Responding to Climate Change

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Introduction

Sudan encompasses an area of about 1.9 million km2. The majority of the land is of vast arid plains interrupted by a few widely separated ranges of hills and mountains. Water resources outside the Nile basin are limited, soil fertility is low and drought is common. Compounded by a range of human pressures, these underlying conditions create a state of vulnerability in Sudan, in addition to climate change impacts and the livelihood risks associated with current and future climate variability and change.

Annual rainfall in the north ranges from close to zero near the Egyptian border to about 200 mm around the capital Khartoum. Along the southern border, annual rainfall rarely exceeds 700 mm. The combined effects of the Inter Tropical Convergence Zone (ITCZ) and the country's topography dominate Sudan's climate. The result is wide spatial variation in rainfall. The erratic nature of rain and its concentration in a short growing season pose a serious threat to rainfed agriculture, which is the most prevalent type of agriculture in Sudan.

The country's and resources are dominated by arid and semiarid ecosystems, which constitute more than 80% of the area of the country. Low rainfall savannah makes up the majority of other land types, with small montane vegetation areas taking up the remainder.

Arable land constitutes about one third of the total area of the country, with about 21% of this land under cultivation. Over 40% of the total area of Sudan consists of pasture and rangelands. Since human communities, flora, and fauna have become highly adapted to subsist within these areas, climate change poses a major threat. Under changing climatic conditions, adverse changes in the distribution and productivity of Sudan's natura resources - its forests, soils, and grasslands - are expected to have significant repercussions for millions of people.

The Nile Basin traverses Sudan from south to north. The Blue and White Nile converge just north of the capital, Khartoum. Sudan's current water resources, as well as its ability to harness them, are limited and prone to severe shortage. The Nile water basin contributes most of Sudan's available e surface water. The water resource situation for remote areas is especially precarious as flow from seasonal streams is limited in quantity and duration and varies in terms of turbidity.

Sudan is also burdened with low human and economic development and serious environmental problems. In recent years, Sudan has made significant development strides, yet profound poverty and other challenges persist. Factors such as life expectancy, school enrolment and GDP per capita reflect a disturbing situation.

Climate Change vulnerability and Risk Assessment:

Sudan has recently been under increased evidence of climate change such as rising temperatures, and changing rainfall patterns, and has experienced extensive climate related impacts through the increased frequency and intensity of weather extremes' events such as droughts and flooding.

Climate scenario analyses conducted under INC indicate that average temperatures are expected to rise significantly relative to the baseline scenario. By 2060, projected warming will range from 1.5 C to 3.1 C during August and1 C to 2.1 C during January. Projections of rainfall under climate change conditions also show sharp deviations from the baseline scenario.

Results from some of the models show average rainfall decreases Therefore, the different sectors (agriculture, water, health, livestock, settlements and infrastructure) will be affected. A rise in average temperatures and drop in annual rainfall will affect the viability of current agricultural production systems and the efficacy of current water resource management strategies, while at the same time endangering public health.

These manifestations of climate change constitute a serious threat to Sudan's economic sectors and eco-systems on which the country's sustainable development and future prosperity depends. Sudan's ecological zones indicate that the majority of its land is quite vulnerable to changes in temperature and precipitation. Sudan has vulnerable ecosystems, on which the majority of the population depends, already suffer from recurrent droughts, overuse of marginal lands, and the dominance of biomass use for energy. The most vulnerable are the farmers in the traditional rainfed sector of western, central, and eastern Sudan, where severity of drought depends on the variability of rainfall both in amount, distribution and frequency. The most heavily affected are the northern Kordofan and Darfur states.

Extreme event such as drought is threatening the existing cultivation of about 12 million hectares of rainfed, mechanized farming and 6.6 million hectares of traditional rainfed lands. Pastoral and nomadic groups in the semi-arid areas of Sudan are also affected.

Despite the prevalence of drought hazards, floods also an extreme event affect Sudan. As with drought, two types of floods affect the country: localized floods, caused by exceptionally heavy rainfall, and runoff (flash flood) and widespread floods caused by overflow of the River Nile and its tributaries.

Even small changes in climate will have adverse effects on crop, grassland, water resource, animal production and forests because of the fragility of the ecosystem.

Non-climatic factors also contribute to increased vulnerability, especially in rural areas and local communities. Non-climatic factors include: deep poverty; lack of income diversity; lack of agricultural inputs; resource mismanagement; increased cultivation fragile land and water resources; poor soil fertility; deforestation; natural resource conflicts; poor extension services; community displacement, and poor sanitation and health services .

The table below summarizes the types of the extreme weather and climate events, type of occurrence, vulnerable areas, affected sectors and the observed negative impacts on community livelihoods in Sudan

Extreme weather and climate events in Sudan

Event	*Occurrence*	*Vulnerable areas*	*Sectors*	*Impacts*
Drought	Frequent	North & Western Sudan (North Kordofan and Darfur), Kassala State and some parts of the rain-fed areas in central Sudan.	Agriculture, livestock, water resources and health.	Loss of crops and livestock (food shortage), decline in the hydroelectric power, displacement wildfire
Floods	Frequent	Areas within the River Nile basin and low areas from extreme South to far North. Mountain areas along Red Sea.	Agriculture, livestock, water resources and health.	Loss of life, crops, livestock; insects & plant diseases, epidemic/vector diseases, decline in hydro power; damage to infrastructure & settlement areas
Dust storms	Frequent	Central and northern parts of Sudan	Transport (aviation and land traffic)	Air and land traffic accidents and health.
Thunder - storms	Infrequent	Rain-fed areas throughout all Sudan	Aviation	Loss of lives and properties.
Heat waves	Rare	Northern, central parts of Sudan besides the Red Sea State.	Health, agriculture & livestock.	Loss of live, livestock and crops.
Wind-storms	Rare	Central and north central Sudan	Settlements and service infrastructure	Loss in lives, property; damage to infrastructure (electricity and telephone lines)

Source Sudan National Adaptation Program of Action June 2007

Responding to Climate Change

Responding to the challenge of climate change is a national priority for Sudan. Impact of climate change is already affecting rural communities, natural resources, agricultural productivity and coastal infrastructure. The increasing frequency of severe droughts and declining rainfall are already an urgent priority, which requires immediate action in cooperation with international community.

The Government of Sudan signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993, Kyoto Protocol (KP) 2005 and Paris Agreement (PA)in 2015. Sudan is an active member at UNFCCC negotiations and contribute to Intergovernmental Panel on Climate Change (IPCC) meetings and publications. The Higher Council for Environment and Natural Resources (HCENR) under Prime Minister Office is the designated authority for all environment and natural resources issues. It is the focal point to both UNFCCC and IPCC.

Since 1997 Sudan has started to develop various climate change-related policies, strategies, projects and programs to effectively cope with climate change challenges and embark into a low-carbon climate resilient development. This includes: Environment Protection Act (EPA, 2001); Initial National Communication (INC2003); Renewable Energy Master Plan (REMP, 2005); Sudan National Action Programme to Combat Desertification (SNAP, 2006); Forestry Policy (FOP, 2006); National Adaptation Program of Action (NAPA, 2007); National Plan for Environmental Management (NPEM, 2008); National Water Supply and Sanitation Policy (WASH, 2009); Strategic Plan for the National Malaria Control Programme (SPNMCP, 2010); National Clean Development Mechanism Strategy (NCDMS, 2011); National Investment Plan for the Agricultural Sector (NAIP, 2016); Second National Communication (SNC, 2013); Technology Needs Assessment for Adaptation and Mitigation (TNA-A and TNA-M, 2013); Nationally Appropriate Mitigation Action (NAMA, 2015); National Biodiversity Strategy and Action Plan (NBSAP, 2015); Intended Nationally Determined Contribution (INDC, 2015); National Adaptation Plan (NAP, 2016); Sudan First State of Environment and Outlook Report 2020 ; Emission Reduction of REDD+Programme of Blue Nile, Sinnar and Gedarif States November 2020 and Mainstreaming of REDD+ in National Development Plan, Policies Strategies and Legislation for Sudan (April 2021) .Also there are many climate change projects under different stages of implementation .

Good Practices

Diverse activities are implemented from some of the above projects. Impact on communities is resulting in increasing resilience, increasing income and improving livelihood. Best practices are already being identified such as:

-Micro-fencing using dead stems to build fences that reduce the sand encroachment, rangelands reseeding, village nurseries for rehabilitation of rangelands were the most important practices for increasing the resilience of the community, with high involvement of community members (particularly Women).

-Shifting from total dependence on biomass energy to Butane gas units for domestic energy was a good practice reducing tree cutting for cooking, reducing sand dune movement. The practice is resulting in retarding of removed of vegetation cover and also resulting in reducing involvement of women in wood collection, and reducing cooking time and availing women time to be used in other activities.

-Provision of water from ground water, drilling wells increase cultivated areas and establish community managed horticulture provide a viable practice for enhancing community adaptation to climate change through support to household food security and income.

-Promotion of water harvesting is a good practice in mitigating the effect of temporal

and spatial variability of rainfall and the high risks on inter-seasonal dry spells, leading to increased crop yields
.-Introducing drought resistant and early maturing vanities of crops and vegetables seeds.
-Livestock activities through vaccination against epidemic, strategic supplementary feeding and improved species.

Gaps and Constraints

Despite the determination and the commitment of the GoS to address climate change issues, there are still important challenges that need to be addressed to effectively steer the development of the country toward a low-carbon climate resilient trajectory. These challenges include among others:

- Lack of reliable data and information. Sudan is facing important challenges in respect to availability and reliability of data and information for decision making. When available, the data are neither up to date nor statistically robust, and usually relies on extrapolation or interpolation.

-Limited human and institutional capacity. While some good expertise on climate change exists both within the government and among other relevant stakeholders, the very dynamic flow of knowledge and techniques that go along with climate change issues suggest the need to further strengthen human and institutional capacity, especially at the State level, for more effective climate change mainstreaming into development planning.

-Lack of mutually reinforcing actions across State and national levels of government. Sudan has a federal system of political governance. There are several levels within this governance system that are perceived as broad constraints to collaborative action between the federal and state levels, including power sharing arrangements, and institutional coordination protocols..

-Leveraging private sector investment in climate change adaptation and mitigation projects is very limited

Public-private sector partnership is very weak

-It has been often noted that Sudan strategic planning is sectorial in nature, led by limited groups of politicians and a few professionals, never based on wide grassroots consultations and often subjected to poor implementation

-. A limited effort has been spent to foster awareness of climate risks to food security.

- Government institutions are subject to frequent changes due to political instability and this has resulted in limited incorporation of multilateral environmental agreements such as the UNFCCC

Polices

Several policy issues were identified during the implementation of climate change projects and studies to fill the above gaps and uplift the constraints . The following are the major policy recommendations:

- Mainstreaming climate change adaptation and mitigation in the national and states development plans.
- Provision of political support for the climate change adaptation and mitigation at the national and State level.

- Updating and activating the environmental policies and legislation.
- Transparency, responsibility and accountability should be emphasized.
- Policies for water resources management to emphasize water harvesting, efficient and sustainable utilization of water resources to stress provision of safe potable water for rural, urban and nomadic populations.
- Strategies and policies should guarantee food security.
- A national land use plan should be adopted.
- Poverty reduction should be included in the adopted plans.
- Encourage sustainable use of natural resources.
- Adopt best practices to conserve biodiversity and vegetation cover and combat desertification.
- Introduce technical packages in agriculture that could help to build resilience and enhance adaptation to climate change (water harvesting, drought resistant varieties, shelterbelts, etc).
- Document and promote indigenous knowledge adaptation practices and encourage exchange of experience between the States.

Policies to support modernization and development of the agricultural and livestock systems.

- Avail microcredit for small farmers and pastoralists.
- Strengthen the role of extension and awareness in all adaptation and mitigation processes (awareness adaption and mitigation and learning mechanisms and identifying and promotion of best practices).

-Introduce renewable energy technologies for irrigation to mitigate climate change and to achieve sustainable development

- Support the involvement of research in adaptation and mitigation activities .- Establish community based organizations (CBOs) and ensuring the active participation of communities in all phases of adaptation planning and implementation.
- Undertake concerted efforts to achieve effective horizontal and vertical coordination between all the stakeholders (Climate Change Unit at HCENR, line ministries at the national and State levels, the CBOs, and the local leaders).
- Empower women through their active participation.
- Capacity Building of all stakeholders.
- Establish a national early warning system, and assist in establishing community based local early warning systems

-There is a need to leverage private sector investment in climate change adaptation and mitigation projects through inclusive value chain and market-based approaches so that value chain actors, such as micro, small and medium size enterprises could be rewarded and incentivized to protect and improve their productive assets (forest, water, land, etc.), whilst generating ecosystem services for the local community

-There is a need to forge and strengthen public-private partnership to complement top-down upstream policy and regulatory measures with downstream bottom-up financial and viable business approaches for scaling up climate change adaptation and mitigation measures to benefit the local community and to generate long-term and transformative impacts. This will help build trust and confidence and breakdown any unintended ‘silo’ mentality between the public and private sector

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