharing of best practices as a side-effect. Still, on the positive side, three areas received a score of 3; the city works with NGOs and/or volunteers in some DRR capacities, but this could improve. There is a modest volunteer capacity relative to the city needs. For training focussed on Risk and Resilience, training curriculum available but is not fully deployed across the city. There is an annual refreshers and emergency drill cycle but may not be city-wide

or reach all participants. Four areas received scores on the weak side, 1 and 2. In terms of availability of skills and experience in disaster resilience, inventory may not have complete coverage, but known widespread lack of multiple skill or experience types in many organizations. Also, the sharing of data on the city's resilience position with the community organizations is rudimentary at best. Some significant information on readiness and risk is withheld from other organizations or is missing and/or badly fragmented across multiple websites. Regarding training offered and available to resilience professionals, training curriculum available but is not fully deployed across the city.

2.7. Essential 07: Understand and Strengthen Societal Capacity for Resilience

7.1.1	Coverage of community or "grass roots" organization(s) throughout the city.	1
7.1.2	Effectiveness of community network.	1
7.1.2.1	Effectiveness of community network.	0
7.2.1	Social connectedness and neighbourhood cohesion.	1
7.2.2	Engagement of vulnerable groups of the population.	3
7.3.1	Extent to which employers act as a channel with employees.	1
7.3.2	Business continuity planning.	1
7.4.1	Frequency of engagement.	1
7.4.2	Use of mobile and e-mail "systems of engagement" to enable citizens to receive and give updates before and after a disaster.	1
7.4.3	Validation of effectiveness of education.	0

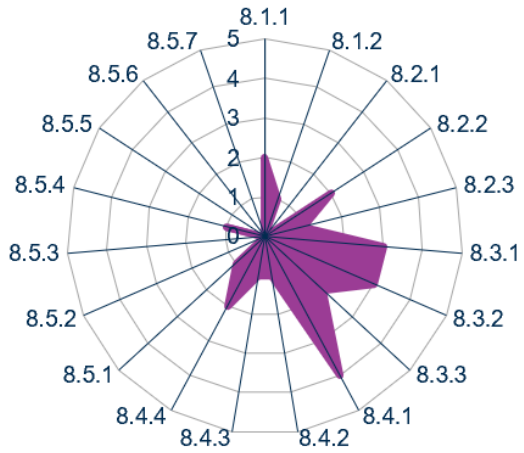


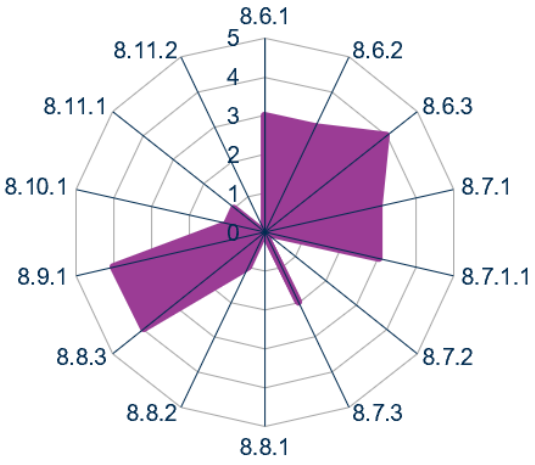
For Essential 7, Khartoum scored 10 out of 50 possible maximum scores, about 20 %, representing one of the weakest scores for an essential. One area scored 3, related to engagement of vulnerable groups of the population. There are one or more significant gaps in coverage or active engagement. There are 7 areas, which showed very weak score of 1, including; currently there is no nongovernment body for pre and post event response for each neighborhood in the city, but there are plans to engage neighborhoods and maybe one or two initial cases. Community organizations meet on an ad-hoc basis in less than 25% of neighborhoods, of a few "enthusiasts." In terms of social connectedness and neighbourhood cohesion, 50% or less of residents will be contacted immediately after an event, and regularly after that to confirm safety, issues, needs, etc. The proportion of employers that pass resilience communications to employers and allow limited time off for resilience volunteer activities is only 10% / 1%. The portion of businesses with a solid business continuity plan is 10% or less.

Further, looking at the frequency of engagement, more than 50% of the population do not receive any messages at all in case of disaster. There is only rudimentary use of systems of engagement – perhaps only via mobile access to the existing website which may not have been optimized for smartphones and others – but interest in expanding this. Finally, there are two apparent gaps with a score of 0. Regarding the effectiveness of the community network, there are no roles defined and no coordination. Knowledge of "most probable" risk scenario and knowledge of key response and preparation steps is <10% known, or no poll (not tested by survey).

2.8. Essential 08: Increase Infrastructure Resilience

8.1.1	Adequacy of protective infrastructure (Ecosystems can offer a natural buffer – see Essential 5).	2
8.1.2	Effectiveness of maintenance.	1
8.2.1	Customer service days at risk of loss.	0
8.2.2	Designated critical asset service days (for example, service to hospitals or other critical assets) at risk of loss from water or sanitation failure.	2
8.2.3	Cost of restoration of service.	1
8.3.1	Customer service days at risk of loss.	3
8.3.2	Designated critical asset service days at risk of loss from energy failure.	3
8.3.3	Cost of restoration.	2
8.4.1	Safety and integrity of gas system (if applicable).	4
8.4.2	Customer service days at risk of loss.	1
8.4.3	Designated critical asset service days at risk of loss from gas supply failure.	1
8.4.4	Cost of restoration of service.	2
8.5.1	Road – service from road system at risk of loss.	1
8.5.2	Road – survival of critical access and evacuation routes.	0
8.5.3	Rail/metro (if applicable) – service from rail system at risk of loss.	0
8.5.4	Air (if applicable).	1
8.5.5	River/Sea (if applicable).	0
8.5.6	Other public transport (if applicable).	0
8.5.7	Cost of restoration of service (all transport routes).	0
8.6.1	Service days at risk of loss.	3
8.6.2	Designated critical asset service days at risk of loss from communications failure.	3
8.6.3	Cost of restoration.	4
8.7.1	Structural safety and disaster resilience of health care and emergency facilities (Staffing/ first responders – see Essential 9).	3
8.7.1.1	Structural safety and disaster resilience of health care and emergency facilities (Staffing/ first responders – see Essential 9).	3
8.7.2	Health records and data.	0
8.7.3	Availability of emergency healthcare including facilities and urgent medical supplies for acute needs.	2
8.8.1	Structural safety of education facilities.	0
8.8.2	Loss of teaching time.	1
8.8.3	Education data.	4
8.9.1	Disaster resilience of prison system.	4
8.10.1	Assurance of continuity of all critical administration functions.	1
8.11.1	Assurance of continuity of computer systems and data critical to government continuity.	1





8.11.2	Assurance of continuity of computer systems and data critical to any of the above infrastructure.	0

For Essential 8, Khartoum scored 53 out of 165 possible maximum scores, about 32 %, which overall gives a modest status for infrastructure resilience. It is the biggest Essential in terms of the number of assessment areas. Four assessment areas score 4 out of 35 areas. One area is under the energy and gas theme and is related to safety and integrity of the gas system as there is >90% of properties; 90% fracture resistant pipe. The second is related to the cost of restoration. The likely cost of loss of service and restoration of communications system(s) as % of annual billed revenue is 10% of annual billed revenue. The third is related to education, specifically education data. The score indicates that 90% or more of critical education data, with associated apps, are imaged at remote sites. The fourth is related to the ability of the prison system to survive "most probable" and "most severe," scenarios, without releasing or harming inmates. It is scored that some minor damage to facilities is probable – no less of life or loss of custody.

There are 6 assessment areas scored 3. Customer service days at risk of loss "Electrical energy loss factor" indicates loss factor of 1-25% from the most probable" scenario. While designated critical asset service days at risk of loss from energy failure "Electricity critical asset (ECA) loss factor" shows loss factor of 1-25% from the most probable" scenario. The service days at risk of loss "Communications loss factor" shows a loss factor of 1-25% from the most probable" scenario. The designated critical asset service days at risk of loss from communications failure stands at Loss factor of 1-25% from the most probable" scenario. Structural safety and disaster resilience of health care and emergency facilities show 1-5% of annual bed days lost from most probable" scenario, and <2.5% of critical annual bed days lost from most probable" scenario, respectively. It is still on the positive side offering an opportunity for improvement.

There are 5 assessment areas have a weak score of 2 including the adequacy of protective infrastructure, designated critical asset service days, cost of restoration, cost of restoration of service, and availability of emergency healthcare.

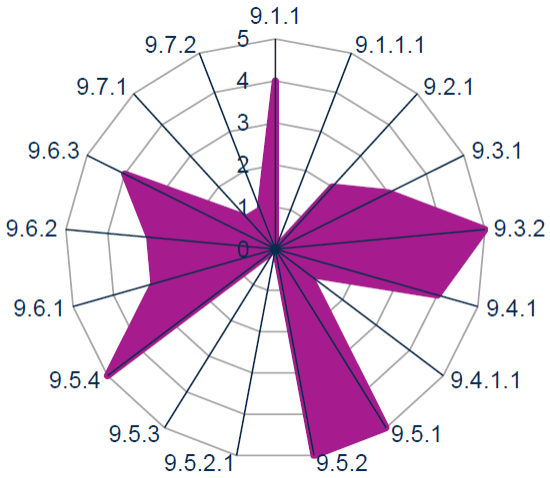
A group of 8 assessment areas scored very weakly, 1. Those areas include effectiveness of maintenance, cost of restoration of service, customer service days at risk of loss, designated critical asset service days at risk of loss from gas supply failure, road – service from road system at risk of loss, Air , loss of teaching time, and assurance of continuity of computer systems and data critical to government continuity.

This essential also has the most significant number of gaps, 9 assessment areas, scored 0. These gaps include customer service days at risk of loss, road – survival of critical access and evacuation routes., rail/metro, service from rail system at risk of loss. It also includes River/Sea, other public transport, cost of restoration of service (all transport routes), health records and data, the structural safety of education facilities, and assurance of continuity of computer systems and data critical to any of the above infrastructure.

In overall, Essential 8 tend to be on the weak side, scoring a percentage of one-third of the possible maximum score. It will need special attention to the action plan.

2.9. Essential 09: Ensure Effective Disaster Response

9.1.1	Existence and effectiveness of early warning systems.	4
9.1.1.1	Reach of warning.	0
9.2.1	Existence of emergency response plans that integrate professional responders and community organizations (For post-event response - see Essential 10).	2
9.3.1	"Surge" capacity of police also to support first responder duties.	3
9.3.2	Definition of other first responder and other staffing needs, and availability.	5
9.4.1	Definition of equipment and supply needs, and availability of equipment.	4
9.4.1.1	Definition of equipment and supply needs, and availability of equipment.	1
9.5.1	Likely ability to continue to feed population.	5
9.5.2	Likely ability to meet needs for shelter/safe places.	5
9.5.2.1	Likely ability to meet needs for shelter/safe places.	0
9.5.3	Ability to meet likely needs for staple goods.	0
9.5.4	Likely availability of fuel.	5
9.6.1	Interoperability with neighbouring cities/states and other levels of government of critical systems and procedures.	3
9.6.2	Emergency operations centre.	3
9.6.3	Coordination of post event recovery.	4
9.7.1	Practices and rehearsals – involving both the public and professionals.	1
9.7.2	Effectiveness of drills and training.	1



For Essential 9, Khartoum scored 46 out of 85 possible maximum scores, about 54 %, representing an overall positive score. Four assessment areas out of 13, scored high top score of 5. Staffing Needs are defined for “most probable” and “most severe” scenarios, either from actual events or from practice drills for scenarios in Essential 2, taking into account the role of volunteers. Likely ability to continue to feed the population, Positive outcome – days of emergency food available exceeds estimated days disruption to regular supply. Nevertheless, the assessment area related to “Staples gap” - % shortfall in supply within 24 hours relative to demand score 0, with an estimated staples gap of 20% or more while the likely ability to meet needs for shelter/safe places available within 12 hours exceeds the estimated need. “Shelter gap” – the ability of shelters to withstand disaster events and remain safe and usable score 0, less than 50%, are assessed as likely to withstand a “most severe “event. For likely availability of fuel, days of fuel available exceeds estimated days’ disruption to supply.

Three assessment areas scored 4, indicating strength opportunity. For existence and effectiveness of early warning systems, warnings exist, but warning time may be less than technology currently permits. Warnings are seen as reliable and specific. As of equipment and supply needs defined for “most probable” and “most severe” scenarios in Essential 4, needs are defined independently of the latest scenarios. In terms of

coordination of post event recovery, there is some coordination of post-response activities in the city. However, overlapping roles exist and accountability is not clearly defined.

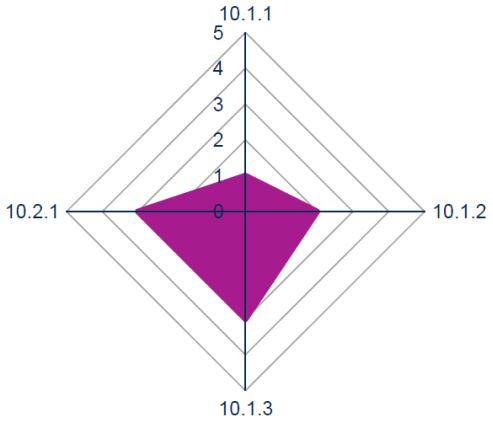
Three assessment areas scored 3. Surge capacity exists but is known or suspected to have minor inadequacies, perhaps in location, numbers, coverage of all neighborhoods within 4-12 hours. The Ability to cooperate at all levels with neighboring cities and other levels of government shows some minor incompatibilities but are being addressed. The score note that emergency operations center exists with SOPs designed for "most probable" scenario), most agencies participating but incomplete camera visibility or communications.

One area scored 2, indicating that emergency response plans that integrate professional responders and community organizations exist, but are known to be incomplete or otherwise deficient.

Three areas show significant weakness as it scored 1. Equipment and supply needs are defined for "most probable" and "most severe" scenarios in Essential 2, independently of the latest scenarios.
Practices and rehearsals – involving both the public and professionals, are characterized by Ad hoc partial exercises – not all scenarios tested, not realistic. The Level of the effectiveness of Drills indicates that the city is broadly unprepared for disaster in terms of training and skills.

2.10. Essential 10: Expedite Recovery and Build Back Better

10.1.1	Planning for post event recovery and economic reboot.	1
10.1.2	Extent to which there has been stakeholder consultation around the 'event recovery and reboot' plans.	2
10.1.3	Shadow financial arrangements for processing incoming aid and disbursing funds.	3
10.2.1	Learning loops.	3



For Essential 10, Khartoum scored 9 out of 20 possible maximum scores, about 45 %. Two assessment areas scored 3 showing strength for opportunities, representing in overall a positive score. Regarding shadow financial arrangements for processing incoming aid and disbursing funds, post-event arrangements have one or more significant gaps that may compromise aspects of workability In considering the learning loop, the need to learn is acknowledged and there is some attempt to share learnings, but it is not systematic - there are gaps.

One area scored 1 (very weak), indicating that plans exist for post "most probable" event but with generalized inadequacy. As of stakeholder consultation around the 'event recovery and reboot' plans, at least 4 groups have been engaged/ consulted.

2.11. Efforts and Practices for Disaster Risk Reduction in Khartoum State

This section is meant to highlight some efforts and useful and successful practices in Khartoum that support disaster risk reduction. Since Khartoum joined the "Making Cities Resilient Campaign (MCRC)" and conducted the Preliminary Scorecard assessment in 2017, it has undertaken several initiatives and projects to support disaster risk reduction. It has established a hybrid disaster-risk reduction mechanism, developed a tracking system, introduced new software for machines maintenance, built new two dams from national resources, allocating budget from financial resources of different parties.

The following also highlights some efforts and practices to improve disaster risk reduction in Khartoum State. There are sound risk and vulnerability assessments and economic analysis of the floods in Khartoum State and a vision of what needs to be done to address the threats. Nevertheless, inadequate resources hinder suitable actions (Siyam 2018).

In spite the transportation system in the Great Khartoum is characterized and identified as privatized, congested, not available, have considerable delays, not connected and provide low quality of transit services, there have been sound plans since 2011 to upgrade the system and strengthen the system resilience. Nevertheless, there are gaps between what is planned and the implementation on the ground (Abdalla 2018).

There is also a structural plan for the Khartoum State, which is developed in response to the problems facing the absorption of future urban growth of the State. It is based on three main issues; limited natural area, environmental constraints for physical development (such as green cover and natural waterways), and rural settlement systems. The ecological framework was the focus of all development frameworks and structures. Environment and resilience to disaster are integrated into the policies of the structural plan. Like the other plans, there is a disconnect between the planning and the implementation on the ground, in large part due to the limited available resources (Structural Plan Team 2018).

Public participation has become a successful alternative model for finding resources to build resilient infrastructure including culverts, roads, waste transport…etc in Khartoum State, and Sudan in general. Citizen contributions compensate for the lack of financial capital, using their public relations and social networks including relatives, neighbors and members of local communities (Social capital). The collective resources and energies allow them to improve their living conditions, education quality, public health…etc. Public participation provides the opportunity for voluntary societies to contribute to decision-making, planning, implementation and follow-up of projects and all other related activities that could improve their quality of life. There many ways in which public participation could contribute to the development of resilience infrastructure (El Tahir and A. Ali 2018).

An exciting practice at the community level used in Khartoum and Sudan, in general, is place-making to create resilient communities. Placemaking is a bottom-up approach to empower and engage people in ways that are not offered in traditional planning processes. The process identifies local community leadership, draws on the local assets and skills the community to find solutions. It relies on its people rather than relying on professionals and experts who provide advice and

support if needed. The process entails. The main idea is to Empower, mobilize, engage, foster teamwork, and achieve resilience (Eltahir 2018).

3. Action Plan and Implementation Strategy

The following section provides the framework for the action plan including a vision, mission, strategic objectives, planned actions, monitoring and evaluation.

3.1. Vision

Khartoum State is safe and resilient through the reduction of risks and leveraging of capacities and opportunities across all levels of the stakeholders, and through integrated and efficient emergency management system responsive to the needs in case of disasters.

3.2. The Mission

Strengthen resilience and reduce disaster risk, vulnerability and impacts of natural and non-natural disasters on Khartoum State, integrate disaster risk reduction in development planning and making DRR everybody responsibility through the efficient coordination process.

3.3. Strategic Objectives

Some key strategic objectives have been defined through the DRR capacity assessment process through consultation and feedback of the stakeholders participated in the assessment process. The DRR action plan has some overall Objectives:

- *Raise awareness and provide stakeholders with relevant knowledge and information about natural and other disaster risks.*
  One of the hindering factors in DRR work is lack of adequate awareness, knowledge and information about disaster risk reduction. Reaching out to the stakeholders and raising their awareness and provision of quality information, assessment, statistics and databases is a vital objective of the action plan

- *Integration of risk reduction into development plans and policies and oversight.*
  There is a consensus among the stakeholders in Khartoum State that disaster risk reduction can't be achieved unless it is fully integrated into development plans at all levels and across all sectors.

- *Strengthening of capacities for natural and other disaster risk Management.*
  Capacity building was expressed as an overarching objective of the action plan. Capacity building should be conducted to all the stakeholders including government authorities, civil society, private sector, academics and researchers, and media.

- *Create safe and resilient communities from disasters across the State.*
  The efforts for disaster risk reduction are to be spread at all levels including local communities as strengthening the resilience of those communities will increase the overall resilience of the State.

- *Strengthen governance and coordination in disaster risk reduction.*
  One of the critical weakness in the capacity for disaster risk reduction in Khartoum State is the current governance and coordination among the stakeholders. The situation calls for strengthened governance and enhanced coordination

- *Build resilient and robust disaster-management early warning and emergency communication.*
  The action plan aims to provide efficient means of early warning and communication mechanisms to ensure timely alerts, knowledge and information are provided to communities that could be impacted by disasters

3.4. Planned Actions

The Action plan for Disaster Risk Reduction for Khartoum State is designed to be a five years plan. Nevertheless, sources and amounts of funding are not confirmed. Therefore, the Action Plan will be considered as a living document that responds to and adjusts to the reality of the situation of the available resources and the enabling environment. At the time, of drafting the Plan, Sudan has undergone a revolution and a change of regime. It is believed that the current situation will affect the implementation of the plan. The positive news is that there is a plan in place, which can be tailored according to the situation. Some actions could be shifted to the next plan if the resources were not made available for this plan.

As described in the methodology section, the actions planned are the outcomes of the UNISDR scorecard assessment using the stakeholders inputs and supplemented by contributions from the focal point for Khartoum and selected experts. The actions are proposed based on and in response to the gaps identified by the stakeholders, experts and the author of the plan from the responses to the indicators of the scorecard. For each essential, there are several actions to respond to the gaps identified. The 117 indicators in a scorecard are not distributed equally among the ten essentials. The number of actions doesn't necessarily match the number of indicators, as it is more related to the gaps rather than the number of indicators. Table 3 shows the number of actions per each essential and the number of indicators in the scorecard for that essential.

As shown in Figure 10, Essential 8 on “Increase Infrastructure Resilience” has the highest number of actions (14 actions), and it also has the highest but not an equal number of indicators (33 indicators). Essential 9 “Ensure Effective Disaster Response” has the second highest number of actions (11 actions) as well as the second highest number of indicators (17 indicators).

The action plan was structured that each essential would have objectives. For each objective, there are actions to achieve it. For each action, there are indicators and targets. There are also the timeline, responsible agencies and sources of funding. The following section highlights the key actions in general terms, while the details are given in Table 4.

Table 3. Number of Actions Versus Number of Indicators		
Essential	**Number of Action Proposed**	**Number of Indicators in the UNISDR Scorecard**
Essential 1. Organize for Resilience	5	9
Essential 2. Identify, Understand and Use Current and Future Risk Scenarios	**5**	**6**
Essential 3. Strengthen Financial Capacity for Resilience	**7**	**10**
Essential 4. Pursue Resilient Urban Development	**9**	**10**
Essential 5. Safeguard Natural Buffers to Enhance the Protective Functions Offered by Natural Ecosystems	**5**	**6**
Essential 6. Strengthen Institutional Capacity for Resilience	**5**	**13**
Essential 7. Understand and Strengthen Societal Capacity for Resilience	**5**	**10**
Essential 8. Increase Infrastructure Resilience	**14**	**33**
Essential 9. Ensure Effective Disaster Response	**11**	**17**
Essential 10. Expedite Recovery and Build Back Better	**2**	**4**

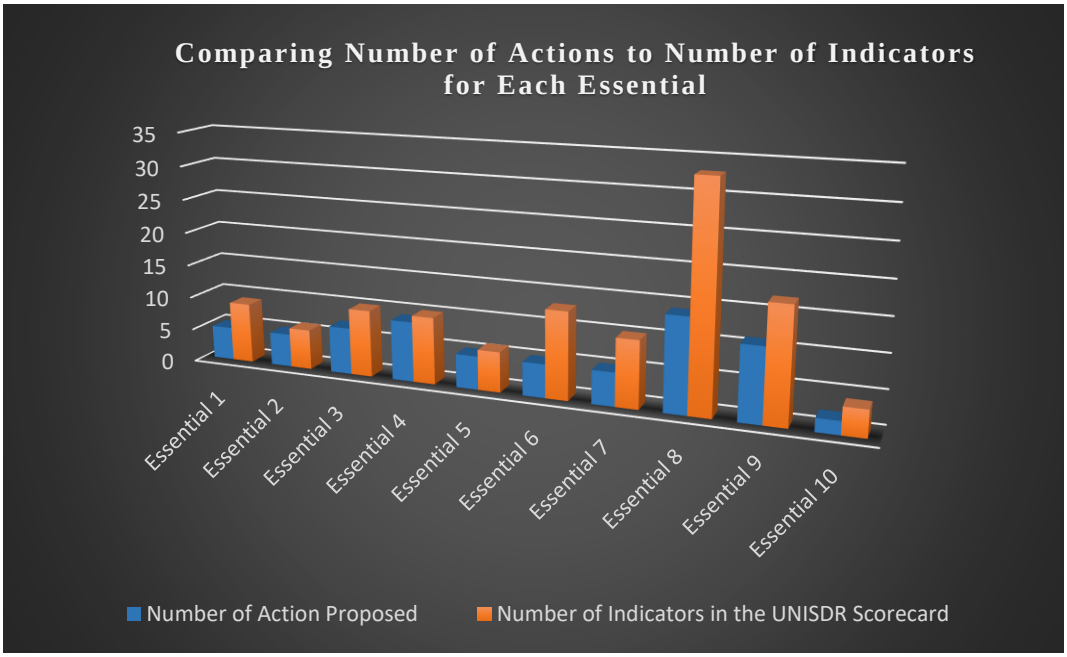


Figure 10

Essential 10 “Expedite Recovery and Build Back Better” has the least number of actions (2 actions) as well as the least number of indicators (4 indicators). Concisely, the number of actions correlates to but not equal to the number of indicators in the scorecard.

The actions on organizing for resilience stressed on data and information, strategy and programs, monitoring the implementation of the action plan, and laws related to DRR. Among the stated action are establishing a state unified disaster risk reduction data and information center, preparing a unified disaster risk reduction strategic plan, making a unified disaster risk reduction strategic plan, developing clear programs and assign budgets for DRR. It further asks to evaluate, review, update and enforce relevant laws.

Actions related to identifying, understanding and using current and future risk scenarios include conducting a comprehensive assessment of all potential hazards, developing detailed risk scenarios, preparing a study on the losses caused by disasters, comprehensive risk mapping, collecting data and establishing a database bank on critical assets and related disaster loss databases.

The actions proposed to strengthen financial capacity for resilience are mainly related to outreach for the deployment of BOT, BOOT and PPP Systems, developing of national investment law, providing incentives, guarantees to investors and remove investment obstacles. It also includes developing one consolidate financial plan, increasing the financing ratio, providing incentives to insurance companies, and public awareness and advocacy to promote insurance of assets.

In meeting the need to pursue resilient urban development and design, the plan is stepping in the inventory of displaced persons, enforcement and modernization of building laws, and activities that could be affected by risks. land uses diversions, laws on agricultural land investment, water harvesting projects, laws for urban design and the use of modern environmental technologies, green buildings and green cities, and building codes and regulations.

In safeguard natural buffers offered by natural ecosystem, the plan is to enforce laws and policies related to ecosystems, increase protected areas, and ecosystem initiatives and projects. The plan includes activating monitoring and evaluation programs for land use and environmental impact assessment and integrating the concepts of the new urban agendas and sustainable development goals into all laws, legislation and policies.

In the framework of strengthening institutional capacity for resilience, there are actions to review and develop relevant institutional laws and strengthen organizational structures, establish exchange programs for disaster resilient, develop and implement training and awareness programs and introduce DRR in the education system.

The plan is meeting to understand and strengthen societal capacity for resilience by establishing coordination mechanisms between government authorities and the civil society. It also has actions to identify the roles and responsibilities of the stakeholders and strengthening community bodies

and activists, establish a resilience social network, identify and meet the needs of the most vulnerable groups.

The plan incorporates a wide range of actions to increase infrastructure resilience, including preparing flood hazard maps, completing the drainage networking, constructing sustainable earth dams and Nile barricades, implementing preventative maintenance programs, developing and upgrading Khartoum water and sewage system and networks. It also encompasses the construction of water treatment and solar energy plants, improving the transit services network, and completing and upgrading existing road networks. Further, it includes rehabilitation and development of new health service centers, establishing an information center for healthcare services, and rehabilitation and construction of new educational service buildings.

Actions to ensure effective preparedness and disaster response, focus on establishing a multi-hazard early warning center, mobilizing telecommunications networks to disseminate alerts, preparing disaster response plans, establishing a risk management coordination office, and tightening coordination and automating operating procedures. Other action items include strengthening the capacity of civil defense, increasing knowledge about the needs of affected people during disasters, providing sustainable food and shelter for needy people affected when emergencies happen, establish safe havens. It also includes defining roles and responsibilities, organizing work and accountability for responding to disasters, and ensure sustainable and timely fuel supply in case of emergency.

The last set of actions in the plan are concerned with the expedite recovery and build back better. Only two main actions are proposed, namely preparing a comprehensive plan to deal with economic and infrastructure needs for post-disaster, and establishing a state-wide disaster risk reduction mechanism for the stakeholders.

OBJECTIVES	ACTIONS	TARGETS	INDICATORS	TIMEFRAME	RESPONSIBILITY (* LEAD AGENCY) and key Partners	POTENTIAL SOURCES OF BUDGET	Estimated Budget (US Dollar)
Essential 1: Organize for disaster resilience							
Unified databases and information to support disaster risk reduction	Establish a state unified disaster risk reduction data and information center with a common information platform for all relevant actors.	One main Center	# data and information centers established # databases developed # institutions contributing to the databases and information	One year Starting June 2019	Sovereign authorities (normally national security agencies) and civil society	Local Gov	600,000
Disaster risk reduction is guided by an updated a sustainable strategic plan	Prepare a unified disaster risk reduction strategic plan, with laws and policies that accommodate all relevant actors	One Strategic plan	# strategic plans developed # institutions participating in and implementing the plan The level of performance of the plan	6 months (first 6 months) Starting April 2019	Sovereign authorities (normally national security agencies) and civil society	Federal Gov Local Gov	100,000
	Develop clear programs and assign budgets for the implementation of the plan	10 programs for the 10 Essentials	# programs developed # programs implemented The amount of budget assigned for each program	One Year (First year) Starting June 2019	Sovereign authorities (normally national security agencies) and civil society	Local Gov	100,000

	Monitor the implementation, evaluate and update the plan every 2 years	Two updated plans in the five years	# reviews and updates to the plan	Continuous Starting June 2019		Local Gov	100,000
Ensure uniform and harmonized laws, policies and procedures	Review, update, and enforce relevant laws and eliminate obstacles for implementation	All relevant laws, with a maximum of 10 top priority laws	% of total relevant laws reviewed and updated # obstacles removed for the implementation	Continuous June 2019	Sovereign authorities (normally national security agencies) and civil society	Federal Gov Local Gov	100,000
Essential 2: Identify, understand and use current and future risk scenarios							
Strengthen the knowledge of and identify the risks faced by the city and the likelihood of occurrence and assess the city vulnerability to those risks	Conduct a comprehensive assessment of all potential hazards, update the knowledge about them, and identify vulnerability and disaster risk areas at each level	One comprehensive assessment	# assessments conducted # vulnerabilities identified # risk areas identified	One year Starting June 2019	Local Government International Agencies NGOs National Council for Civil Defense Support centers for specialized disaster departments	Federal Gov Local Gov NGO`s	20,000
	Develop comprehensive risk scenarios that cover the entire state	4 scenarios	# scenarios developed # institutions contributing to scenario development # experts contributing to the scenarios	One year Starting Jan 2020	Local Government International Agencies NGOs National Council for Civil Defense Support centers for specialized disaster departments	Federal Gov Local Gov	20,000

	Prepare a study on the losses caused by disasters and identify risk relationships and how they relate to losses.	One study on the losses	# studies conducted on losses caused by disasters	One year Starting Jan 2020	Local Government International Agencies NGOs National Council for Civil Defense Support centers for specialized disaster departments	Federal Gov Local Gov	50,000
	Prepare a comprehensive risk map to be continuously updated.	One comprehensive risk map	#risk maps completed	One year Starting Jan 2020	Local Government International Agencies NGOs National Council for Civil Defense Support centers for specialized disaster departments	Federal Gov Local Gov	50,000
Improve the knowledge and related databases about critical assets including infrastructure	Collect data and establish a database bank on critical assets and related disaster loss databases including damage of critical assets	One database on critical assets	#databases on critical assets developed Integration of the database in a databank at the data center mentioned in Essential 1	10 months Starting June 2019	Support centers for specialized departments of disasters	Federal Gov Local Gov	60,000

Essential 3: Strengthen financial capacity for resilience							
Attract and Enhance External &Internal Investments	Develop mechanisms to Seminars and outreach events to introduce and deploy BOT, BOOT and PPP Systems	5-7 mechanisms deployed per year	#mechanisms deployed to introduce and deploy BOT, BOOT and PPP Systems # BOT, BOOT, and PPP systems deployed % project financed # Procedures & regulations #Inv. Research Study % Reduced VAT per Year	One year Starting Jan 2020	Ministry of Infrastructure and Transport Ministry Planning Ministry of Finance UN	Federal Gov Local Gov	10,000
	Develop a national investment law	One integrated investment law	# approved investment laws developed	One year Starting Jan 2020	Ministry of Finance Ministry of Justice UN	Federal Gov Local Gov	10,000

	Remove investment obstacles, provide guarantees to investors, and apply various incentive schemes that motivate stakeholder's participation	At least 10 obstacles have been removed Developing and introducing 8 incentive schemes	# obstacles removed # incentives developed and introduced	One year Starting Jan 2020	Ministry of Infrastructure and Transport Ministry Planning Ministry of Finance	Federal Gov Local Gov	10,000
Improve Financial Coordination and Consolidation	Consolidate financial plans in one plan and protect it from political influences, and tighten coordination in budget distribution according to priorities	One consolidated financial plan	% consolidation and coordination of the financial plans within one year	One year Starting Jan 2020	Ministry of Finance Strategic Planning Council	Federal Gov Local Gov	10,000
Develop & update new financing tools and techniques.	Increase the financing ratio by at least 50% and protect it from conversion for other purposes	50% increase per year	% Increased funding ratio/year	One year Starting Jan 2020	Ministry of Finance Ministry of justice	Federal Gov Local Gov	10,000
Increase coverage of insurance assets	Introduce incentives programs for insurance companies to increase insurance coverage of assets, buildings and housing	At least 50 % of assets insured	Percentage of assets insurance coverage (ex, Building, Housing, Organizations)	One year Starting Jan 2020	Insurance Companies Ministry of Finance Ministry of justice	Federal Gov Local Gov	10,000
	Develop public awareness programs and advocacy to encourage insurance of assets	One Program, which include 10 activities	#of events organized #institutions participated # people benefited	One year Starting June 2019	Insurance Companies Ministry of Finance	Federal Gov Local Gov NGO`s	40,000

Essential 4: Pursue resilient urban development and design							
Reduce population displacement and slum housing	Inventory of displaced persons and determine their percentage, causes and types of displacement	One full inventory conducted with 6 months	% people displaced from disaster areas recorded List of causes and type of displacement	One year Starting Jan 2020	Ministry of Urban Planning and related agencies	Local Gov	4,000,000
	Enforcement and modernize building laws and optimize land uses to increase resilient capacity	All relevant building laws to be enforced and modernize in the timeframe of the action plan Land uses to be reviewed and optimized in the timeframe of the action plan	% building laws enforced and modernize % land used optimized	One year Starting Jan 2020	Ministry of Urban Planning and related agencies	Federal Gov Local Gov	300,000
Sustainability of economic activity	Identify activities, which could be affected by risks	One assessment to identify activities affected by risks	List of activities affected by risks	10 months Starting June 2019	Ministry of Infrastructure and Transport	Local Gov	300,000
	Enforce non-diversion of land uses (E.g. agricultural to residential or industrial).	Enforce all laws related to non-diversion of land uses within one year	% land use diversion % laws enforced to prevent land use diversion	Continuous Starting Jan 2020	Ministry of Urban Planning Ministry of Agriculture	Federal Gov Local Gov	300,000

Protection of agricultural land from risks	Activate and update the laws on agricultural land investment	Periodic update on a yearly basis	# updates of laws on agricultural land investment % increase in agricultural land investment	Two years Starting Jan 2020	Ministry of Agriculture and Forests Ministry of Urban Planning	Federal Gov Local Gov	300,000
	Develop and implement water harvesting projects	4 projects One project per year	# projects implemented	4 years Starting Jan 2020	Ministry of Agriculture and Forests Ministry of planning Council of Environment	Federal Gov Local Gov NGO`s	1,000,000
Achieve Sustainable urban design	Enact a law for urban design and the use of modern environmental technologies, and introduce articles in the current building law that support increasing the city resilience to disasters	Enact one law Introduce the use of 10 modern environmental technologies Introduction of 3 articles in current building laws	# laws enacted #modern technology mobilized #number of articles introduced	One year Starting Jan 2020	Government institutions + consultants Ministry of planning Council of Environment	Federal Gov Local Gov	300,000
	Advocate the culture of green buildings and green city, including the use of alternative energy technologies	Organize 4 advocacy activities per year	# advocacy activities organized # buildings or projects used green building concepts and alternative energy technologies	4 years Starting June 2019	Government institutions Ministry of planning Council of Environment	Federal Gov Local Gov NGO`s	1,000,000

Develop building laws that contribute and raise awareness for city resilience	Develop and update building codes and regulations to conform with international standards (LEED, BREEAM, Greenstar, etc.)	Develop and update building codes within one year	List of new building codes and regulation List of updated building codes and regulations % buildings not conforming to buildings laws and regulations The percentage of buildings conforming to the specifications of building laws and regulations	One year Starting Jan 2020	Ministry of Urban planning Ministry of Infrastructure UN UNCHR	Local Gov	500,000
Essential 5: Safeguard natural buffers to enhance the protective functions Offered by natural ecosystem							
Protecting natural barriers, environmental assets and ecosystems, and improving the quality of life	Enforcement of laws and policies at all levels through the Supreme Council for Environment and Urban Upgrading, and implement international, regional and local conventions and treaties through partnerships	All relevant laws and policies are enforced within the timeframe of the action plan	# laws activated and policies implemented # projects implemented in cooperation with regional and international organizations	4 Years Starting Jan 2020	Ministry of law prime minister	Federal Gov Local Gov NGO`s	100,000
	Increase the number and area of protected areas in disaster risk zones	At least adding 3 new protected areas in in	# protected areas added in disaster risk zones	4 Years Starting Jan 2020	Ministry of Health & Finance	Local Gov	1,000,000

		disaster risk zones					
Improve and maintain the health and performance of ecosystem services	Inventory, register, build and maintain holistic view and list of all key ecosystem development initiatives and projects	One list of all key ecosystem development initiatives and projects	# monitoring and maintenance programs # lists of key ecosystem development initiatives and projects	4 Years Starting Jan 2020	Ministry of Health & Finance	Federal Gov Local Gov NGO`s	100,000
Improve and maintain the health and performance of ecosystem services	Activation of monitoring and evaluation programs for land use and environmental impact assessment of projects before, during and after implementation	One monitoring and maintenance program per key thematic area Impact assessment study for each project undertaken	# monitoring programs for all thematic areas # impact assessment studies to the # projects undertaken	4 Years Starting Jan 2020	Ministry of Health & Finance	Federal Gov Local Gov	200,000
Building sustainable, resilient green cities	Incorporate and integrate the concepts of the new urban agendas and sustainable development goals into all laws, legislation and policies	Integration of the list of new urban agenda concepts and relevant SDGs during the implementation of the 5 years plan	# new urban agenda concepts integrated # Relevant SDGs integrated	4 Years Starting Jan 2020	Ministry of Health & Finance	Federal Gov Local Gov	200,000

Essential 6: Strengthen institutional capacity for resilience							
Develop and strengthen the institutional capacity of the public and private sectors and civil society organizations in the areas of disaster risk reduction	Review and develop relevant institutional laws and strengthen organizational structures	Target key leading and partner institutions to implement the action plan	# institutional laws and structures reviewed and strengthened % increase in institutional efficiency in response to disasters % reduction in disaster losses due to institutional efficiency	One year Starting June 2019	National Council for Civil Defense Ministries of urban planning, infrastructure and related bodies	Federal Gov Local Gov	100,000
	Establish exchange programs with similar cities and forums for disaster resilient	Target 8 national cities And 50 regional /international cities	#twining between national cities #twining with regional/international cities % implementation of exchange programs with similar cities	Continuous Starting June 2019	Concerned ministries with the Ministry of Human Resources Development	Local Gov NGO`s	100,000

	Develop and implement training programs related to the various essentials to increase the resilience of the communities	Umbrella training for each of the 10 Essentials	# training workshop conducted # number of trainees Degree of the Diversity of the training programs	Continuous Starting June 2019	Concerned ministries with ministry of humanities resources	Federal Gov Local Gov NGO`s	200,000
	Develop and implement awareness programs in different disciplines targeting both institutions and individuals	Target at least 15 relevant institutions and 20 community groups	# outreach campaigns # groups reached # awareness materials developed Diversity of the awareness materials	Continuous Starting June 2019	Concerned ministries with ministry of humanities resources	Federal Gov Local Gov NGO`s	200,000
	Develop and introduce curriculum for resilience in the education system	Three school curriculums for primary, middle and high school current One University curriculum	# curriculums developed # curriculums introduced in the education system # students benefited from the curriculums	Continuous Starting June 2019	Ministry of Education	Federal Gov Local Gov	200,000

Essential 7: Understand and strengthen societal capacity for resilience							
Strengthen the role and participation of civil society in disaster risk reduction (preparedness, response, recovery) and encourage the use of social media	Establish coordination mechanisms between government authorities and the civil society, in consultation with all competent governmental authorities.	One overall coordination mechanism 6 Selected sectoral coordination mechanisms	# efficient coordination mechanisms # and % government institutions participating in the coordination % increase of civil society groups engaged in disaster risk	Continuous Starting June 2019	Ministry of Finance Federal Humanitarian Relief Commission Ministry of Social Affairs State Commission Ministry of Infrastructure and Transport Civil society organizations	Federal Gov Local Gov NGO`s	100,000
	Identify roles and responsibilities and strengthen community bodies and activists through training to respond before and after disaster events.	All relevant communities to be identified in the first year	# list of institutions and civil groups and their role # communities strengthened	6 months June 2019	Ministry of Finance Federal Humanitarian Relief Commission Ministry of Social Affairs State Commission Ministry of Infrastructure and Transport Civil society organizations	Local Gov NGO`s	200,000

	Establish a resilience social network that includes groups representing all districts in the state of Khartoum	One overall resilience social network	A resilience social network #groups joining the network	6 months Starting June 2019	Prime Minister committee Ministry of Infrastructure and Transport. Civil society organizations	Local Gov	100,000
	Identify the most vulnerable groups and learn to deal with them before and after the disasters.	All relevant groups to be identified during the 5 years	# a survey of vulnerable groups completed # vulnerable groups identified	One year Starting June 2019	Ministry of Infrastructure and Transport Civil society organizations	Local Gov NGO`s	200,000
Advocate the culture of volunteering to the private sector, employers and citizens to prepare for and respond to the disasters	Develop advocacy programs using multimedia (audio and visual media) to promote volunteerism during and after the disasters	One major program	# advocacy campaigns # beneficiaries # volunteering institutions # volunteering individuals	Continuous Starting June 2019	Ministry of Information Ministry of Infrastructure and Transport Civil society Media	Federal Gov Local Gov NGO`s	200,000
Essential 8: Increase infrastructure resilience							
Enhancement and reinforcement of resilient infrastructure	Prepare flood hazard maps	At least one flood hazard map	#flood hazards maps completed	2 years Starting June 2019	MOIAT, NGO`S, civil defense, local government	Federal Gov Local Gov NGO`s	500,000
	Complete the drainage network (studies, design & consultation)	100 % of the drainage network	% Percent completion of drainage network	2 years Starting Jan 2020	MOIAT, NGO`S, civil defense, local government	Federal Gov Local Gov NGO`s	600,000,000

	Construct 5 sustainable earth dams	5 Earth Dams	# earth dams constructed	2 years Starting Jan 2020	MOIAT, NGO`S, civil defense, local government	Federal Gov Local Gov NGO`s	7,500,000
	Construct sustainable Nile barricades for vulnerable areas	30 barricades for vulnerable areas	# vulnerable areas protected	2 years Starting Jan 2020	MOIAT, NGO`S, civil defense, local government	Local Gov	13,600,000
Develop and maintain efficient infrastructure	Develop and implement preventative maintenance program	Annual program for maintenance	% of infrastructure maintained	Annual Starting Jan 2020	MOIAT, MPP, private sectors	Local Gov	100,000
Ensure reliable and clean water supply and sewage systems	Develop and upgrade Khartoum water and sewage system/networks	The entire network	% supply and coverage served area	4 and half years Starting Jan 2020	MOIAT, MPP, Environment Council, local government, private sector, public	Federal Gov Local Gov NGO`s	3,500,000,000
	Construct 4 water treatment plants	4 water treatment plants	# water treatment plants completed	4 and half years Starting Jan 2020	MOIAT, MPP, Environment Council, local government, private sector, public	Federal Gov Local Gov NGO`s	180.000,000
	Construct 6 compact water treatment units	6 compact water treatment units	#6 compact water treatment units	4 and half years Starting Jan 2020	MOIAT, MPP, Environment Council, local government, private sector, public	Federal Gov Local Gov NGO`s	20,160,000
Increase electricity production and enhance clean-green renewable energy	Construct 7 solar energy stations/ plant for different economic activities	7 solar energy stations	# renewable energy units constructed # Percentage of energy from green sources	3 years Starting Jan 2020	MOIA, MPP, Environment Council, MOIE,	Federal Gov Local Gov NGO`s	5,500,000
Development of resilient sustainable transport and mobility network	Build inter-model modes (transit services network)	One network	# transit commuters among population	4 and half years Starting June 2020	MOIAT, MPP, Environment Council, Local government	Federal Gov Local Gov NGO`s	435,000,000

	Complete & upgrade existing road networks (1000 km)	1000 Km	% completed roads networks	4 and half years Starting June 2020	MOIAT, MPP, Environment Council, Local government	Federal Gov Local Gov NGO`s	120,000,000
Improving healthcare services	Rehabilitation & construction of new health service centres using sustainable & resilient materials capable to withstand disasters	15 rehabilitated health care centers 8 new health care centers	# healthcare service centers per capita	4 and half years Starting June 2020	Ministry of health	Federal Gov Local Gov NGO`s	50,000,000
	Establish an information centre for healthcare services.	One major health information center 5 subsidiary health information centers	# health information centers	4 and half years Starting June 2020	Ministry of health	Local Gov NGO`s	1,000,000
Improve educational services	Rehabilitation & construction of new educational service buildings using sustainable & resilient materials to withstand disasters	10 rehabilitated educational service buildings 5 new health care centers	# rehabilitated educational service buildings # new health care centers	4 and half years Starting June 2020	Ministry of Education	Local Gov NGO`s	25,000,000
Essential 9: Ensure effective preparedness and disaster response							
Develop and strengthen early warning capabilities in Khartoum	Establishment of a multi-hazard early warning center (with a spokesperson), including state of the art early warning systems- taking in consideration local	One a multi-hazard early warning center	# multi-hazard early warning center established	2 years Starting Jan 2020	Secretariat of Khartoum Government Min of Infrastructure HAC	Federal Gov Local Gov	10,000,000

	knowledge and culture						
	Mobilize all existing telecommunications networks to disseminate alerts, and obligate telecommunications companies to participate in the alert system	All existing telecommunication companies	#telecommunication companies engaged % people receiving timely alerts and information Time spent and reliability of alerts dissemination	4 and half years Starting June 2019	Secretariat of Khartoum Government	Federal Gov Local Gov NGO`s	50,000
Ensures Sustainability and effectiveness of response plans and emergency management	Prepare disaster response plans, which could address the most likely and most severe scenarios	One master plan and a plan for each locality	% completed plans that are linked to the expected scenarios	4 and half years Starting June 2019	Secretariat of Khartoum Government Localities of Khartoum Relevant ministries	Local Gov NGO`s	20,000
	Establish a risk management coordination office	One coordination office	Coordination mechanism is in place	6 months Starting June 2019	Secretariat of Khartoum Government Localities of Khartoum Relevant ministries	Local Gov	250,000
	Tighten coordination and automate operating procedures through cameras and monitoring devices	One network of cameras and monitoring devices	% coverage of cameras and disaster monitoring devices	A year June 2019 Starting	Secretariat of Khartoum Government Localities of Khartoum Relevant ministries	Federal Gov Local Gov NGO`s	200,000

Strengthening the effectiveness of the regular forces and the actors involved in the disaster situations	Strengthen the capacity and qualification of civil defense through training and equipment	Increase personnel by 30 % 4 specialized training programs for civil defense personnel Add state of the art missing equipment	% increase in the number of civil defense personnel % police forces trained % increase in equipment # reduction in the time for deployment	6 months Starting June 2019	Ministry of Interior National Council for Civil Defense	Federal Gov Local Gov NGO`s	500,000
Maintain and sustain knowledge of the response needs of those affected during disasters	Develop programs for continuous improvement and sustainability of knowledge of the needs of affected people through training and practices	One major program based on needs assessment	#organizations participated in the program #people participated #activities implemented by the program	Annually Starting June 2019	Ministry of Finance Supreme Council for Training Ministry of Infrastructure and Transport Social Welfare Localities of Khartoum Community committees	Federal Gov Local Gov NGO`s	100,000

	Prepare plans to provide and sustain food and shelter for needy people affected when disasters happen	An integrated plan for sustained food and shelter	# plan prepared % food needs met	Annually Starting June 2019	Ministry of Finance Supreme Council for Training Ministry of Infrastructure and Transport Social Welfare Localities of Khartoum Community committees	Federal Gov Local Gov NGO`s	500,000
	Establish safe shelters	8 safe shelters	# shelters completed	Annually Jan 2020		Federal Gov Local Gov NGO`s	100,000
Sustain the speed of recovery after disaster	Define the roles and organize the work of the organizations and institutions concerned, with accountability framework	List of roles and responsibilities completed One accountability framework	List of roles and responsibilities completed #accountability framework % overlap between the institutions concerned % increased coordination	For 6 months Annually June 2019 Starting	Secretariat of Khartoum Government Ministry of Infrastructure and Transport Social Welfare Localities of Khartoum	Local Gov	100,000

	Provide sustainable and timely fuel supply in case of emergency response to disasters	List of estimated fuel needs to make fuel available in case of emergency	List of estimated fuel needs % of fuel availability in case of emergency	Annually Starting June 2019	Secretariat of Khartoum Government Ministry of Infrastructure and Transport Social Welfare Localities of Khartoum	Federal Gov Local Gov	100,000
Essential 10: Expedite recovery and build back better							
Reconstruction of the affected areas	Prepare a comprehensive plan to deal with economic and infrastructure needs and post-disaster groups.	One comprehensive plan with three components: - Economic - infrastructure needs - Post disaster groups	# plan completed # 3 components are in the paln	Annually for 4 years Starting October 2020	Ministry of Finance Ministry of Urban Planning Ministry of Infrastructure and Transport	Federal Gov Local Gov NGO`s	100,000
Integration of stakeholders in reconstruction.	Establish a state disaster risk reduction mechanism for the stakeholders	A mechanism of the stakeholders engagement	Number of stakeholders engaged in reconstruction projects	One year Starting Jan 2020	Secretariat of Khartoum Government	Local Gov	200,000

3.5. Challenges

The results section reflected on most challenges facing DRR work at the level of Khartoum State. Nevertheless, this section is to highlight some of the most pressing challenges more coherently and transparently.

- Actions are not directly related to physical assessments on the ground identifying the specific geographic locations, types of risks exist at those locations, and what particular steps needed to protect it.
- The legal framework for DRR indicates that there is a lack of consolidated laws, policies, and regulations on disaster risk reduction.
- Implementing the new institutional setup for disaster risk reduction proposed for Sudan and the individual States is very challenging considering the needed resources and the level of coordination required, even though it is much needed institutional change.
- Inadequate capacity for the management of disaster risk reduction manage.
- Focus still on emergency response and relief work rather than disaster risk reduction.
- Disaster Risk reduction is still not integrated sufficiently in policies and development planning, even though some of the plans seem to recognize it.
- No clear accountability framework has been developed for the implementation of DRR efforts.
- Finding adequate sources of funding to support DRR efforts is the major challenge facing DRR work in Sudan in general.
- There is insufficient awareness in many segments of society in Khartoum and Sudan in general.
- Selective awareness on DRR. Most people know about hazards but hardly heard anything about exposure or vulnerability.
- The political situation and the many years of economic sanctions are constraining the work of DRR.
- Coordination at all levels is a major challenge, including inter-agency coordination, and government-civil society, and horizontal and vertical coordination across sectors and concerned entities.
- Data and information for DRR are still inadequate and require substantial strengthening.

4. Monitoring and Evaluation

This section is to highlight the general framework for monitoring and evaluation of the Khartoum disaster and risk reduction action plan. Monitoring and evaluation help to keep track of the progress of implementation, identify the gaps between the planned timeframe and resources and the actual timeline and resources used, guide taking measures to close the gaps and take corrective actions, learn what is working and what is not, and use the lessons learned to improve future programming and planning. The process helps improve performance and achieve results and to more effectively manage the outcomes and outputs known as development results (UNISDR 2015).

The monitoring and evaluation of the Khartoum State DRR action plan is guided by the UNISDR Monitoring and Evaluation Framework published in 2015.

4.1. Objectives of the monitoring and evaluation

The objectives of the monitoring and evaluation are to:

- track the overall implementation of the Khartoum State DRR action plan, identify gaps and areas of improvement.
- track the progress of individual actions and its activities for achieving its stated objectives.
- guide formulating corrective measures and mobilization of resources to ensure successful completion of the action plan.
- track funding requirement and expenditure of the planned activities.
- measure the outcomes and impacts of the implemented actions.
- facilitate coordination among implementing agencies.
- provide some means for accountability of the implementing partners.
- identify what worked and what didn't for future consideration.
- improve action plan implementation.
- use lessons learned for better design of future.

4.2. Monitoring

Monitoring can be defined as a continuing function that aims primarily to provide the management and main stakeholders of an ongoing intervention with early indications of progress, or lack thereof, in the achievement of results. An ongoing intervention might be a project, program or other kinds of support to an outcome.

4.3. Indicators

Sets of indicators will be carefully selected based on the objectives defined for the action plan and the objectives for monitoring the action plan. Two complementary sets of indicators will be defined and selected; 1) a set of outcome/impact indicators to measure changes in the system, 2) output/process indicators to measure the degree to which activities are being implemented (UNISDR 2015). The indicators will be selected based on a standard set of criteria. Key elements to facilitate the monitoring process include the timetable for the main activities and components; the set of indicators chosen and data collection methods; responsibilities for each element; reporting requirements; and budget and sources of funding.

4.4. Monitoring implementation plan

A monitoring implantation plan will be developed to guide the monitoring process and to keep track of the progress. It will allow comparing the actual implementation process against the targets, identifying the gaps to guide taking corrective measures.

4.5. Evaluation

Evaluation is a systematic and selective process to assess and objectively identify progress towards and the achievement of an outcome and identify effects – positive or negative, intended of the implementation of the actions or activities such as a project or program. The evaluation must be linked to the objectives and outcomes of the activities undertaken. Typically, evaluation is not a

one-time event, but a process of assessments carried out at several points in time according to needs (UNISDR 2015).

There are several types of evaluations; its use depends on the object being evaluated and the purpose of the evaluation. The most common ones are formative and summative evaluation. Formative evaluations help to strengthen or improve the activity or object being evaluated. It is mostly concerned with the delivery process, implementation quality, the organizational context, personnel, procedures, inputs, and so on whereas summative evaluations, on the other hand, looks into the impacts, effects or outcomes of program object (UNISDR 2015).

4.6. Tools

Monitoring and evaluation require tools to manage the process and make use of the information generated. Several tools will be mobilized to support the monitoring and evaluation process including a tracking system, verbal and written communication, meetings, reports, and diary notes. The secretariat overseeing the implementation of the action plan will consider the UNISDR developed online e-management tool for planning, resource and project management to explore if it is an option that can be used for the monitoring and evaluation process.

4.7. Reporting

A reporting mechanism and a process will be set in place including sectoral reporting and integrating reporting of the entire process. Some periodic reports (monthly, quarterly, semi-annually and annually) will be prepared by sector line ministries, agencies and departments. Those reports will be integrated into a statewide report at least once every year. Nevertheless, interim reports could be produced as needed to enable decision makers to be updated periodically to take any necessary corrective decisions and measures.

4.8. Management of the Monitoring and Evaluation

A risk reduction mechanism to mitigate the risk of rains, floods and flash floods was created by the Minister of Infrastructure and transportation, according to the Ministerial Resolution No. (2018/32). It compromises the following relevant entities; Ministry of Infrastructure and Transport (Public Administration, Authority of Roads, Bridges, Drainage, and Department of Information), Meteorological Authority, Ministry of Water Resources and Electricity, Civil Defense, Security Agency, Traffic Police, Khartoum State Police, Localities, Civil society organizations. This mechanism will oversee the overall monitoring and evaluation of the action plan to ensure coordinated efforts across the stakeholders whether governmental, civil society or the private sector. The Ministry of Infrastructure and Transport will act as the secretariat of the mechanism. The same procedures applied in the current mechanism will be applied with strengthened coordination and enhanced efficiency.

5. References

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6. Annexes

Annex I

List of Participating Stakeholders	
Ministry of Infrastructure and Transport	وزارة البني التحتية والمواصلات
Roads & Bridges Authority	هيئة الطرق والجسور
The Ministry of Urban Planning	وزارة التخطيط العمرانى
Civil Defence	الدفاع المدني
Supreme Council of the Environment	المجلس الاعلي للبيئة
Humanitarian Aid Commission (HAC)	مفوضية العون الانسانى
State Commission	المفوضية الولايه
The National Ribat University	جامعة الرباط الوطنى
Omdurman Islamic University (OIU)	جامعة ام رمان الإسلامية
Private sector representative	مهنة خاصة
The Ministry of Education	وزارة التربية والتعليم
Alintibaha Newspaper	صحيفة الانتباه
Alwatan Newspaper	صحيفة الوطن
Ministry of Agriculture Khartoum	وزارة الزراعة ولاية الخرطوم
Khartoum TV	تلفزيون ولاية الخرطوم
Information Office of the Governor	اعلام مكتب الوالي
Central Bureau of Statistics	الجهاز المركزي للإحصاء
The Executive Authority for land protection	لجاز القومي لحماية الأراضي
Khartoum Company for Shareholding and Planning	شركة الخرطوم للمساهمة والتخطيط
Ministry of Health	وزارة الصحة

Annex II

Activities	2019				2020				2021				2022				2023			
	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th	1st	2nd	3rd	4th
Essential 1: Organize for disaster resilience																				
1. Establish a state unified disaster risk reduction data and information center with a common information platform for all relevant actors																				
2. Prepare a unified disaster risk reduction strategic plan, with laws and policies that accommodate all relevant actors																				
3. Develop clear programs and assign budgets for the implementation of the plan																				
4. Monitor the implementation, evaluate and update the plan every 2 years																				
5. Review, update, and enforce relevant laws and eliminate obstacles for implementation																				
Total Number of Actions Essential 1 = 5																				
Essential 2: Identify, understand and use current and future risk scenarios																				
6. Conduct a comprehensive assessment of all potential hazards, update the knowledge about them, and identify																				

	vulnerability and disaster risk areas at each level	
7.	Develop comprehensive risk scenarios that cover the entire state	
8.	Prepare a study on the losses caused by disasters and identify risk relationships and how they relate to losses.	
9.	Prepare a comprehensive risk map to be continuously updated.	
10.	Collect data and establish a database bank on critical assets and related disaster loss databases including damage of critical assets.	
	Total Number of Actions Essential 2 = 5	
Essential 3: Strengthen financial capacity for resilience		
11.	Introduce and deploy BOT, BOOT and PPP Systems	
12.	Develop a national investment law	
13.	Remove investment obstacles, provide guarantees to investors, and apply various incentive schemes that motivate stakeholder's participation	
14.	Consolidate financial plans in one plan and protect it from political influences, and tighten coordination in budget distribution according to priorities	

15.	Increase the financing ratio by at least 50% and protect it from conversion for other purposes	
16.	Introduce incentives programs for insurance companies to increase insurance coverage of assets, buildings and housing	
17.	Develop public awareness programs and advocacy to encourage insurance of assets	
	Total Number of Actions Essential 3 = 7	
Essential 4: Pursue resilient urban development and design		
18.	Inventory of displaced persons and determine their percentage, causes and types of displacement.	
19.	Enforcement and modernize building laws and optimize land uses to increase resilient capacity.	
20.	Identify activities, which could be affected by risks.	
21.	Enforce non-diversion of land uses (E.g. agricultural to residential or industrial).	
22.	Activate and update the laws on land agricultural investment	

23.	Develop and implement water harvesting projects	
24.	Enact a law for urban design and the use of modern environmental technologies, and introduce articles in the current building law that support increasing the city resilience to disasters	
25.	Advocate the culture of green buildings and green city, including the use of alternative energy technologies	
26.	Develop and update building codes and regulations to conform with international standards (LEED, BREEAM, Greenstar, etc.)	
	Total Number of Actions Essential 4 = 9	
Essential 5: Safeguard natural buffers to enhance the protective functions Offered by natural ecosystem		
27.	Enforcement of laws and policies at all levels through the Supreme Council for Environment and Urban Upgrading, and implement international, regional and local conventions and treaties through partnerships	
28.	Increase the number and area of protected areas in disaster risk zones	
29.	Inventory, register, build and maintain holistic view and list of all key ecosystem	

	development initiatives and projects	
30.	Activation of monitoring and evaluation programs for land use and environmental impact assessment of projects before, during and after implementation	
31.	Incorporate and integrate the concepts of the new urban agendas and sustainable development goals into all laws, legislation and policies	
	Total Number of Actions Essential 5 = 5	
Essential 6: Strengthen institutional capacity for resilience		
32.	Review and develop relevant laws and strengthen organizational structures	
33.	Establish exchange programs with similar cities and forums for disaster resilient	
34.	Develop and implement training programs related to the various essentials to increase the resilience of the communities	

35.	Develop and implement awareness programs in different disciplines targeting both institutions and individuals
36.	Develop and introduce curriculum for resilience in the education system
	Total Number of Actions Essential 6 = 5

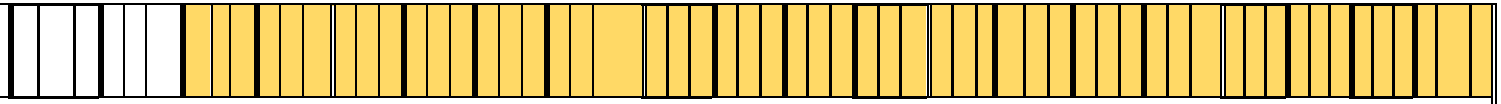
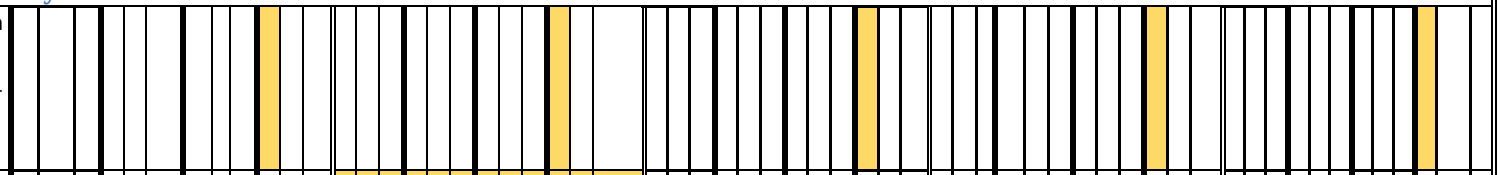
Essential 7: Understand and strengthen societal capacity for resilience

37.	Establish a coordination mechanism between government authorities and the civil society, in consultation with all competent governmental authorities.
38.	Identify roles and responsibilities and strengthen community bodies and activists through training to respond before and after disaster events.
39.	Establish a resilience social network that includes groups representing all districts in the state of Khartoum
40.	Identify the most vulnerable groups and learn to deal with them before and after the disasters.
41.	Advocate the culture of volunteering to the private

	sector, employers and citizens to prepare for and respond to the disasters	
	Total Number of Actions Essential 7 = 5	
Essential 8: Increase infrastructure resilience		
42.	Prepare flood hazard maps	
43.	Complete the drainage network (studies, design & consultation)	
44.	Construct 5 sustainable earth dams	
45.	construct sustainable Nile barricades for vulnerable areas	
46.	Develop and implement preventative maintenance program	
47.	Develop and upgrade Khartoum water and sewage system/networks	
48.	Construct 4 water treatment plants	
49.	Construct 6 compact water treatment units	
50.	Construct 7 solar energy stations/ plant for different economic activities	

51.	Build inter-model modes (transit services network)	
52.	Complete & upgrade existing road networks (1000 km)	
53.	Rehabilitation & construction of new health service centres using sustainable & resilient materials capable to withstand disasters	
54.	Establish an information centre for healthcare services.	
55.	Rehabilitation & construction of new educational service buildings using sustainable & resilient materials to withstand disasters	
	Total Number of Actions Essential 8 = 14	
Essential 9: Ensure effective preparedness and disaster response		
56.	Establishment of a multi-hazard early warning center (with a spokesperson), including state of the art early warning systems- taking in consideration local knowledge and culture.	
57.	Mobilize all existing telecommunications networks to disseminate alerts, and obligate telecommunications companies to participate in the alert system	

58.	Prepare disaster response plans, which could address the most likely and most severe scenarios
59.	Establish a risk management coordination office
60.	Tighten coordination and automate operating procedures through cameras and monitoring devices
61.	Strengthen the capacity and qualification of civil defense through training and equipment
62.	Develop programs for continuous improvement and sustainability of knowledge of the needs of affected people through training and practices
63.	Prepare plans to provide and sustain food and shelter for needy people affected when disasters happen
64.	Establish safe shelters
65.	Define the roles and organize the work of the organizations and institutions concerned, with accountability framework
66.	Provide sustainable and timely fuel supply in case of

	emergency response to disasters	
	Total Number of Actions Essential 9 = 11	
Essential 10: Expedite recovery and build back better		
67.	Prepare a comprehensive plan to deal with economic and infrastructure needs and post-disaster groups.	
68.	Establish a state disaster risk reduction mechanism for the stakeholders	
	Total Number of Actions Essential 10 = 2	