

**REPUBLIC OF SUDAN**



## **INTENDED NATIONALLY DETERMINED CONTRIBUTIONS (INDCs)**





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#### **Introduction**

The Government of the Republic of Sudan (hereafter referred to as Sudan) hereby submits its Intended Nationally Determined Contributions (INDCs) in line with Decisions 1/CP.19 and 1/CP.20 of the Conference of the Parties (COP) to the United Nations Framework on Climate Change (UNFCCC) to communicate INDCs “towards achieving the objective of the Convention as set out in its Article 2” (Decision 1/CP.20), i.e., “to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner” (UNFCCC, 1992, Article 2).

Sudan’s INDC is also based on its commitments under Article 4.1 and Article 12 of the Convention which requires all Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, to formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change by addressing anthropogenic emissions by sources and removals by sinks of all greenhouse gases (GHG) not controlled by the Montreal Protocol, and measures to facilitate adequate adaptation to climate change. As such, Sudan’s INDC contains both mitigation and adaptation aspects that Sudan aims to undertake towards achieving the objective of the Convention and its national development priorities.

Being classified as a least developed country (LDC) Sudan is not obliged to pursue a GHG emission reduction target. Nevertheless, Sudan views the planning process to reduce GHG emissions, or rather pursue low-carbon development, as an opportunity to strengthen national capacity, promote sustainable resource management, facilitate technology transfer, and identify synergies between national economic objectives and sustainable development.

#### **National Circumstances**

Sudan is highly vulnerable to climate change and climate variability, predominantly a result of

climatic and non-climatic factors (NAPA, 2007) (see table 1). These factors in addition to the interaction of other multiple stresses such as ecosystem degradation, complex disasters and conflicts, and limited access to capital, markets, infrastructure and technology have all weakened people's ability to adapt to changes in climate (AIACC WP No. 42, 2005; Zakieldein, 2009).

Climatic factors constitute, above all, temperature increases and infrequent precipitation. Sudan's Second National Communication (SNC, 2013) illustrated that air temperatures have been steadily increasing over the period 1960 – 2009, with temperature increases between 0.2°C and 0.4°C per decade for the periods March – June and June – September. When averaged across all seasons, temperatures in the 2000-2009 periods are roughly between 0.8°C and 1.6°C warmer than they were in the 1960 – 1969 period. Rainfall is also very variable, and is becoming increasingly unpredictable. During the period 1981 – 2012 the rainfall in the whole country was significantly decreased compared to 1971 – 2000.

Both the SNC (2013) and the National Adaptation Plan (NAP, 2014) illustrated that the frequency of extreme climatic shocks is increasing, particularly drought and floods. Frequent drought threatens about 19 million hectares of rain-fed mechanized and traditional farms, as well as the livelihoods of many pastoral and nomadic groups; more than 70% of Sudan's population's livelihood depends on this sectors. Floods in Sudan can either be localized caused by exceptionally heavy rainfall or more widespread, caused by the overflow of the River Nile and its tributaries (NAPA, 2007).

Non-climatic factors that contribute to the vulnerability of communities in different parts of Sudan include unsustainable management of natural resources, and socio-economic factors such as poverty, lack of income diversity, unequal distribution of income, urbanization, population growth, and lack of adequate infrastructure, and lack of international support and investments.

### **Assumptions**

Sudan submits its INDC under the assumption that the Paris outcome to be agreed at COP 21, December 2015.

- Is comprehensive, ambitious, fair, effective and binding for all Parties to the Convention;
- Strengthens the multilateral rules-based regime to enhance international and regional cooperation;
- Is under the Convention and hence guided by its principles and provisions including common but differentiated responsibilities and respective capabilities and equity;
- Covers all elements including mitigation, adaptation, finance, technology, capacity-building and transparency in a balanced manner;
- Is consistent with science reflecting the short, medium and long term;
- Includes effective arrangements for transparency of action and support; and
- Funding is available from different sources, particularly through the finance mechanism under the UNFCCC.

Being one of the most vulnerable countries to the adverse effects of climate change and given Sudan's status as LDC, the **implementation of the envisaged undertakings communicated in Sudan's INDCs is depended on various conditions**, including

- The full implementation by **developed countries of their commitments relating to finance, technology development and transfer and capacity-building** pursuant to Article 4 of the Convention;
- Reaching the long-term temperature goal that is currently set at below 2°C and subject to be revised at COP 21; and
- Sudan's access to adequate, predictable and sustainable **financial resources**, including **technology transfer and capacity-building**.

## **Mitigation Contribution**

Sudan intends to pursue implementing low carbon development interventions in **three sectors of energy, forestry and waste** inline with Sudan's national development priorities, objectives and circumstances. Sudan's intended nationally determined contribution on mitigation as shown in Table (2) below aims at contribution to the global mitigation efforts in the post-2020 period, these contributions are planned to ensure deviation from the current development trajectory to a low carbon development. Sudan's communication of a mitigation component within its INDC (M-INDC) is informed by and premised on the current commitments under Article 4 and particularly Articles 4.1, 4.3, 4.5, 4.7 and 4.9 of the Convention.

**Sudan intended mitigation INDC contributions** towards the 2015 Agreement are considered fair and ambition given its current national circumstances, development objectives and priorities. These intended contributions are also in line with Sudan's strategy to integrate climate mitigation and adaptation into its national sustainable development process (INC 2003) to achieve low-carbon and resilience development objectives.

## **Intended Contributions**

**Table 1: Sudan's Intended mitigation Contributions:**

<b>Sector</b>	<b>Program of Action</b>	<b>Description</b>	<b>Objectives of Actions</b>	<b>Cost, million USD</b>
<b>Energy</b>	Integration of renewable energy in the power system	<p><b>Objective:</b> Integration of renewable energy in the power system of the Sudan, target of 20% by 2030</p> <p>1. <b>Wind energy:</b> 1000 MW (grid connected) will be applicable in strong wind regime areas.</p> <p>2. <b>Solar PV energy:</b> 1000 MW (on - and off - grid) will be applicable in different states within Sudan.</p>	<p>1. Utilization of the different renewable energy resources potential in Sudan to avail the electric energy all over the country;</p> <p>2. To achieve a competitive price of energy from renewable sources which will lead to fuel saving;</p> <p>3. Diversify the energy</p>	4,300

		<p>3.<b>Solar CSP technology:</b> 100 MW (grid connected) will be applicable, especially in the northern part of Sudan</p> <p>4.<b>Waste to Energy:</b> 80 MW (grid connected) will be applicable in several intended sites</p> <p>5.<b>Biomass Potential:</b> 80 MW (grid connected); e.g. the sugar industry.</p> <p>6.<b>Geothermal Potential:</b> 300 MW in different states of Sudan.</p> <p>7.<b>Small Hydro Plants:</b> 50 MW (grid connected)/ especially in combination with irrigation-sites, small hydro plant projects;</p> <p>8. Solar rural electrification through installation of 1.1 million Solar Home Systems (SHSs) up to 2030.</p>	<p>supply sources and ensuring the energy security and saving the environment;</p> <p>4. To be part of the global energy development which is expected to lower the prices in the future;</p> <p>5. Supporting the national economy by technology and knowledge transfer and capacities building and promoting local Renewable energy industry;</p> <p>5. Contribute to the development of the different regions of the Sudan;</p> <p>6. Provides access to electric energy supply to rural areas far from the national or the isolated grids for which the grid extension is not a feasible solution.</p>	
	Energy efficiency	<p>GHG mitigation is achieved through energy efficiency according to:</p> <p>1. Reduction of loss in transmission and distribution networks;</p> <p>2. Rehabilitation of the cooling system in Hydroelectric stations;</p> <p>3. Increase the readiness of the power station – matrix turbines.</p> <p>4. Reduction of the costs of producing electricity and auxiliary consumption from thermal power plants;</p> <p>5. Improvement of specific fuel consumption in thermal power plants;</p> <p>6. Replacement of incandescent lamps by CFL and LED lamps in residential sector;</p> <p>7. Establishment of the labeling system for electrical appliances.</p>	<p>The indicative target of the energy efficiency reflecting the rate or the value of savings in electrical energy consumed in 2016 up to 2030, which resulted from measures to improve electric power efficiency and the rationalization of electricity consumption. These contributions are estimated to result in energy saving in the order of 6500 GWh.</p>	350
	Electricity thermal generation using Natural Gas	Production of 2300 MW using natural gas in different areas in the country	GHG emission reduction, fuel cost reduction and enhancement of social and economic development in the country.	2900
Forestry	Afforestation and reforestation	<p>Afforestation/reforestation through official planting. Community planting and Planting in irrigated agricultural areas.</p> <p>To meet the main goal of 25% forest coverage from the total area of the Sudan by 2030 an area of 790795 hectares needs to be planted annually if</p>	Afforestation/reforestation supports climate mitigation (emission reduction - carbon sequestration) by increasing the forest cover in the country.	1500

		international financial support is provided.		
	National REDD+ strategy	<p>1.The carbon balance and incentives for energy substitution to LPG;</p> <p>2.Incentives for using sustainable charcoal, firewood efficiency, increased gum Arabic production, forest conservation and sustainable forest management, Reforestation, Forest Plantations and more balanced livestock production;</p> <p>3.</p> <p>4. Reconciliation of conflicting policies of rival economic sectors and streamlining of activities of supporting sectors such as education and research.</p>	<p>Reducing emissions from deforestation and forest degradation enhance carbon sequestration and livelihoods.</p> <p>Decreasing the high rate of deforestation and forest degradation for biomass energy, crop cultivation and other important livelihood needs.</p>	1,700
<b>Waste</b>	Collection	Collection is the major problem for solid waste management in Sudan. More than 83% of waste, i.e.6 million tons of municipal waste is left without collection, which is five times the estimated impact as set out in Sudan's Second National Communication report (1.3 million tons). Proper waste collection is expected to eliminate the hazard of this huge amount.	<p>The objective is to treat the whole generated waste and ensure that no waste is sent to the landfill. This will lead to GHGs emission reduction, pollution control; land used saving and income generation. It could be achieved through recycling, composting and energy recovery.</p>	930
	Sanitary landfill:	Landfills are also a real challenge to the environment. Adoption of sanitary landfill with treatment facilities, gas collection and capture system will lead to mitigate GHG as such sanitary landfill is an essential and important solution for the land fill gas.		
	Zero waste concept	<p>This is most recent and efficient system for GHG mitigation method. It includes:</p> <p>1. Composting of organic component in municipal waste;</p> <p>2. Sorting and recycling of recyclable items such as plastic and paper;</p> <p>3. Use of non-recyclable items as a fuel for cement factories;</p> <p>4. Energy Recovery by generation of electricity or gas from waste.</p>		

**Table2: Information to Facilitate Clarity, Transparency and Understanding**

<b>Time frame</b>	The timeframe for implementing Sudan's INDC is <b>2025-2030</b>
<b>Gases Covered</b>	Carbon dioxide ( <b>CO<sub>2</sub></b> ), methane ( <b>CH<sub>4</sub></b> ) and nitrous oxide ( <b>N<sub>2</sub>O</b> )
<b>Sectors Covered</b>	<ol style="list-style-type: none"> <li>1- <b>Energy</b> (Electrical power)</li> <li>2- <b>Forestry sector</b></li> <li>3- <b>Waste sector</b></li> </ol> <p>Geographic coverage for energy and forest sectors include contributions to be implemented in most of the (18) states of Sudan, however, for the waste sector it includes only Khartoum state</p>
<b>BAU Scenario</b>	<p>Currently, Sudan has neither an overall baseline emission scenario for all sources of emissions and removals in the three sectors covered in this contribution, nor sectoral baselines that can be used to define quantitative mitigation actions and assess their overall effects. As such, Sudan is planning to establish a baseline as part of its proposal for a low-carbon development strategy, of which its preparation is still pending availability of financial and technical support. Sudan is currently embarking on the implementation of its Readiness Preparation Proposal for REDD+, which will also enable Sudan to establish reference emissions levels / forest reference levels (ERL/FRL) for the forestry sector. For the implementation of the intended contribution included in this INDC, Sudan foresees that sectoral or project level specific baselines should be established to enable a robust assessment of the effect of these mitigation contributions.</p> <p>The trend in Sudan's total GHG emissions indicates an increase by about 8%; from <b>72,014 Gg of carbon dioxide-equivalent (CO<sub>2</sub>e) in 1995 to 77,650 Gg CO<sub>2</sub>e in 2000</b>. In <b>2000</b>, the total GHG emissions in the three sectors that are covered in Sudan's INDC are estimated at <b>8,539Gg from energy, 9,392 Gg from LUCF1 and 2,015 Gg from waste</b>. The major drivers for these changes in GHG emission levels are attributed to, among others, changes in emissions from the <b>energy</b> sector, which increased by roughly 10%, mainly due to increased fossil fuel consumption.</p> <p>Regarding the <b>waste</b> sector, emissions from waste management have more than doubled, mainly due to greater amounts of municipal solid waste sent to landfill sites. There are a number of limitations and shortcomings affecting the GHG estimations in the <b>three sectors</b>, mainly related to serious problems of data availability and quality, and partly related to technical capacity and application of methods.</p> <p>Energy consumption in Sudan is expected to reach over 13 million tons of oil-equivalent (TOE) by 2030. Diesel and gasoline, used primarily in the <b>transport</b> sector, dominate future growth in fossil fuels and account for over 70% of energy use by 2030. <b>GHG emissions associated with this energy use trajectory are expected to reach just over 24 million tons of CO<sub>2</sub>-equivalent by 2030</b>, a 6-fold increase from year 2000 levels (see Figure 4-2). The <b>transport and electricity sectors</b> together account for most of the growth in GHG emissions in Sudan, with these <b>two sectors responsible for around 70% of projected GHG emissions</b></p>

<sup>1</sup> Land Use, Land-Use Change and Forestry



	<p>by 2030 (SNC 2013). The current source of electrical power in Sudan is a mix of hydropower and thermal power generation plants. The thermal power generation is composed of steam turbines, diesel engine, and steam turbines which have lower-efficiency of about 14% compared with gas high efficiency diesel-fired combined cycle unit up to 45 %. Therefore, there is a need to shift to the high efficiency diesel-fired combined cycle unit but the initial cost is high, predominantly due to the lack of available infrastructure for LNG importation and as well as the necessary high and long-term investments.</p> <p>Sustainable land use management faces great challenges in Sudan mainly due to poor policy coordination across sectors (i.e., forestry, agriculture, range and protected lands). Additional factors include the absence of unified legislation, absence of high-resolution land use maps, inadequate consideration of the socio-economic factors, and weak implementation of the existing legislation and policies by the sectors. This land use context has led to serious environmental problems such as overgrazing, over cultivation and reduced land productivity which in turn have led to rural poverty, and rural-urban migration patterns that cannot be sustained in the long-term. In the absence of concerted efforts to address these issues, land degradation is expected to worsen over the next 30 years. Factors such as unsustainable wood fuel use, increasing demand for agriculture and grazing resources, and mismanaged of forests and land use has led to the current deforestation rate, which is estimated at 2.2 of the total land area.</p>
<b>Methodology for Estimating Emissions</b>	<p>The methodology used is the Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories (IPCC, 1996). In addition, the Good Practice Guidance 2000 (IPCC, 2000) and the Good Practice Guidance for Land Use, Land–Use Change and Forestry (IPCC, 2003). The GWP values of the IPCC Second Assessment Report.</p>
<b>Contribution of International Market Based Mechanisms</b>	<p>Sudan does not exclude using market-based-mechanisms in implementing its contributions if access to market mechanism is granted.</p>



## Adaptation

### Introduction

Sudan's communication of an adaptation component within its INDC (A-INDC) is based on Decision 1/CP.20 of the "Lima Call for Climate Action" which "*Invites all Parties to consider communicating their undertakings in adaptation planning or consider including an adaptation component in their intended nationally determined contributions*" (Lima Call for Climate Action, Decision 1/CP.20, paragraph 12). As an LDC and African country, Sudan is amongst the most vulnerable countries to the adverse effects of climate change. As such, adaptation is the first and overriding priority of Sudan's climate actions and hence constitutes a major part of Sudan's INDC. Sudan's A-INDC is informed by and builds on its current commitments under Article 4.1 of the Convention, with the understanding that provisions, particularly Articles 4.3, 4.4 and 4.7 are being applied, i.e. full incremental costs being provided by Annex II Parties, as well as provisions under Article 12 in relation to adaptation. It also builds on the various adaptation-related mechanisms and processes under the Convention, including, above all, Sudan's NAPA (2007), Sudan's INC and SNC (2003; 2012), TNA (2013), and particularly Sudan's NAP.

### Aim/Objective

The overall aim of Sudan's INDC is based on the objective of Sudan's NAP, i.e. to contribute to sustainable development and reduce poverty by reducing the long-term negative impacts of climate change. Having recognized the implications climate change can have on national development the need for climate change adaptation in the context of sustainable development was identified as an area of major concern. As such Sudan's A-INDC is being prepared with the view and in the context of achieving economic and sustainable development and poverty reduction in line with Sudan's 25-year development strategy, the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs). It, thereby, comprises of Sudan's assessment of needs, priorities, capabilities and benefits to develop nationally-determined priorities and plans for adaptation.

### Scope

The scope of Sudan's A-INDC is focused on a sector – and state -level based approach to reduce vulnerability. The sectors include water, agriculture (both livestock and crop production systems), coastal zone and human health. With the development of Sudan's NAP each of Sudan's 18 states undertook vulnerability assessments of these sectors and identified adaptation priorities that are informed by and build upon state-level development. These will serve the basis of information for Sudan's A-INDC.

In addition, Sudan's A-INDC will entail intended contributions around

1. Adaptation policies and measures, and planning (e.g. NAPA, NAP), including prioritizing interventions for implementation and integrating adaptation into development planning;
2. Strengthening institutional capacity at the state and federal level;
3. Implementation of adaptation initiatives

- Continued implementation of urgent and immediate needs as identified in Sudan's NAPA;
  - Implementation of adaptation programmes and projects in the most vulnerable sectors and states as identified in the NAP;
4. Enhancing research, observation systems and climate modeling to better focus targeted A-action across sectors and state level; and
  5. Increasing public awareness.

## Baseline

The baseline serving the development of Sudan's A-INDC is based on assumptions as well as sector- and state-based vulnerability assessments undertaken in Sudan's NAP, NAPA as well as national communications and other national studies and research. Sudan's NAP undertook state-level vulnerability assessments to 1) characterize vulnerability to climate change in the sectors of agriculture, water and health and 2) identify adaptation strategies to reduce these vulnerabilities (NAP, 2014).

The approach for conducting the vulnerability and adaptation assessments is based on a bottom-up approach and consists of four main steps:

1. Capacity Building of actors and institutions at the state level including training programmes on vulnerability assessments;
2. Vulnerability assessments in each state, including taking stock of all relevant research and studies, and stakeholder consultations taking into account both climatic and non-climatic factors determining vulnerability of the key vulnerable sectors;
3. Adaptation assessments, including identifying adaptation needs to reduce vulnerabilities at the state and sectorial level, predominantly through stakeholder consultations;
4. Public awareness through regional and state level workshops to 1) validate the vulnerability and adaptation assessments, 2) identify areas of synergies with national and state-level development planning, and 3) develop implementation strategies and discuss ways forward.

The impacts of climate change for Sudan's most vulnerable sectors are as follows:

**Agriculture:** Traditional subsistence agriculture dominates the Sudanese economy with over 70% of the population dependent upon crop production and/or livestock husbandry to support their livelihoods. Combined with growing socioeconomic pressures, the imposition of climate variability and climate change is intensifying the ongoing process of desertification of arable areas. Humid agro climatic zones are shifting southward, rendering vast arable lands increasingly unsuitable for agriculture production. Crop production is declining and predicted to decline substantially for millet and sorghum as well as other cash crops. The area of arable land as well as the Gum Arabic belt and its traditional livelihoods production and pastoral systems are all degrading and decreasing in ability to support livelihoods of dependent communities, with attendant impacts on both local incomes and food security, which is further expected to drop;

**Water Resources:** Reduced groundwater recharge – either through decreased precipitation or increased temperature and evaporation – has grave repercussions for Sudan. National studies have shown that soil moisture would further decline under future climate change. When

coupled with increased water consumption, population growth, high variation in rainfall and the high rate of evaporation, a looming water crisis appears likely. Regarding the river Nile there is a clear finding that under many climatic scenarios, water flow in the Nile River will decrease considerably, between 20% and 30% over the next 40 years.

### ***CoastalZone***

Sudan's coastal zone faces several major climate-related hazards, namely sea level rise, increase of seawater temperature and salinity changes in addition to storm surgeintensification. Evidence shows that these climatic changes might resulted in more frequent coral bleachingevents and widespread mortality decline in mangroves, remobilizing the fine sediments of salt marshes, increasing coastal turbidity which in turn affecting sea grasses, coral reefs and other marine biota.

**Public Health:** Communities in Sudan are exposed to significantly increased risk of malaria under climate change. Studies in Kordofan State, for example, have shown that the risk of transmission potential could increase substantially by 2060. This is already being realized, and further expected not only to overburdened health care systems, which is under extreme stress, but the disease would exact a heavy toll on local communities.

**Table 3: Sudan's Vulnerability to Climate Change**

Climate Change Impacts and Variability	Key vulnerabilities
<p><b><u>Variable Rains(INC 2003, Sudan NAPA, 2007):</u></b></p> <ul style="list-style-type: none"> <li>• A decrease of annual rainfall of about 0.5% per year.</li> <li>• Co efficient of variability increased by 2.0 % per year</li> <li>• More frequent and intense drought trend</li> <li>• Changes in precipitation are more uncertain results showing both wetter and drier conditions (NAP 2013)</li> </ul>	<ul style="list-style-type: none"> <li>• Shifting agro-climatic zones southwards</li> <li>• Water deficit</li> <li>• Declining, and failure of, crop production</li> <li>• Loss of range resources and livestock</li> <li>• Desertification</li> <li>• Poverty</li> <li>• Food insecurity and famines</li> <li>• Loss of livelihoods</li> <li>• Competition over resources and conflicts</li> <li>• Human displacement and suffering</li> </ul>
<p><b><u>Temperature ( Sudan INC, 2003):</u></b></p> <ul style="list-style-type: none"> <li>• By 2060, projected warming ranges from 1.5 - 3.1 C0 during August to between 1.1o - 2.1 C0 during January.</li> <li>• Climate scenario for Kordofan indicates an increase in average temperature</li> <li>• Temperature clearly show substantial warming (climate scenarios, NAP 2013)</li> </ul>	<ul style="list-style-type: none"> <li>• Increased water loss</li> <li>• Negative impact on the winter season crops</li> <li>• Decline wheat production</li> <li>• Increases weeds, pests and diseases (e.g. white fly, root rottenness)</li> <li>• increase risk of malaria and diseases</li> </ul>
<p><b><u>Floods (Sudan NAPA, 2007):</u></b></p> <ul style="list-style-type: none"> <li>• Floods caused by torrential rains with overflow of the Nile River and its tributaries</li> <li>• Flash flooding due to heavy localized</li> </ul>	<ul style="list-style-type: none"> <li>• Damage crops production systems</li> <li>• Damage human settlements and properties</li> <li>• Increase risk of malaria and other diseases</li> <li>• Loss of livelihoods</li> </ul>

rainfall	
<p><b><u>River Flow (SNC, 2013):</u></b></p> <ul style="list-style-type: none"> <li>• Peak River Nile and Blue Nile flow is 20% and 30% respectively less than usual in 2090.</li> </ul>	<ul style="list-style-type: none"> <li>• Exacerbate water management challenges</li> <li>• Declined production in irrigated sector</li> <li>• Decrease water availability and quality</li> </ul>
<p><b><u>Coastal Zone (SNC 2013):</u></b></p> <ul style="list-style-type: none"> <li>• Sudan sea-level is already rising in the Red Sea about 10-20 cm during the past century</li> <li>• Warmer sea surface temperatures and</li> <li>• increasing water salinity</li> </ul>	<ul style="list-style-type: none"> <li>• Coral reef bleaching</li> <li>• Loss of mangrove areas</li> <li>• Decline fish production</li> <li>• Loss of other marine resources</li> <li>• Inundation of coastal resources and infrastructure</li> </ul>

**Table 4: Sudan's Intended **Adaptation** Contributions**

Sector	Intended Contributions
<b>Agriculture</b>	<p><b>Crop Production</b></p> <ul style="list-style-type: none"> <li>• Crop diversification and introduction of improved drought-resistant varieties/early maturing varieties (both field and horticultural crops) in areas affected by rainfall decrease/ variability</li> <li>• Rehabilitation of the meteorological networks to enhance early warning system activities</li> <li>• Diversification of income generating activities in order to increase adaptive capacity of vulnerable farmers' communities in order to achieve food security/reduce poverty</li> <li>• Strengthening of enabling environment/activities to empower vulnerable communities including through: establishment of markets in vulnerable areas, awareness and access to information by vulnerable groups/communities etc.</li> <li>• Introduction of agroforestry in areas vulnerable to climate change to enhance agriculture production as well as empower vulnerable communities through their involvement in community forests activities/products.</li> <li>• Establishment of women cooperative societies in order to empower them and increase their resilience</li> <li>• Enhancing the participation of women and youth in activities related to adaptation and environmental conservation in order to empower them and enhance their adaptive capacity including through establishment rural women development programme</li> <li>• Climate-proofing of some of the existing developmental project to increase their resilience for current and future climatic changes</li> <li>• Planting shelterbelts, introduction of high economic value trees and rehabilitation of the Gum Arabic gardens to increase the resilience of vulnerable communities through engagement in a range of forestry activities</li> </ul> <p><b>Rangeland and livestock</b></p> <ul style="list-style-type: none"> <li>• Regular surveillance of animal diseases through improved monitoring</li> <li>• Establishment of range's enclosures/ranches to increase resilience of vulnerable communities</li> <li>• Advance research on various areas related to climate change impacts on rangelands (e.g. plants and animals species, communities etc.) and measures to address that</li> <li>• Joint management of the natural resources for comprehensive consideration of climate change impacts</li> <li>• Management of the grazing areas and rangelands in a sustainable manner</li> <li>• Enhancement of enabling environment in order to empower vulnerable communities including through: Improving marketing/markets, supplementary feeding, increase awareness and access to information by vulnerable groups/communities, etc.</li> </ul>

	<ul style="list-style-type: none"> <li>• Restocking animal herds in areas affected by climate change</li> <li>• Improving animal productivity and animal breeds to increase resilience to climate change</li> <li>• Replanting and rehabilitating of vulnerable areas with palatable range species and management of animal routes</li> <li>• Improving veterinary services (including, mobile clinics provision of vaccines etc.) to enhance the adaptive capacity in vulnerable areas</li> </ul>
<b>Water</b>	<ul style="list-style-type: none"> <li>• Integrated Management of the water resources to meet the current and future challenges/needs</li> <li>• Water harvesting (dams, hafirs, terraces, etc.) to assist vulnerable communities to adapt and build their resilience facing increasing vulnerability of water sources/resources</li> <li>• Establishment and rehabilitation of hand pumps and construction of water-networks in rural areas for provisions of drinking-water and achieving water security in order to discourage communities' migration from vulnerable areas</li> <li>• Advance research related to climate change impacts on water sector e.g. Undertaking geophysical studies of the aquifers for sustainable ground water utilization</li> <li>• Establishment of rain gauge stations to monitor and provide hydrological information</li> <li>• Introduction of a revolving micro-credit fund to support implementation of small water harvesting projects</li> </ul>
<b>Coastal Zone</b>	<ul style="list-style-type: none"> <li>• New information systems: Enhancing monitoring programs in natural and urban settings to detect biological, physical, and chemical changes and responses due to direct and indirect effects of climate change</li> <li>• Implement integrated coastal zone management: an integrated approach to land use planning, creation of ecological buffer zones, establishing protected inland zones to accommodate salt marsh, mangrove and sea grass</li> <li>• Building awareness: This involves enhancing the awareness of coastal developers through national and international activities, technical assistance, and capacity-building</li> </ul>
<b>Health</b>	<ul style="list-style-type: none"> <li>• Introduction of early disease diagnosis and treatment programmes for malaria, meningitis, and leishmaniasis</li> <li>• Raising the health awareness of communities in vulnerable areas to climate change related diseases in order to increase their adaptive capacities</li> <li>• Building the capacities of the health cadres and improvement of health services to meet the evolving and increasing challenges of climate change</li> <li>• Increasing health resilience to climate change related diseases and reducing the associated mortality by Supporting family's and school's health programmes</li> <li>• Control of Endemic and epidemic diseases induced by Climate Change through Combating vectors and insects borne diseases</li> <li>• Controlling of diseases shared between humans and animals</li> <li>• Improve community sanitation and medical services, including capacities for diagnosis and treatment</li> </ul>

## **Planning Process**

**Mitigation** and adaptation actions are implemented across the various sectors at both the national and states administrative levels. The Framework of National Appropriate Mitigation Actions and the National Adaptation Planning process being undertaken by Government provides a good basis for long- term adaptation and mitigation programming and mainstreaming of climate change adaptation/mitigation into the existing national planning processes.

Sudan has taken concrete actions and showed political will to address and minimize the risks posed by climate change to its communities, natural resources and economy by identifying and implementing adaptation measures while pursuing low-carbon development strategies to spur its local and national economy in a sustainable manner. Sudan's Initial National Communication (INC) to the UNFCCC identified agriculture, water resources and public health as most vulnerable sectors to climate change and climate variability. SSNC (2012) further identified coastal zones as an increasingly vulnerable sector that needs to be considered in climate change adaptation actions.

With the National Adaptation Programme of Action (NAPA) Sudan's adaptation engagement was brought to a different level (2007) as it initiated building a solid base to take systematic adaptation planning and implementation, including through stakeholder engagement, raising public awareness, and building individual and institutional capacities in the Sudanese context that set the basis for further adaptation action. Sudan's NAPA is the first adaptation plan prepared to enable Sudan to access funds made available through the Least Developed Countries Fund (LDCF) to implement real adaptation actions on ground. The overall goal of the NAPA preparation process was to identify urgent and immediate activities to address climate variability and climate change within the context of the country's economic development priorities. Sudan's NAPA identified 32 urgent and immediate adaptation initiatives in the four states River Nile, Gedarif, South Darfur and North Kordofan, representing five different ecological zones.

In addition, in response to the Cancun Adaptation Framework (CAF, 2010), Sudan launched a process for a NAP in line with its National Implementation Strategy (INC, 2003). Sudan is currently in the final stage of developing its NAP which is currently subject to Ministerial endorsement. Sudan's NAP aims to integrate climate risks into all national development planning processes and reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience. As such, Sudan's NAP process includes assessment of vulnerability and adaptation in all Sudan's States, covering the main development sectors, such as water, agriculture, health and coastal zone.

Sudan has conducted its Technology Needs Assessment (TNA) for adaption and mitigation in 2013. For mitigation the TNAs covers energy, industry and forestry sectors while two priority sectors have been covered with regard to technology for adaptation, namely agriculture and water sectors. The TNAs resulted in a Technology Action Plan (TAP), which includes some priorities with regard to technology transfer for enhancing national actions on adaptation and mitigation

At national level line ministries developed climate change related polices such as the Agricultural Revival Program (ARP) of 2008 –2011 and the five year economic reform programme 2015-2019. The Forest Policy, (2006) supports climate resilient livelihoods via encouraging income diversification, facilitating microfinance and providing access to land (Ministry of Agriculture and Irrigation, 2012). The Natural Resource Management policy is part of the development plan



of the state, which is in line with Sudan's national policy. The policy provides clear guidelines for local rehabilitation. This made local communities becoming more aware of the importance of sustainable resources management. Mainstreaming adaptation and enhancing adaptive capacity could be increased by encouraging partnerships between informal processes and formal interventions to facilitate adaptation.

In terms of mitigation, Sudan aims towards achieving quicker economic growth rates in a sustainable manner. In line with this Sudan intends to undertake measures across a number of sectors of its economy to pursue low-carbon development, guided by the long-term national development policies, plans and strategies, which are clearly stated in different national development planning documents such as the Strategic Plan document 2007-2033. In addition, it incorporates the outcome of further analysis and consultation to enhance Sudan's existing plans, in particular the assessment of the potential economic sectors that lead towards a low carbon development strategy. Sudan has also prepared a proposal for a low-carbon development strategy, how its implementation still pending access to international climate funding.

### **Means of Implementation**

Despite being committed to and meeting its obligations under the Convention, however due to some political and unilateral sanctions by some developed countries Sudan was not successful in accessing bilateral sources of climate finance, which is currently the major source for funding climate action in developing countries. This situation leaves Sudan even more vulnerable to the devastating consequences of climate change impacts on its people and natural systems upon which their livelihoods depend. Sudan is currently implementing some key urgent and immediate adaptation initiatives as identified based on the NAPA only in six states out 18 vulnerable states, based on resources from the LDCF and substantial local contributions from the participating states and the national government. However, these are far from match the magnitude of Sudan's vulnerability to the impacts of climate change. Sudan also implementing some mitigation priorities on renewable energy (solar, wind) as well as forestry mitigation projects using its STAR GEF allocation, which is limited funding to create an ambition contribution to required global climate mitigation efforts.

Implementing the communicated intended contributions requires an overall investment estimated up to 2025 for adaptation and up to 2030 for mitigation based on current sectoral plans. The required resources to be mobilized through climate finance mechanisms under the UNFCCC such as the Green Climate Fund (GCF), GEF and other climate related bilateral, multilateral and domestic financing including the private sector investment.

The international support required to implement the intended contribution in terms of finance, technology and capacity building, over a cycle of contributions of 5-10 years, amount to a total of 12.88 USD billions, of which 1.2 billions USD\$ for adaptation and 11.68 billions for mitigation. This amount is required to be met from all possible and accessible international climate finance sources. In addition the national and states' government will provide local contributions within their regular and development budgets, national resources and priorities permitting as demonstrated in the case of the current GEF (LDCF/STAR) funded adaptation and mitigation projects. Further development and elaboration of contributions and assessment of costs will be necessary to refine the required investment for implementing such programmes and actions.



