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SPECIAL REPORT

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Assessment of Policy and Institutional Responses to Climate Change and Environmental Disaster Risks in South Sudan

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Summary

This report examines policy and institutional response to climate change and environmental disaster risks, with the view to providing recommendations to the government and its partners in South Sudan on where to focus their environmental policy interventions. To get a sense of the policy and institutional measures, we interviewed key government officials and examined legal and policy documents on environment, disaster management, food security, seeds, agriculture and livestock, fisheries, forestry, wildlife, land, electricity and petroleum and related institutional frameworks in target areas.

Climate change has increased the frequency of severe droughts, floods, storms and cyclones in various parts of the world (IPCC 2007, IPCC 2012, IPCC 2013, Meadowcroft, 2009). In South Sudan, seasonal patterns have become erratic and rain-fed agricultural areas have decreased significantly in the northern and eastern parts of the country (Funk et al., 2011). Rainfalls have decreased in South Sudan by 10-20 % and temperatures have increased by more than 1 °C since the middle of the 1970s. These rainfall and temperature changes are linked to increase in atmospheric Carbon Dioxide (CO₂) since the industrial revolution (IPCC, 2013, IPCC, 2012, the Royal Society and the US National Academy of Sciences, 2014). The atmospheric CO₂ has worldwide increased by 40% since the industrial revolution, and about 70% of this has been emitted since the mid-1970s (ibid).

Observations suggest that patterns in which floods and droughts occur in the same season have become widespread, with droughts happening earlier in the season around May/June and floods occurring later around August/September in South Sudan. These climatic shocks have wider negative impacts on people in terms of food security, health, and safety needs. The government and relevant actors can develop policy and institutional measures to address these shocks.

Summary of key findings

Institutional frameworks:

Institutional frameworks in response to climate change, environmental and natural disaster risks are at nascent stages in South Sudan. Relevant institutional framework, which is in place, covers the Ministry of Humanitarian Affairs and Disaster Management², South

²The Ministry of Humanitarian Affairs and Disaster Management was dropped during the 2013 ministerial reshuffle and restructuring. However, the undersecretary and staff are still in place and in charge of policy making.

Sudan Relief and Rehabilitation Commission, Ministry of Environment, South Sudan Meteorological Service (SSMS), Ministry of Agriculture, Forestry, Tourism, Animal Resources and Fisheries, Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR), Ministry of Finance, Commerce and Economic Planning, Ministry of Lands, Housing and Physical Planning, Ministry of Petroleum, Mining and Industry, Ministry of Foreign Affairs and International Cooperation and Ministry responsible for wildlife. These institutions have been grouped in this study as part of climate change adaptation, mitigation and disaster risks reduction institutional framework, because of their role in either contributing to climate change impacts or in helping the country adapt or mitigate the impacts.

The biggest challenge that we found based on interviews is that these nascent institutions have been weakened by lack of technical know-how, financial resources and by a low priority of the environment and climate change issues on the agenda of the government. The Ministry of Environment has established a climate change unit but it is not operating due to lack of financial and human resources.

The South Sudan Meteorological Service faces challenges related to lack of weather and climate change forecasting equipment, international network connection, and trained personnel. There used to be a total of 43 stations all over South Sudan but most of them have been destroyed by the 1983 - 2005 civil war. Only three stations in Wau, Raga and Juba are currently operating. Two stations in Malakal and Renk stopped operating after the ongoing civil war started in December 2013.

South Sudan Relief and Rehabilitation Commission (SSRRC), with the support from the World Food Program (WFP), put in place an early warning technical unit in September 2013. Staffed with four national experts and two international experts, this unit is conducting a need assessment to establish an early warning system for environmental disaster risks reduction. An early warning information management center will be the product of this early warning technical unit, with the center expected to be fully operational in three years.

The ministry of agriculture, forestry and fisheries has no climate change resilience department. However, it has a number of institutions, which can be improved for climate change resilience. Some of these include Yei Agricultural Research Center and Yei Seed Factory, which have been testing and developing seeds for climate change resilience.

South Sudan Wildlife Service does not have a climate change unit. The Act of parliament, which established it, does not contain a single word or phrase on climate change and environmental disasters although it declares its main purpose is to ‘protect the wildlife; to preserve and conserve the natural habitat of flora and fauna of South (ern) Sudan and; sustainably manage the natural resources in the context of this Act.’ This lack of mention of climate change and environmental and natural disasters demonstrates the thinking about climate change and disaster risks reduction has not been in the minds of the law and policymakers.

The Ministry of Foreign Affairs and International Cooperation is the political focal point for international environmental conventions and treaties and the Ministry of Environment is the technical and operational focal point. South Sudan has acceded to United Nations Framework Convention on Climate Change (UNFCCC), UN Convention on Biodiversity (UNCBD) and UN Convention to Combat Desertification (UNCCD). It has also joined Global Environment Facility (GEF) which funds the three conventions, and has also become a partner country to Reducing Emissions from Deforestation and Forests Degradation (REDD), which provides money to a country that preserves its forests by putting financial value on a ton of carbon that is stored in forests. South Sudan has not yet completed enabling activities to allow it to qualify for such climate change related funds. The Ministry of Environment and relevant institutions are working on enabling activities with technical assistance from the United Nations Environmental Program (UNEP). If an enabling environment is created, South Sudan could get between 40 and 70 million US dollars in climate change financing in the coming years.

The Ministry of Finance and Economic Planning has no climate change financial mechanisms and instruments in place. It also does not have climate change financing department. In addition, the Ministry of Petroleum and Mining and the ministry responsible for electricity have no climate change response departments. Furthermore, the Ministry of Petroleum and Mining has no regulations on CO₂ emission limits and specifications for the industry technologies.

Traditional governance structure was also examined. South Sudan has a highly decentralized traditional governance and institutional framework. The Transitional Constitution 2011 and Local Government Act 2009 recognize the traditional governance institutions. The land Act and the Transitional Constitution 2011 classify land into public, community and private lands. The traditional and local government institutions govern the community land along with environmental issues that arise as a result of land use. Traditional adaptation and mitigation approaches include preservation of seeds, migration to climatically conducive territories in the event of drought and floods, building of dykes, recessive flood farming method and rotational fishing at fishing points, among others. The magnitude of climate change shocks seems to overwhelm traditional adaptation approaches but such approaches can be built on through provision of political leadership support, modern technical approaches and financial resources at the grassroots levels.

Policies

First, majority of the policies available are still going through the drafting process. Second, half of the policies pursue climate change adaptation, mitigation and disaster risks reduction measures to a varying extent. These include policies on food security, environment, and forestry, fisheries, wildlife and disaster management. The other half stress little integration of climate change adaptation, mitigation and disaster risks reduction measures. These include seeds, agriculture and livestock extension, land, electricity and petroleum policies.

The Ministry of Environment has proposed in the **national environmental policy** a development of a climate change policy and mechanisms for climate change adaptations and mitigation. The ministry has also proposed guidelines or plans for coordinating responses to environmental disasters in South Sudan. However, it has not proposed climate change legislation, regulations, and set standards for climate change adaptation and mitigation.

The food security policy is relatively strong in terms of envisioning development of a community adaptive capacity for climate change through crops that can resist droughts and floods. However, its weakness lies in lack of tools that can ensure communities' resilience against climate change shocks and stresses. For example, it mentions lack of food preparation, preservation and storage technologies as barriers, but it falls short of stating the solution or the ways to provide such a technology.

The Ministry of Humanitarian Affairs and Disaster Management recognizes in the **disaster management policy** floods and droughts as some of the disasters that need to be addressed. It proposes building of dykes as a solution for preventing floods but it says little about building resilience to droughts. It does not clearly link droughts and floods to climate change despite the fact that scientific evidences suggest that droughts and floods are expected to become more prevalent and severe due to global warming.

The seed policy has been written from the perspective of improving seed quality, providing access and making seeds available. But it lacks a vision to develop a seed system for climate change resilience.

Agricultural and livestock extension policy does not address issues related to climate change adaptation and mitigations for agriculture and livestock. Droughts and floods have been mentioned once as cross cutting issues but the policy fails to provide clear direction on how to address them.

While the **fisheries policy** incorporates, to a certain degree, climate change response measures and FAO's code of conduct for responsible fisheries, it fails to mark climate change policy response as a priority for or as a means of accessing financing.

Forestry policy is relatively strong in terms of recognizing forests as critical environmental service provider and in terms of proposing the undertaking of activities to enable the flow of climate financial benefits to South Sudan. Forestry policy also calls for ratification of UNFCCC and meeting of the requirements for REDD and establishment of a designated national authority to coordinate international assistance for climate change adaptation and mitigation in South Sudan. However, one of its weaknesses is that it does not recognize climate change as one of the threats to forests, failing to propose how to protect forests from the impacts of climate change.

Although the **land policy and law** require an environmental and social impact assessment before any land investment activities take place, they say little about the

challenges of climate change regarding land use except the mention of displacement due to natural disasters.

Policy on wildlife conservation and protected areas recognizes climate change as a threat and suggests coping strategies such as institutional partnership to study, predict and monitor the impacts and make adaptation protocols. However, it does not clearly state how to protect wildlife species and their habitats from climate change induced floods and droughts. It also does not make a case for mitigation or reduction of greenhouse gases emissions.

Energy policies, which includes petroleum and electricity sectors, do not have direct measures to address climate change, even though environmental and social impact assessment and environmental baseline assessment are required before any development of energy project takes place.

Recommendations

Based on the above findings, we recommend that the government, BRACED Consortium and other relevant institutions should work together by applying their unique expertise and capabilities to do the following:

1. Raise awareness to mainstream climate change adaptation and mitigation thinking in policy making in all sectors.
2. Enact climate change legislation and regulations to legalize and operationalize the climate change policy response.
3. Establish a national climate change authority equipped with technical expertise, full political leadership support and financial resources to coordinate, regulate, and implement climate change adaptation and mitigation policies, measures, strategies and plans. Such a body should work closely with relevant institutions including South Sudan Relief and Rehabilitation Commission, ministries responsible for environment, agriculture, forestry, fishery, wildlife, energy, mining and meteorological service, among others.
4. Speed up the creation of enabling activities required for UNFCCC, REDD+, UNCBD and UNCCD, among others, for international climate financial resources to flow to South Sudan to support its adaptation and mitigation efforts.
5. Establish punitive measures against heavily polluting and emission intensive technologies in the petroleum, electricity production, mining and infrastructure sectors.
6. Base licensing, permitting, renewal of licenses & permits and approvals on results of environmental audit, environmental and social assessments and implementation of environmental management system aimed at achieving sustainable development

goal in general and adapting to climate change and minimizing emissions of greenhouse gases in particular.

7. Establish climate change funds, to finance adaptation and mitigation measures and programs, and transparency and accountability system to govern the funds. The funds should come from international climate financing mechanisms and from internal taxing of unsustainable and emission intensive sectors of the economy. The funds should be used to:
 - Establish strategic reserve food silos for the drought and flood periods and put in place transparency and accountability measures to prevent abuse of such a system;
 - Establish insurance programs for crops and livestock in flood and drought prone areas. In so doing, collaboration should be made with national financial and insurance institutions, international financial and insurance institutions as one of the ways to make it successful;
 - Put in place rain water harvesting technology and establish irrigation system and water points in water scarce areas;
 - Establish incentives for companies and institutions to use clean and less CO₂ emission intensive technologies;
 - Establish an early warning system that is able to predict flood and drought and communicate the information to stakeholders to mitigate the impacts;
 - Build dykes in flood prone areas to protect communities and businesses from flood.

Introduction

This report examines policy and institutional gaps in response to climate change and environmental disaster risks in South Sudan, with the view to providing recommendations to the government and its partners³. The report focuses on policy landscape for natural resources (e.g. agriculture, fisheries, forestry, wildlife, land, water, energy) and environmental disasters for two main reasons. First, climate change affects agriculture, fisheries, forestry, livestock, wildlife sectors and ecosystems in South Sudan (UNDP, 2011). Any meaningful climate change policy response must provide ways to protect these resources through mitigation, adaptation and disaster risks reduction measures. Second, the energy sector has traditionally had a negative influence on climate, as the increase in the greenhouse gases emissions has empirically been linked to the increase in the frequency of floods and droughts (IPCC, 2012, US National Academy of Sciences and the Royal Society, 2014). Therefore, South Sudanese policy response to climate change is expected to prevent, reduce, and mitigate the energy sector's negative influence on climate change.

To understand policy and institutional measures, we interviewed key government officials and experts and examined over ten legal and policy documents on environment, disaster management, food security, seeds, agriculture and livestock, fisheries, forestry, wildlife, land, electricity and petroleum and related policy commitments in target areas. The assessment was conducted between May and August 2014 in Juba.

Since a study by the UNDP in 2011, which found that institutions and policies to address climate change were still at a nascent stage, little information remains known about the progress of legal, institutional and policy frameworks for climate change adaptation and mitigation in South Sudan. Therefore, this report provides an update on policy responses to climate change in South Sudan.

Climate change background

There is 'convincing scientific evidence' that human activities have been changing the global climate (IPCC 2007, IPCC 2013, Meadowcroft, 2009). Current global manifestations of climate change include severe droughts, floods, storms and cyclones (IPCC 2012). These consequences adversely affect key livelihood infrastructure, human settlements, agriculture and natural resources, which result in serious economic costs and other consequences on people's wellbeing and the ecosystem at large (Stern, 2007). Poor nations are more vulnerable to climate change impacts than rich nations because they have little capacity and resources to adjust and because they generally depend on natural resources (including agriculture) for livelihoods (Mallon et al., 2013, Burton, Malone and

³ The BRACED Consortium is composed of the Sudd Institute, UN FAO, Oxfam GB, Acted and Concern Worldwide.

Huq, 2004, Meadowcroft, 2009). Fossil fuels are the largest emitters of greenhouse gases (GHGs), which cause climate change (IPCC, 2013, IPCC, 2011, IPCC, 2007, Bernauer and Schaffer, 2010). The GHGs absorb heat. A high concentration of these gases causes the earth to warm up, as the heat (infrared radiation) is not able to escape from the earth's atmosphere. Affluent societies are the biggest fossil fuel consumers. Atmospheric CO₂ has increased by 40% since the industrial revolution, and most of the increase started in the mid-1970s (IPCC, 2013, IPCC, 2012, the Royal Society and the US National Academy of Sciences, 2014).

Global policy efforts in the last decades have led to intense negotiations on how best countries can reduce the potential impacts of climate change and develop means to cope with unavoidable negative consequences. Such global policy efforts have been spearheaded by the United Nations, which culminated in the proclamation of the United Nations Framework Convention on Climate Change⁴ (UNFCCC) in 1992. The UNFCCC, of which South Sudan became a full member on May 18th, 2014, requires its signatories to cooperate in reducing average global temperature increases, and mitigate resulting impacts and design means to cope with inevitable impacts. As the biggest emitters of greenhouse gases (GHG), developed countries are required to support developing countries financially so that they can develop their adaptation and mitigation capacities. Such assistance is provided by the Convention through the Global Environment Facility⁵ (GEF). South Sudan is already a member of the GEF and will benefit from support in the next number of years when it meets certain requirements.

The UNFCCC has not been enough to make countries meet their obligations. Therefore, the signatories launched the Kyoto Protocol in 1997, which introduced legally binding commitments towards the emission reduction targets and to help the developing countries address their climate change challenges⁶. The Kyoto Protocol requires countries to do more in terms of shifting patterns and modes of production and consumption to mitigate the negative impacts of climate change (Meadowcroft, 2009). The Kyoto Protocol provides an opportunity through clean development mechanism (CDM) for developing countries like South Sudan, to obtain 'certified emission reduction (CER) credits'⁷ and trade and sell CER credits to developed countries that pursue emission reduction targets. This mechanism is both controversial and visionary at the same time but the market for such credits has now greatly slowed down.

⁴ See UNFCCC: <http://unfccc.int/2860.php>

⁵ See the Global Environment Facility (GEF): the GEF provides financial mechanisms for UN Convention on Biodiversity, Convention to Combat Desertification, Stockholm Convention on Persistent Organic Pollutants, UNFCCC and Minamata Convention on Mercury. More on <http://www.thegef.org/gef/whatisgef>

⁶ See the Kyoto Protocol: http://unfccc.int/kyoto_protocol/items/2830.php

⁷ See Clean Development Mechanism: <http://cdm.unfccc.int/about/index.html>

The global climate change policy has two main approaches namely: adaptation and mitigation mechanisms. Adaptation⁸ policies involve putting in place mechanisms that allow people and systems to adjust and stay resilient to negative impacts of climate change. Mitigation⁹ policies attempt to institute measures that can reduce greenhouse gas emissions, the main driver of climate change. The UNFCCC and the Kyoto Protocol require adaptation and mitigation measures at the country-level. Mitigation policy approaches attempt to address sources of emissions, consider cost effective abatement potentials and approaches (IPCC, 2014, Fröhlich and Knieling, 2013, Meadowcroft, 2009). Both mitigation and adaptation policies¹⁰ have common goals which are linked to the promotion of sustainable development. However they differ in the sense that mitigation measures provide global and long-term benefits while adaptation policies provide local and short-term benefits by virtue of addressing localized and regional ongoing climate change induced shocks and stresses (Dang et al., 2003, IPCC, 2007). Therefore, cooperation between countries is needed to effectively mitigate climate change impacts (IPCC, 2014). Some of the climate change mitigation policy instruments include carbon trade, carbon capture and storage, carbon sequestration, abolition of subsidies for fossil fuel, tax and financial incentives for renewable energy, regulatory standards for equipment and consumer product like energy. Other policy instruments particularly at the global level include provision of financial assistance to developing and poor societies to develop adaptation and mitigation capacities ¹¹(UNDP, 2011, Tirpak and Parry, 2009).

Apart from the UNFCCC, other significant international policy frameworks by which climate change is being addressed include UN Convention on Biodiversity (UNCBD) and UN Convention to Combat Desertification (UNCCD). South Sudan has already acceded to these three frameworks (Ministry of Environment, 2014). To qualify for assistance, South Sudan needs to conduct enabling activities in the form of the National Adaptation Programmes of Actions (NAPA), National Biodiversity Strategy and Action Plan (NBSAP) and National Action Plan (NAP)—all required by UNFCCC, UNCBD and UNCCD, respectively. These can also be complemented by undertaking the National Capacity Self-Assessment (NCSA) and activities around REDD Readiness. South Sudan became a

⁸ UNFCCC defines adaptation as the ‘Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities’. More details can be found here: http://unfccc.int/files/documentation/text/html/list_search.php?what=&val=&valan=a&anf=0&id=528

⁹UNFCCC defines mitigation in the context of climate change as ‘ a human intervention to reduce the sources or enhance the sinks of greenhouse gases. Examples include using fossil fuels more efficiently for industrial processes or electricity generation, switching to solar energy or wind power, improving the insulation of buildings, and expanding forests and other "sinks" to remove greater amounts of carbon dioxide from the atmosphere.’ More details can be found on http://unfccc.int/essential_background/glossary/items/3666.php

¹⁰ For more, see http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch2s2-5-2.html

¹¹ Regarding capacity building for developing countries, see Marrakesh Accords <http://unfccc.int/resource/docs/cop7/13a01.pdf#page=5>

REDD Programme partner country in 2011¹². We later provide an overview on how far the country has gone in terms of meeting these requirements.

Not only have climate change adaptation and mitigation policies been the focus of recent debate, means of addressing environmental and disaster risks have been also at the center of policy efforts. The reason for environment and disaster risk reduction policy concern is because incidents of environmental disasters have increased in the last several decades (IPCC, 2012, UNISDR, 2011). Climate change, natural hazards and development activities have negative impacts on the people and the environment (Schipper and Pelling 2006). Schipper and Pelling (2006) call them three realms of actions due to the linkages as climate change can cause disasters and disasters affect people and destroy development, particularly infrastructure, economic activities and human settlement (UNDP, 2011). In the past, policymakers failed to see these complex synergies and instead addressed them as separate entities, instead of using an integrative approach in addressing them. Both are interconnected and need to be addressed in a holistic manner. So environment and disaster risk reduction are as important as climate change adaptation and mitigation.

South Sudan's general context and climate change manifestations

This section attempts to provide South Sudan's general context and climate change manifestations on the ground to appropriately place any policy and humanitarian measures on climate change induced disasters.

South Sudan was part of Sudan until July 9, 2011, when it became independent. Before independence, the region witnessed two devastating civil wars from 1955 -1972 and 1983 – 2005. As part of the Sudan, the region was under the Anglo-Egyptian Condominium rule from 1899 to 1956 and most of this time, it had little exposure to the outside world. Before the condominium rule, the region was controlled by various independent ethnic chiefdoms and kingdoms.

South Sudan is rich in natural resources, including wildlife, forests, fish, water, minerals and oil. Oil accounts for about 98% of the government revenues. The country has a population of 8,260, 490 based on the 2008 Population and Housing Census. Recent estimates by the World Bank and other institutions, however, put the numbers between 10 to 13 million people.

South Sudan is currently going through a catastrophic civil war, which started on December 15, 2013. The main areas affected by the war include Jonglei, Upper Nile and Unity states. These areas are also vulnerable to droughts and floods. Wars and years of isolation from the outside world have dealt a huge blow to the country's capacity to withstand climate change shocks and stresses. Famine is looming, as many people in the

¹² See more on <http://www.un-redd.org/Newsletter42/SouthSudanStakeholderEngagement/tabid/130823/Default.aspx>

war-affected areas have not been able to cultivate due to displacement and insecurity. Floods have worsened the war induced humanitarian crisis in various displaced camps. The warring parties have been in peace talks mediated by the Intergovernmental Authority on Development (IGAD) in Ethiopia. Success of any government policy intervention on climate change and environmental and natural disasters in the war-affected regions will largely depend on peace in the country. However, humanitarian intervention for floods and drought affected conflict zones should not wait for peacetime.

Climate change manifestations

Rainfalls have decreased in South Sudan by 10-20 % and temperatures have increased by more than 1 °C since the middle of the 1970s (Funk et al., 2011)). This is consistent with other reports, which suggest that much of the global average temperature increase started in the mid-1970s (IPCC, 2013, IPCC, 2012, the Royal Society and the US National Academy of Sciences, 2014). This is the same period in which the emissions of greenhouse gases have also increased (IPCC, 2007, 2013, The Royal Society and the US National Academy of Sciences, 2014).

Rainfalls used to be from March/April to October/November. However, this pattern is changing, as seasonal patterns are becoming erratic and rain-fed agricultural areas have been decreasing noticeably from the North and East of South Sudan (Funk et al., 2011). Droughts have become very frequent in South Sudan and Sudan with notable ones occurring in 1989, 1990, 1997, 1998, and 2000 (UNEP, 2007). This has wider implications in terms of food security. Drought and floods are among the top sources of vulnerability in South Sudan, with about fifty-six percent of the population surveyed reporting to be vulnerable to drought and flood shocks (NBS, 2009).

Figure 1: Percentage of surveyed population affected by different shocks

Shocks	Percentage of Surveyed population affected
Some shocks	92
Drought/flood	56
Death or stealing of livestock	47
Crop disease or pests	42
Severe illness or accident of a household member	35
Death of a family member	34

(Source: NBS, 2009)

South Sudanese states in high risk of food insecurity due to reduction in rainfall patterns include Eastern Equatoria, Jonglei, Warrap and Northern Bar el Ghazel (Funk et al., 2011). Despite lack of capacity and challenges being posed by climate change, climatic, soil and water conditions are relatively considered favorable for agriculture (Diao et al., 2012).

South Sudan is divided into seven distinct livelihoods zones (see figure 1) based on climatic conditions and agricultural potential (Diao et al., 2012, SSCCSE et al., 2006). These livelihood zones include:

- Greenbelt Zone, which is found in some parts of Eastern Equatoria, Central Equatoria and most of Western Equatoria,
- Eastern Flood Plains zone which is found in parts of Jonglei, Eastern Equatoria and Upper Nile States,
- Western Flood Plains which are found in parts of Unity, Northern Bar el Gazelle, Warrap and Lakes States,
- Pastoral/Arid zone found in some parts of Eastern Equatoria and Jonglei States,
- Hills and mountains zones which are found in some parts of Eastern Equatoria, Upper Nile, Central Equatoria and Jonglei (e.g.Boma);
- Ironstone plateau zone, found in Western Equatoria, Central Equatoria, Western Bar el Gazelle, Warrap and Lakes States.
- Nile - Sobat zone, found in Jonglei, Upper Nile, Unity and Lakes States.

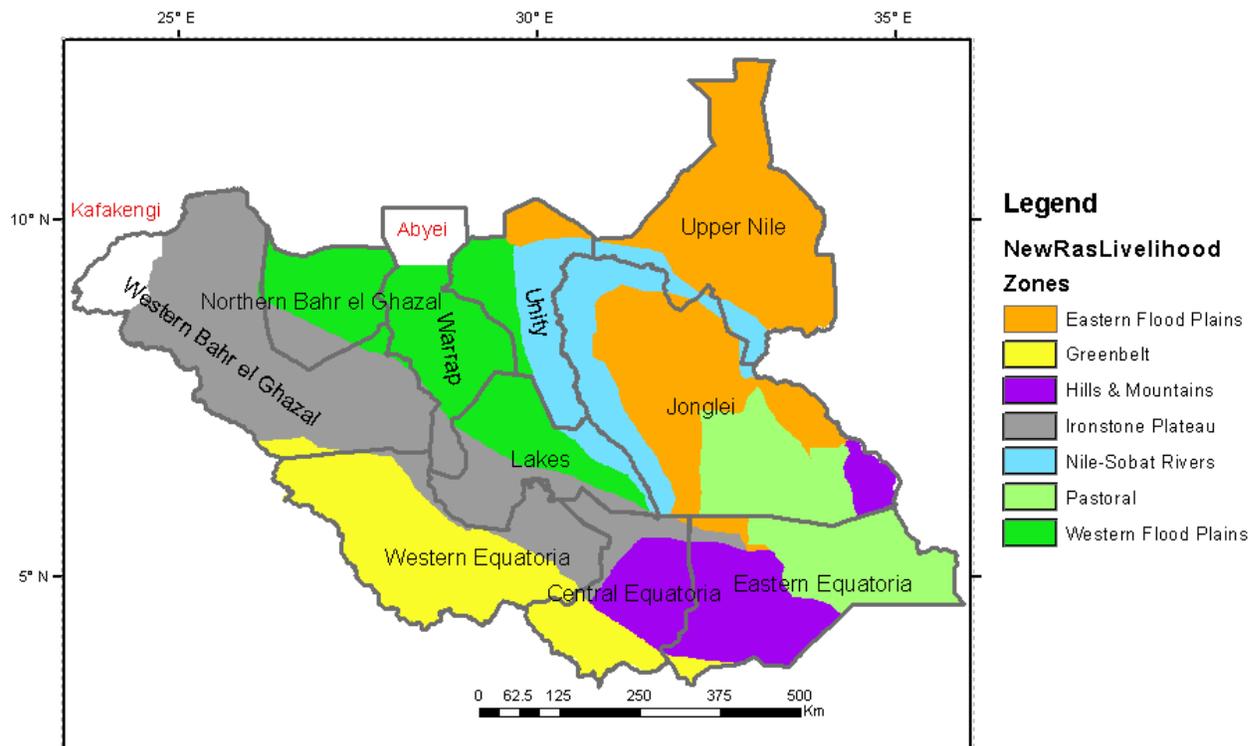


Figure 2: South Sudan’s Agro-climatic Livelihoods Zones

(Source: Diao et al., 2012, SSCCSE et al., 2006).

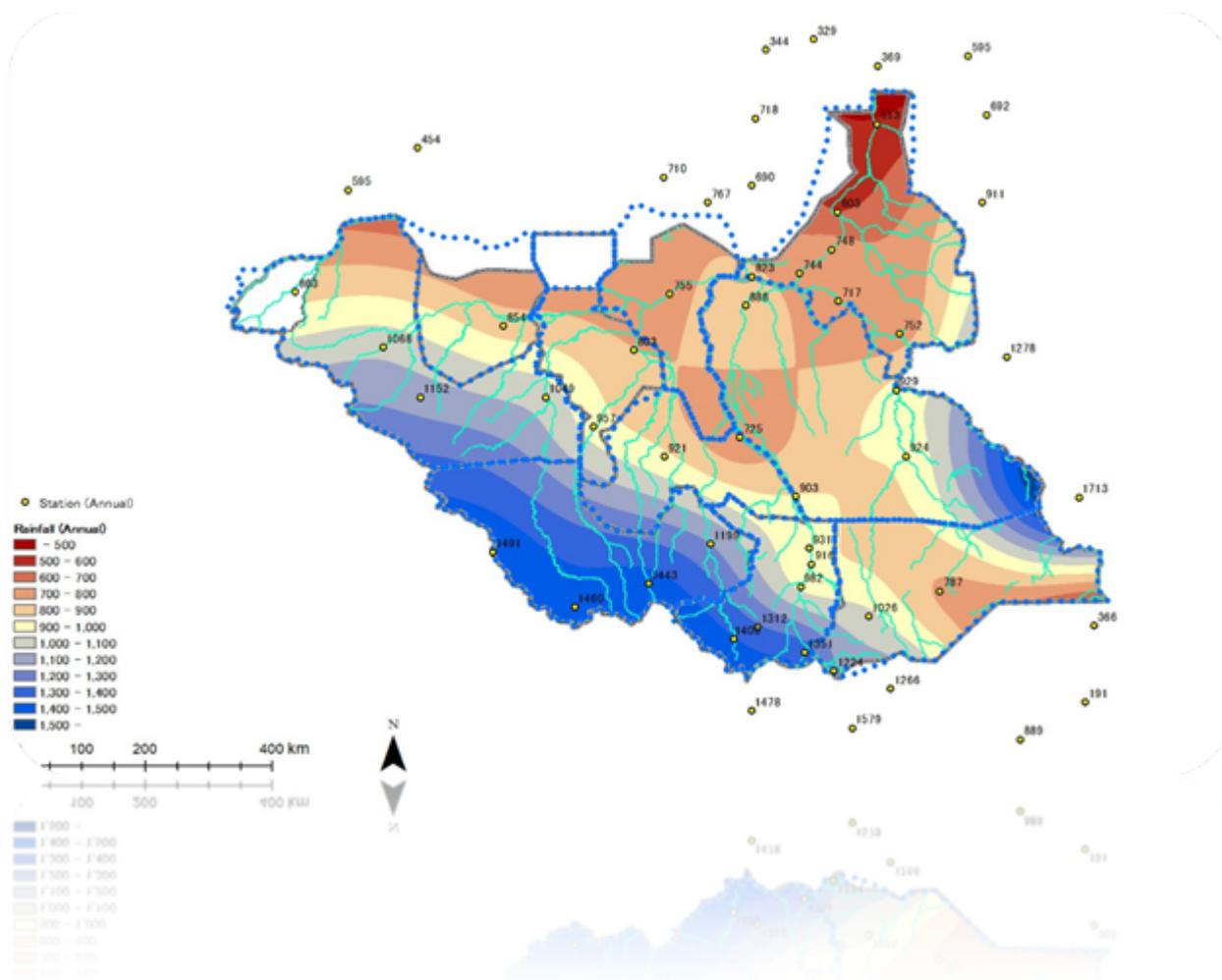


Figure 3: Average Rainfall in South Sudan in the last 30 years (Source: SSMS, 2014).

The map in figure 3 shows South Sudan’s average annual rainfall in the last 30 years and this rainfall pattern follows the pattern of the livelihood zones in figure 1. The greenbelt and mountain zones have the highest amount of rainfall. In addition, rainfalls in the flood plains and pastoral/arid zones have been shrinking.

The most notable ecological features in South Sudan are the White Nile with its several tributaries and the Sudd wetland, which has been marked as a wetland of international

significance by the Ramsar Convention. The Sudd wetland is located in the center of South Sudan and covers almost about 15% of the country's area. These ecological features are important resources for climate change adaptation and mitigation.

Apart from rainfall decrease, floods frequency has increased in recent decades in South Sudan. For example, floods occurred in 1962 -1965, 1978 – 1979, 1988, 1994, 1998, 1999 and 2006 (UNEP, 2007). Both localized and widespread floods also occurred in 2011, 2012, 2013 and 2014. Previous flood occurrences came almost a century apart in 1878 and 1946, suggesting a flood frequency increase in the last 40 years. Local observations suggest that patterns in which floods and droughts occurred in the same season have been rampant, with droughts happening earlier in the season, especially around May/June, and later around August/September. In some years, floods are severe and take longer to recede to the source. Between August and November 2013, for example, floods affected about 150,207 people, destroyed crops and property and infrastructure in South Sudan. The government of South Sudan declared the country as a disaster zone in October 2013 after seven of the country's ten states were heavily flooded. Drought frequency in the Eastern African region has also increased in the last decades, possibly due to warming in the Indian Ocean, which reduces precipitation over land (Park and Funk, 2011).

Policy and legal frameworks

This section attempts to answer the main question: What government policies are in place to address issues related to climate change, environmental and natural disaster risks in South Sudan? Firstly, the Ministry of Environment has drafted a national environmental policy (2012) and a national environmental bill (2012), which are in the final stages of parliamentary discussion. The environmental policy (2012) was first approved by the South Sudanese cabinet in 2012. However, the requirement for policymaking changed before the policy became operational. As a result, the Minister of Environment (in 2014) decided to table the policy for cabinet and parliamentary approvals. In addition, the Ministry of Humanitarian Affairs and Disaster Management, which is currently headed by the undersecretary, is in the process of drafting a disaster management policy. They are at the consultation stage and the policy is expected to be ready in the next several months.

Apart from the national environmental policy, environmental bill and disaster management policy and the Transitional Constitution of the Republic of South Sudan, 2011, we also reviewed seed, livestock, fishery, wildlife, forestry and energy policies to determine if these sectors have incorporated climate change adaptation and mitigation measures. We also reviewed how far South Sudan has gone in terms of ratifying climate change related international conventions and treaties.

Environmental policy and legal framework

Transitional Constitution of the Republic of South Sudan, 2011

Our review of the Transitional Constitution, 2011, reveals that there is no specific constitutional framework on climate change. However, the Transitional Constitution in section 41 guarantees people's right to a clean and healthy environment. It calls for proper legislative measures that: "(a) prevent pollution and ecological degradation; (b) promote conservation; and (c) secure ecologically sustainable development and use of natural resources while promoting rational economic and social development so as to protect genetic stability and bio-diversity." These provisions are not specific. However, climate change can reduce chances of achieving these measures mentioned in section 41. Therefore, the Transitional Constitution still provides a legal basis for climate change policies and legislation notwithstanding the fact that there is a need for clear and specific constitutional direction on climate change.

Policy on the environment (2012) and national environment bill

The South Sudanese **national environmental policy** (2012) is premised on the principles of protecting and managing the environment on the basis of:

1. **Good governance:** rule of law, transparency, accountability and public participation,
2. **Sustainable development:** meeting the needs of the present generation without denying the future generations an ability to meet their own needs,
3. **Preventive principle:** preventing environmental damages, pollution and depletion by instituting preventive measures,
4. **Subsidiary principle:** devolving and decentralizing powers and responsibilities of protecting the environment to the local levels of governance (e.g. states, counties, etc.),
5. **Precautionary principle:** addressing environmental issues in a precautionary way,
6. **Scientific knowledge, skills and expertise principle:** using scientific knowledge, skills and professional expertise to protect and manage the environment,
7. **Polluter pays principle:** holding individuals, institutions and companies accountable for pollution damage and environmental depletion.

The above principles provide guidance through which environmental issues, some of which are related to climatic changes, can be addressed.

Incorporation of climate change measures

In section 3.1, the national environmental policy talks about climate change issues and provides policy guidance on how to address those issues. First, the draft policy recognizes

climate change as a global phenomenon that equally affects South Sudanese and that without adaptation and mitigation measures, it “may adversely impact on the environment and livelihoods of most South Sudanese.” The draft policy, in addition, identifies the current climate change impacts in South Sudan in terms of unreliable rainfall patterns, increase in temperatures and evapotranspiration, some of which have resulted in an increase in the frequency of droughts and floods in some parts of the country. Furthermore, the policy is mindful of the climate change potential to “exacerbate food insecurity, biodiversity loss, water shortages and conflicts due to scarcity of water resources.”

However, what remedies does the policy provide in terms of adaptations and mitigations? To address these climate change issues, the environmental policy proposes (1) development of a national strategy and mechanisms for climate change adaptation and mitigation; (2) formulation of a climate change policy for South Sudan; (3) support for efforts to reduce community vulnerability to weather pattern variability and climate change; and (4) promotion of the use of ozone friendly technologies. Overall, the policy has touched some key areas of addressing climate change such as development of a climate change policy and mechanisms for adaptations and mitigation.

However, it falls short of proposing a legislation that establishes standards for adapting to and mitigating climate change impacts. Climate change specific legislation can allow the country to reduce greenhouse gas emissions, provide legal means and increasing capacity for adaptation and mitigation activities and legal penalties for activities which can exacerbate climate change. If there is need for climate change policy as the environmental policy has proposed, it follows that there is need for climate change legislation as a tool to enforce the policy. Despite proposals for climate change adaptation and mitigations, the draft policy also fails to provide details on such adaptation and mitigation mechanism, although this can be done through a regulation. Policymakers will need to revisit the details to be included in the proposed climate change policy and the need to enact a regulation with such details.

Unlike the National Environmental Policy, the **National Environmental Bill** does not contain any section on how to address climate change. The word ‘Climate’ is only mentioned in the bill as part of the definition of the environment. It defines the environment as “physical factors of the surroundings of human beings, including land, water, atmosphere, climate, sound, odour, taste, the biological factors of animals and plants and the social factor of aesthetics, and includes both the natural and the built environment.”

Obviously, the definition implies the bill’s recognition of the climate as a crucial part of the environment notwithstanding the apparent failure to propose means to tackle issues related to a changing climate. Another instance where the ‘climate’ is mentioned is schedule 2 of the bill regarding project screening criteria during the environmental impact assessment process (EIA). The screening criteria number 8 of the schedule requires a potential project should not have an “adverse impact on [the] climate and hydrological cycle.” While it is

important to state that projects should not cause adverse impact on the climate, the bill fails to elaborate what kinds of impacts, how they adversely influence the climate, and how such impacts can be prevented or minimized.

Despite the apparent lack of sections dedicated to tackling climate change in the bill, section 74, in passing, mentions the need for the would-be Environmental Authority to set “emission standards for various sources” and “minimize emission of green-house gases and identify suitable technologies to minimize air pollution.” Section 76 of the bill also requires emission licensing, perhaps, as a means to control emissions. Furthermore, the bill, under section 75, empowers the Environmental Authority to “establish a register of air pollutants to be maintained as prescribed by regulations, which shall contain data identifying the quantity, conditions or concentrations relevant to the identification of each pollutant.” Even though this may appear rather casual and lacks details, it is acknowledged that setting emission standards particularly for greenhouse gases can contribute to global mitigation of climate change.

Incorporation of environmental disaster risks reduction measures

The environmental policy (2012) acknowledges the threats posed by disasters such as floods, droughts, plagues, bush fires and desertification. The policy describes floods, droughts, and insects’ plague as natural disasters and describes desertification and bush fires as being influenced by human activities. The policy attributes the cause of some of the natural disasters to “changing weather patterns and conditions in the last fifty years.”

However, one of the outstanding gaps is that the policy fails to link these changes with the fact that the increase in the frequency of droughts and floods is largely influenced by climate change. Linking the disasters with climate change based on available scientific evidence is important because putting out the right diagnosis of the problem can allow the country to devise an effective remedial solution.

In order to reduce disaster risks, the environmental policy has, among others, proposed a number of mechanisms which include (1) establishment of meteorological monitoring stations to provide actual data for weather forecasting, (2) development of advanced emergency preparedness, response and intervention plans, and (3) development of digital maps and zones of flood-prone areas in South Sudan.

These mechanisms are crucial in alleviating disaster risks. However, it is important to link such remedies clearly with people livelihoods. For example, the proposed mechanisms only attempt to establish mechanisms to predict emergencies, where they can occur and prepare for them. However, these mechanisms do not state how to prevent disasters and how people can cope with them. A policy statement declaring how to prevent or reduce the risks of environmental disasters such as floods and drought and how to cope with inevitable consequences can be a step in the right direction.

The national environmental bill includes disaster management and preparedness. It gives some powers to the Environmental Authority to “prepare Guidelines or plans for coordinating responses to environmental disasters in South Sudan.” It also authorizes state and local government environment committees to “prepare plans for responses to local environmental disasters with specific reference to known possible disasters within their area of jurisdiction.”

Policy on disaster management

One of the disaster management policy’s objectives is to build capacity for disaster risks reduction in South Sudan. The proposed disaster policy identifies disasters as civil wars, local conflicts, drought and floods, naming the latter as natural disasters. Some of the tools the policy declares to be used to prevent flood disasters include building of dykes and drainages. The disaster policy also intends to turn flood disasters into opportunities by engaging in fishing during the flood and cultivating “short maturing crops on flooded plains” after the flood. Some officials from the ministry of agriculture called it ‘recessive flood crop production’ which is a technique where people can cultivate as the floods recede.

Even though the proposed policy makes such proclamations, it does not clearly link disasters to climate change and environment. It, instead, looks at floods and droughts as natural disasters without any particular link to climate change. While floods and droughts can be considered as natural disasters often induced by El Niño and La Niña events, scientific evidence suggests that droughts and floods are expected to become more severe and extreme due to the global warming caused by greenhouse gases, which are mainly emitted from energy production and consumption (US National Academy of Sciences and the Royal Society, 2014). For example, research indicates that “heavy rainfalls associated with tropical cyclones are likely to increase with continued warming” (IPCC, 2012). Therefore, as mentioned previously, it is very important to make a clear diagnosis of the problem so as to arrive at an effective remedy. So clearly linking climate change with droughts and floods in a disaster management policy can be a step in the right direction.

Policy on food security (2012)

South Sudan National Policy on Food Security (2012) recognizes threats to food security as natural disasters such as droughts, floods, pests and diseases. It attributes the cause of these disasters to climate change. It also points out that poor land management and insufficient application of fertilizers exacerbate these disasters. The policy also counts lack of technologies for food preparation, preservation and storage as one of the main problems.

To address the above challenges related to climate change, the policy statement on climate change is aimed at enhancing “policy measures meant to mitigate the adverse effects and impacts from climate change in the medium and long-term.” Some of the main objectives to overcome climate change adverse impacts include (1) understanding the likely impacts of

climate changes on the resilience of key crops, agro-forestry tree species and livestock in the different agro-ecological zones; (2) enhancing the adaptive capacity of communities in drought and flood prone areas; and (3) supporting measures aimed at protecting vulnerable communities against climate change related diseases and pests outbreaks. The policy proposes the following as the implementation strategies:

- Collaborate with the Ministry of Environment to identify priority activities that respond to their immediate needs to adapt to climate change;
- Support and promote the development of intensive and diversified crops adapted to extreme climate risks;
- Map and intensify research on crops and livestock most adapted to changing climatic conditions in different agro-ecological zones;
- Advocate for strengthening of agro-meteorological services;
- Promote conservation of land and proper utilization based on applicable instruments such as Environmental Impact Assessment (EIA), audits and land use plans;
- Develop appropriate technology and extension methods aimed at improving and maintaining soil fertility;
- Prevent water, soil and air pollution from agro-chemicals.

The food security policy has also proposed South Sudan Food Security Council to implement, monitor and evaluate the implementation of the food security policy. Overall this policy is relatively strong in terms of addressing climate change issues particularly by proposing to develop community adaptive capacity for climate change through the development of crops that can resist droughts and floods. However, this policy is weak in terms of tools that can ensure the communities are resilient against climate change shocks and stresses. For example, while it mentions lack of food preparation, preservation and storage technologies as problem, it falls short of stating the solution or the ways to provide such a technology. The policy also lacks targets and indicators that can help in the evaluation of the success of the policy.

Policy on seeds

The ministry of agriculture has proposed a seed policy, which is not yet operational. Some of the challenges and constraints that the draft identifies in the agricultural sector include (1) poor infrastructure, (2) lack of institutional framework to manage the seed sector, (3) gender inequality as households headed by females cultivate less land compared to male headed households, (4) subsistence nature of agriculture which tends to discourage demand for improved seed, (5) poor connection between farmers and the seed sector as farmers

have no access to seed markets and relevant opportunities and (6) inadequate research capacity.

The draft seed policy focuses on government's priority to ensure "food security, poverty reduction and sustainable growth and development." Its goal has been declared as an improvement of "agricultural productivity, household income generation and food security through adequate, timely and sustainable supplies of well-adapted high-quality seed at competitive prices."

The seed policy is premised on eight principles which include: (1) sustainable development, (2) improved food security and poverty reduction, (3) biodiversity and environmental services, (4) partnerships in governance, (5) gender equity, (6) cultural and traditional institutions, (7) meeting international obligations and (8) considering environmental and social values when making seed valuation.

The draft seed policy promises to create a 'South Sudan Seed Council' as the implementing agency to be under the directorate of agriculture. It also declares creation of legislation and regulations to operationalize the policy and regulate the seed sector.

The policy has been written from the perspective of improving seed quality, providing access and making seeds available. However, it lacks a vision presently to develop a seed system for climate change resilience. In other words, it does not address how to develop a seed system in response to climate change or extreme weather. The phrase climate change is not mentioned anywhere in the draft. Importantly, the draft policy does not mention mechanisms and plans to develop seeds that can withstand droughts and floods.

Policy on agriculture and livestock

The aim of the policy on agriculture and livestock (2011) is "to transform agriculture and livestock from traditional/subsistence systems to achieve food security, wealth creation and national economic growth through science based, market oriented, competitive and profitable agricultural systems." The policy does not address issues related to climate change adaptation and mitigations for agriculture and livestock. Droughts and floods have been mentioned once as cross cutting issues but the policy fails to provide clear direction on how to address them.

Policy on fisheries

The directorate of fisheries and aquaculture development has a Fisheries Policy 2012 – 2017. This policy has somewhat integrated climate change thinking and Food and Agriculture Organization (FAO) Code of Conduct for Responsible Fisheries 'in all activities and sub-sectors.' The fisheries' policy objective on climate change is "to respond appropriately to climate change and natural disasters." Strategies include researching into and developing "policy advice to contribute to wider government responses to climate

change and disaster management.” However, in the policy matrix, it fails to mark climate change policy response as a priority or as a means for accessing financing for resilience.

Policy on forestry (2013)

Forests act as carbon sinks and also help with local people’s ability to adapt to climate change. They are an important tool for climate change mitigation and adaptation, particularly through Kyoto Protocol’s clean development mechanism (CDM) and REDD+. There are a number of serious threats to forests, which need consideration in policy formulation. Some of these threats include cutting of forest trees for agricultural use, firewood and charcoal and climate change induced droughts and floods, which are causing deforestation (UNEP, 2007). Climate change induced droughts are causing encroachment of deserts southward and floods have destroyed forests in low-lying areas, particularly in the areas close to the Sudd wetland and White Nile.

The South Sudan forestry policy 2013 recognizes the critical role played by forests in providing “critical environmental services, water catchment and in mitigating climate change.” The forestry policy proposes the ratification of the UNFCCC so that the country can benefit from the CDM. Besides, it proposes the establishment of a designated national authority “to facilitate the flow of climate change benefits to South Sudan.” The policy also emphasizes the need to put down measures “so that South Sudan can access financing under Reducing Emissions from Deforestations and Forest Degradation (REDD).” REDD+ puts financial value on carbon, which is stored in forests. Activities to prepare the country for REDD will be undertaken over the next three years and will be coordinated by UNEP. The forestry policy proposes the establishment of the South Sudan Forestry Commission with administrative, regulatory and supervisory powers regarding forests. However, the policy does not recognize climate change as one of the threats to forests and does not propose how to protect forests from climate change induced droughts and floods.

Policy on land

Legal and policy frameworks on land in South Sudan include the Land Act, 2009, Transitional Constitution, 2011 and a draft Land Policy. The Land Act and the Transitional Constitution, 2011 stipulate that the people of South Sudan own the land while the government regulates its usage. However, subterranean natural resources should be owned, regulated and managed by the government of South Sudan. The Land Act divides the land into private, public and communal lands. The laws also require the government to enter into consultation with communities if a land is needed for investment before making and signing an agreement with a land owning community on behalf of a company that wants to use the land for investment.

The proposed land policy’s goal is to promote land tenure security. It lists the benefits for land tenure security as peace building, economic development and national unity.

Problems which the proposed land policy intends to address include (1) displacements due to civil wars, natural disasters and land right conflicts (2) weak land management system (3) lack of transparency and accountability (4) gender bias and discrimination (5) unplanned settlement in towns (6) conflicts over pastures and water points (7) disagreements over internal administrative boundaries and land grabbing.

The draft policy says little about the challenges of climate change regarding land use except the mention of displacement due to natural disasters. The laws require an environmental and social impact assessment before any investment activities. Such a process should involve community and public consultation. Both the Land Act, draft Land Policy, and the Transitional Constitution do not mention the phrase climate change and measures that can be used to address the impacts resulting from land use activities.

Policy on wildlife conservation and protected areas

Wildlife conservation and protection should be an important area of policy response to climate change. The reason for policy response is that climate change has a huge potential to negatively affect wildlife species through habitat degradation, with flood and drought being the main potential causes of habitat degradation in South Sudan. For example, wildlife species within and near the Sudd wetland are vulnerable to floods while the ones in the eastern and northern parts of the country are vulnerable to drought as rain has been decreasing in these areas.

How does the government address climate change impacts on wildlife species? In the draft policy on wildlife conservation and protected areas (2012), the government recognizes climate change as “a global reality with serious implications for natural ecosystems and wildlife resources.” Noting that it will affect the habitat and population of wildlife species, the policy calls for designing coping strategies to address the impacts. Some of the strategies the policy proposes include partnership with relevant institutions to study, predict, monitor climate change and its impact, and develop and implement adaptation protocols. The policy does not elaborate in details what such adaptation protocols should be. It also falls short of suggesting instruments to enforce adaptation and mitigation measures. Furthermore, it does not answer how to protect species from drought and floods.

In addition, the Wildlife Service Act 2011 does not address climate change issues. The Act talks about conservation of wildlife species and protection against poaching and trafficking without mentioning climate change as a threat to the species and their habitats.

Policies on energy

This section reviews national policies in the energy sector. We begin with a general overview about climate change adaptation and mitigation measures in the energy sector to get a sense of the linkages and instruments used. Energy sources, particularly fossil fuels such as petroleum and coal, are the biggest emitters of greenhouse gases, which cause

climate change. Mitigation basically means prevention or reduction of the emissions of greenhouse gases (Fröhlich and Knieling, 2013). Mitigation measures mainly focus on designing energy policies that reduce the emissions of greenhouse gases and providing long term resilience as adaptation measures do not usually provide long term solutions. Most mitigation measures attempt to advance renewable energy technologies as alternatives to fossil fuels. Some of the measures used to promote renewable energy technologies include financial and tax incentives, rules and regulations and regulatory changes. Financial and tax incentives include tax exemptions, deductions, credits, subsidies, grants, preferential rate loans and production incentives (Tupy, 2009, Menz and Vachon, 2006). In general, energy policy tools most countries use to minimize GHGs and advance renewable energy technologies include:

- Renewable energy production incentives¹³ such as Feed –in- tariffs, which is a mechanism through which people generate their own power and get paid for extra power they put into the electricity grid;
- Inclusion of negative externalities when setting energy prices as a means to create a level playing fields for renewable energy technologies such as solar, wind and biofuels;
- Levying taxes on fossil fuels (e.g. transport fuels, power generation fuels, etc.) as a means to generate money to invest in cleaner energy producing technologies and to make renewable energy technologies competitive;
- Setting procurement standards with mandate to put restrictions on dirty power sources;
- Renewable portfolio standard¹⁴, which is a mechanism which establishes a binding rule requiring an electricity provider to get a certain percentage of energy from qualified renewable energy sources within a given timeframe.

Under the Kyoto Protocol's CDM, any project that reduces greenhouse gas emissions can allow the country to obtain the CER credits.

South Sudan's **National Petroleum Policy 2013** does not have any provision for climate change mitigation or any of the above mentioned instruments that can reduce greenhouse gases. However, it calls for environmental protection in the petroleum industry through environmental and social impact assessment, environmental audit and environmental management plan, among others. It ties issuing licenses for petroleum activities to environmental assessments. For example, it calls for the termination of

¹³ Production incentives are considered effective compared to investment subsidies because they are aimed at getting paid for the energy produced (IPCC, 2011)

¹⁴ Such a mechanism, the renewable portfolio standard, requires energy providers to disclose their sources of energy together with the emissions associated with the source and certify they are using the type of energy sources required by the law.

petroleum activities in case of non-compliance with South Sudanese laws and international standards. However, this is not enough from the standpoint of climate change mitigation. The petroleum policy should incorporate measures to reduce greenhouse gases from the South Sudanese petroleum industry. Such measures should include setting up emission limits, emission reporting, and investment in clean and less emission intensive technologies, among others.

The **National Electricity Sector Policy** does not contain any measures to advance renewable energy production, even though it casually mentions renewable energy as one of the sources for supplying rural South Sudan with power. The policy sets the basis for selecting energy technology options and prioritization on ‘least economic cost and highest economic benefit.’ Such a premise is troubling for renewable energy development, given the fact that renewable energy technologies are less economically viable due to upfront costs, which make investors go for the economically viable fossil fuels. The policy does not mention climate change. It does not contain any mechanism for mitigation and adaptation, with adaptation in this sense being mechanisms that enable energy infrastructure and people to stay resilient to climate change induced floods and related extreme weather events such as storms.

International Environmental Treaties and Conventions

This section highlights the progress of South Sudan with regards to ratification and implementation of international environmental conventions. As mentioned in the introduction, South Sudan has acceded to United Nations Framework Convention on Climate Change (UNFCCC), UN Convention on Biodiversity (UNCBD) and UN Convention to Combat Desertification (UNCCD). In addition, South Sudan has also joined the Global Environment Facility (GEF), which provides funding for the three conventions. However, the country has not yet ratified the Kyoto Protocol to the UNFCCC. The country is also a partner country to REDD+.

South Sudan is currently working on National Adaptation Programmes of Actions (NAPA), National Biodiversity Strategy and Action Plan (NBSAP) and National Action Programme (NAP). The Ministry of Environment is the operational focal point for the UNFCCC and UNCBD while the Ministry of Agriculture, Forestry, Tourism, Animal Resources and Fisheries is the operational focal point for the UNCCD.

The UNEP is assisting South Sudan with preparation for its NAPA, NBSAP, NAP, First National Communication, REDD+ Readiness, and the National Capacity Self-Assessment. The enabling activities will be submitted in due course as the country works on them and is supported by UNEP. The government says it is keen on this processes to happen as soon as possible (ibid). After fulfilling the above requirements, South Sudan will then have access to a number of key funds within the GEF, the GEF 6 allocation, the Least Developed Country Fund (on climate change adaptation), the Adaptation Fund and the Special Climate Change Fund (SCCF).

Governance and institutional framework

Institutional framework and service delivery capacity

This section highlights relevant institutions and their capacities in addressing climate change, environmental and natural disaster risks in South Sudan. These include the Ministry of Humanitarian Affairs and Disaster Management South Sudan Relief and Rehabilitation Commission, Ministry of Environment, South Sudan Meteorological Service (SSMS), Ministry of Agriculture, Forestry, Tourism, Animal Resources and Fisheries, Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR), Ministry of Finance, Commerce and Economic Planning, Ministry of Lands, Housing and Physical Planning, Ministry of Petroleum, Mining and Industry, Ministry of Foreign Affairs and International Cooperation and Ministry responsible for wildlife

As shall be seen in the subsequent pages, interviews conducted with officials from relevant ministries indicate that these institutions are at very nascent stages where they are not yet capable of delivering needed solutions to climate change, environmental and natural disaster risks.

Policy making at the national level for **disaster risk reduction** is the responsibility of the **Ministry of Humanitarian Affairs and Disaster Management (MHADM)** while the SSRRC's role is to implement the policies made by the MHADM. The disaster management work is carried out under the SSRRC through the Directorate of Disaster Management at the national level. The work of disaster and relief and emergencies is carried out by the SSRRC's representatives at the levels of states and counties.

Currently, there is no minister for this ministry following the reshuffling and structuring of the government in July 2013. The person in charge of this ministry's affairs at the moment is the undersecretary. A national working group on disaster management policy was established in 2013 and composed of key relevant institutions. The national working group has been able to draft institutional frameworks and the national policy on disaster management. The draft policy was first shared with the states' level SSRRC's representatives in December 2013. However, the work on the disaster management policy was on hold until recently when consultation on the policy resumed at the states' levels. Consultation is intended to assess the needs of states and counties in order to incorporate them into the final draft.

Supported by the UN World Food Programme, the SSRRC started the process of establishing an early warning technical unit in September 2013. The technical unit is staffed by four national experts and two international experts. The team is currently conducting a need assessment to determine equipment and human resources gaps as part of the establishment efforts. The process will take about three years to get the system fully running, with the early warning information management center at the national and states' levels as the end product.

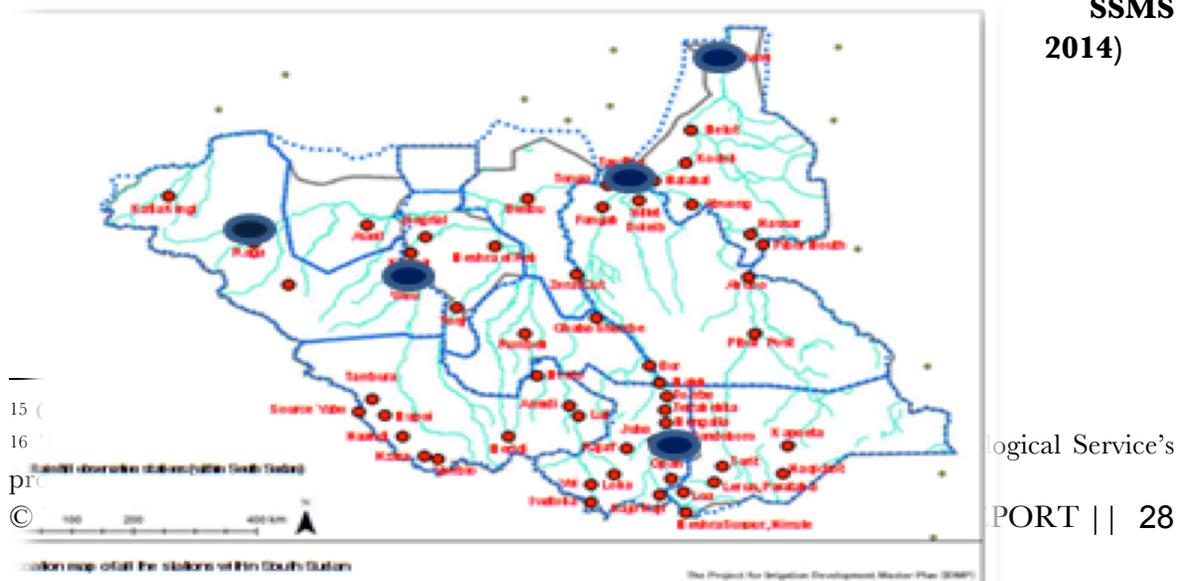
The **ministry of environment** is currently the principal policymaker and regulator on environmental issues in South Sudan. It is the operational focal point for UNFCCC and UNCBD for which it acceded to on behalf of the country in 2013. Climate change unit structure has been established at the ministry of environment but it has no staff to operate it currently. It may take several months, according to the ministry’s senior official, for the unit to operate fully.

South Sudan Meteorological Service (SSMS) can be a crucial part of climate change governance and institutional framework due to the technical role it can play in forecasting and predicting weather and seasonal climate. It is currently under the Ministry of Transport, Roads and Bridges. It has begun to engage with international institutions and mechanisms and is a member of regional association I (Africa) for the World Meteorological Organization (WMO¹⁵).

Before the second civil war, there were 43 meteorological stations¹⁶ distributed strategically throughout the regions of South Sudan. However, most of these were destroyed, exception of the ones in Wau, Malakal and Juba. After the signing of the Comprehensive Peace Agreement (CPA), which ended the civil war, Renk and Raga stations became operational. However, the stations in Renk and Malakal are currently not operating due to the ongoing civil war.

The operating stations have been trying their best to deliver information on actual weather, forecast weather, seasonal outlook and climate. The stations have been transmitting information through mobile phones and emails. Stations in Wau, Juba and Malakal have been used for scientific research and aviation purposes. The station in Renk has been used for agricultural and scientific research purposes while the one in Raga has been used for scientific research and water resource purposes. There are 10 automatic weather stations in the capital cities of ten states of South Sudan. However, these stations are not functioning due to lack of capacity. Figure 4 shows the distribution of meteorological stations in South Sudan.

Figure 4: Distribution of Meteorological Stations in South Sudan (Source: SSMS 2014)



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The SSMS is facing difficulties in providing services due, in part, to limited capacity but also the financial needs to implement what is often delicate and expensive equipment. Some of the main challenges, as enumerated by the SSMS, include:

- Lack of essential meteorological communication networks to the regional distribution and international centers (e.g. Aeronautical Fixed Telecommunication Network System (AFTN));
- Lack of telecommunication weather forecast center in Juba and Meteorological Offices in the States;
- Inadequate stations;
- Inadequate human resources capacity;
- Difficulty in delivery of seasonal forecast and early warning information for disaster risk management;
- Lack of conventional meteorological instrument & equipment;
- Lack of awareness among users on using and interpretation of weather forecast information and warnings;
- Lack of official website to disseminate climate data and weather information to users;
- Lack of satellite receiver in South Sudan;
- Inadequate capacity to deliver weather services to the public and other users.

South Sudan Wildlife Service (SSWS) is an important institution in terms of climate change adaptation and mitigation, as wildlife species are vulnerable to climate shocks and stresses. It is currently under the Ministry of Interior and Wildlife Conservation. However, it does not have climate change unit. The South Sudan Wildlife Service Act 2011, which established it, does not contain a single word or phrase on climate change and environmental disasters, although it declares its main purpose is to “protect the wildlife; to preserve and conserve the natural habitat of flora and fauna of South (ern) Sudan and; sustainably manage the natural resources in the context of this Act.” The fact that the mention of climate change is nowhere in the Act demonstrates that the thinking about climate change and disaster risks reduction has not been in the minds of the law-makers.

The **Ministry of Agriculture** does not have a particular climate change adaptation and mitigation unit for crops and livestock. However, senior officials said during an interview for this assessment that they are planning to test crops which can resist droughts and floods, notwithstanding the fact that these plans are not integrated into the draft national agriculture and livestock extension policy, draft seed policy, and the comprehensive agricultural master plan (CAMP). While having a comprehensive agriculture master plan can go a long way in helping communities cope with climate change, results of CAMP's situation analysis suggest that little link is presently made between the challenges these master plans intend to address and the need for climate change adaptation and mitigation and environmental disaster risks reduction.

Agriculture ministry has two important directorates identified in the CAMP's situation analysis as technical directorates. They include the Directorate of Research and Training, and the Directorate of Agriculture and Extension services. They deal with crop production, plant protection, horticulture, postharvest, home economics, mechanization, extension services, research and training. The research directorate runs three research centers namely: Yei Agricultural Research Center (YARC), Parataka Agricultural Research Centre (PARC) and Halina Agricultural Research Center, which is undergoing rehabilitation (CAMP, 2013). YARC has been testing varieties of seeds, including seeds that can resist droughts. For example, MACIA and KARL MTAMA sorghum varieties can mature early and can as well resist drought. There is a seed factory in Yei to produce high quality crop seeds and tree seedlings. In addition, the directorate of training runs Kagelu Forestry Training Center aimed at providing practical skills to manage forests in a sustainable manner (CAMP, 2013). Besides, a fishery institution has been established and is currently part of John Garang Memorial University of Science and Technology based in Bor, Jonglei State. The fishery institute focuses on development of fishery resources through training and research.

Other important institutions have been proposed in policies on seed, forestry and food security. First, the Seed Policy has proposed establishment of South Sudan Seed Council to be run under the Directorate of Agriculture. The council's main job is to coordinate the implementation of seed policies. Second, the policy on forestry has proposed the establishment of South Sudan Forestry Commission whose role will be to administer, regulate and supervise forestry activities in South Sudan. Third, the policy on food security has proposed the establishment of South Sudan Food Security Council to implement, monitor and evaluate the implementation of the food security policy. For these institutions to effectively address climate change impacts in these sectors, they should be administratively, institutionally, and legally linked to a national climate change authority to be established.

Energy (electricity) production, irrigation and water resources are important when it comes to devising climate change adaptation and mitigation measures. The **Ministry of Electricity, Dams, Irrigation and Water Resources (MEDIWR)** can reduce greenhouse gases by developing renewable energy technologies, monitor and give flood

warning through the department of hydrology and provide irrigation services for the drought affected areas as a climate change adaptation measure. However, what is the capacity for the MEDIWR to discharge these duties effectively? This question can be answered by looking at the institutions responsible for hydrology, irrigation, and electricity production.

Directorate of Hydrology has a role to play in terms of monitoring water levels to predict floods. Due to the civil war between 1983 and 2005, 73 hydrological stations were destroyed in southern Sudan. Only stations in Juba, Malakal and Wau remained operating. Most of these stations are still not operating due to lack of capacity. The MEDIWR is collaborating with a number of partners, including the World Bank, Egypt, and IGAD to build the capacity for hydrological monitoring in the country. Specifically, there is little capacity in terms of hydrological testing and monitoring equipment, human and financial resources. South Sudan is a member of the Nile Basin Initiative, which is a regional body of 9 countries working together to address water issues in the Nile basin. Through this initiative, the member countries are currently working on the establishment of a regional hydro-meteorological system. The Nile Basin Initiative's Environmental and Social Management Framework (ESMF) (March 2014) has climate change in its future projects, including Nile Basin Climate Resilience Project.

The Directorate of Irrigation can be a key partner in climate change adaptation through irrigation during the times of droughts and little rains. According to officials from MEDIWR, there are no irrigation programs in South Sudan. However, Japan has provided about 10 million US dollars to develop irrigation capacity in the country. The department of irrigation in MEDIWR is developing an irrigation development master plan. If implemented according to an official from agricultural ministry, the irrigation development master plan together with comprehensive agricultural master plan can make South Sudan free of food insecurity within five years.

Climate change is linked to energy production and consumption due to this sector's emissions of greenhouse gases that are behind climate change. Currently, there are no climate change adaptation and mitigation programs and policies built into energy projects and policies in South Sudan. South Sudan Electricity Corporation, which is a Government Corporation established through the Electricity Corporation Act, 2011, is responsible for generation of electricity and transmission systems in the country. The Act has no provision on climate change adaptation and mitigation.

One of the ways to mitigate climate change impacts is by integrating mitigation measures and policies into petroleum policies. Common approaches include setting emission level standards, deploying cleaner oil and gas and mining technologies and practices. Some countries go as far as placing energy and climate change departments in the same ministry to mitigate the impacts, although some experts question how a player can be a referee at the same time. By virtue of linkages between climate change and fossil fuel, the **Ministry of Petroleum and Mining** can be at the center of climate change adaptation and

mitigation in the country through cooperation with regulators to set regulations and be in compliance. Currently, South Sudan's Ministry of Petroleum, Industry and Mining does not have a climate change mitigation and adaptation unit. There is also no climate change adaptation and mitigation agency of which it is part. The petroleum policies as mentioned early lack integration of climate change adaptation and mitigation measures.

The **Ministry of Foreign Affairs and International Cooperation** plays a negotiating role on climate change issues. The ministry is now the political focal point for GEF. It is the link between international efforts and South Sudan. It can incorporate climate change adaptation and mitigation thinking into the national foreign policy. But when it comes to environmental technical aspects, it is deficient. Therefore, their present role as political focal point should be regarded as transitional pending the development of relevant and appropriate climate change and environment institutions in South Sudan. Their role should be reduced to acting as a gateway but political, policy and technical roles should be assigned to the environment and natural resources ministries because these institutions are where the country has people with technical knowhow in various aspects of the environment and climate change.

The ministry responsible for **finance, commerce and economic planning** should be a stimulator of activities in the productive sectors of the economy in a manner that can move the country towards adaptation of appropriate production systems that can reduce the negative effects of climate change. Globally, ministries of finance play important roles in meeting national climate goals by designing climate change adaptation and mitigation financing mechanisms and instruments (Meirovich et al., 2013). Some of the financial mechanisms and instruments which have been used to address climate change include national climate change funds, loans, grants, debt swaps, carbon markets and insurance instruments. Global yearly financial flows for climate change adaptation and mitigation for the 2010/2011 period account for between 343 and 385 billion US dollars. Around 74% of this comes from the private sector, with about \$14 billion meant for climate change adaptation.

South Sudan's Ministry of Finance, Commerce and Economic Planning can play an important role in designing and meeting the requirements for these mechanisms and instruments. The proposed manifesto of the ruling party, the Sudan People's Liberation Movement (SPLM), talks eloquently of creating an 'environmental green economy.' In its Strategic Framework for War to Peace Transition (2004), the SPLM intended to build dykes in flood prone areas, harvesting water and constructing water points for water scarce areas, building micro-dams for small scale hydro power for many people in the rural areas and building windmills for sustainable water at homestead levels.

However, most of such proclamations have not been built into the planning and budgeting of the Ministry of Finance. For example, a look at the national budgets for the last several years suggests that there is no budget line item for climate change adaptation and mitigation in South Sudan. Summary for the government expenditure for the years 2009,

2010 and 2011 suggests that only emergency and disaster has been allocated a few million South Sudanese pounds (National Bureau of Statistics (NBS), 2011). If an enabling environment is created, South Sudan could get between \$40 and \$70 million US dollars in climate change financing in the coming years. The Ministry of Finance needs to position itself by designing appropriate financial instruments to shape production and consumption towards adaptation and mitigation of climate change.

Climate change governance: one institution or multiple institutions?

The main challenge in climate change governance lies with the cross cutting nature of climate change issues, which require joint efforts from various government institutions and civil society (Fröhlich and Knieling, 2013). For example, climate change adaptation and mitigation measures need to be incorporated into natural resources (e.g. oil & gas, mining, water, forestry, fishery, wildlife, land) management, infrastructure, social, health, education and disaster management policies to stay resilient to climate change induced shocks and stresses and to promote sustainable development. Measures need also to be incorporated into government budgeting, economic and investment policies. Integrating climate change adaptation and mitigation measures does not only safeguard investments in vital livelihood resources and infrastructure, it is also ‘cost saving’ (Kissinger et al., 2013, 2014). Making synergies in various government sectors and at different levels require a unified and well-coordinated governance structure and political will from the country’s leadership (ibid).

Some of the people interviewed from the relevant ministries prefer having the Ministry of Environment or a standalone agency, commission or authority, to coordinate the climate change response policies, strategies, plans and measures for various sectors. However, can this be an effective undertaking? Our look at available literature shows that it would not be the first time such an approach would be pursued. Therefore, South Sudan can benefit from lessons from these countries. Meadowcroft (2009), Kissinger et al. (2014), and Fröhlich and Knieling (2013) provide relevant examples of climate change governance practices.

Three models for climate change governance exist that South Sudan can draw from (Meadowcroft 2009, Kissinger et al. 2014). The first model is to put climate change policy department within the national ministry of environment or within the responsible agency for the environment. The second model is to create an independent climate change authority or agency and link it to the highest office in the land such as the Presidency or the Office of the Prime Minister, depending on a particular country. The third model is to give the climate change responsibility to one of the senior and powerful ministries such as the ministries of energy, finance, foreign affairs and interior. Centralization of climate change portfolios at finance ministry is more ‘effective and tenable’ (Meirovich et al., 2013). Australia provides an example of a standalone climate change governance agency known as Australian Greenhouse Office. This office has since ceased to exist due to some challenges (Meadowcroft, 2009). The UK provides an example in which a climate change department is linked with the energy ministry (Meadowcroft, 2009). Such a link is

apparently due to the fact that energy production and consumption contribute to greenhouse gas emissions, which cause global warming that leads to climate change. In South Sudan's neighborhood, Ethiopia has placed its climate change department in the office of the Prime Minister while Kenya has proposed its climate change governance council to be in the Presidency to be chaired by the Deputy President (Kissinger et al., 2014).

The most common practice is to place the climate change department within the ministry of environment with responsibility for climate change negotiations in the ministry of foreign affairs because climate change is an environmental problem and the regulation of emissions is a core element of the policy response (Meadowcroft, 2009). But this does not mean it is the most effective model. An effective model depends on a particular country. Each model has advantages and disadvantages, which can be considered on the basis of a particular context. The main disadvantage of a standalone model is isolation from central and line ministries. Australia abandoned its standalone climate change agency reportedly over isolation. However, a standalone model can be effective if it has an executive support. The ministry of environment model provides expertise and institutional capacity base. However, its main disadvantage is that it is usually a junior ministry, which makes any policy emanating from it fall low in priority.

Climate change governance is still at experimental and development stages in most countries to determine which model is better. However, regardless of where the climate change responsibility is placed, the principal climate change agency or ministry must have necessary resources (human and financial resources), high level political support, and be empowered to engage with relevant institutions and organizations across the government (Meadowcroft, 2009, Kissinger et al., 2014, Fröhlich and Knieling, 2013).

Traditional governance

This sub-section attempts to answer the question: What traditional governance systems are available in the target areas that could be built on? The sub-section highlights traditional political and social structure and adaptation approaches against climate shocks and extremes. It is important to point out that unlike the modern western governance system, traditional governance systems are oral and have been passed down from generation to generation through practices. Some of these practices are informed by traditional ecological knowledge. Droughts, floods and water scarcity have posed challenges to South Sudanese communities since time immemorial. As a result, communities have devised means to stay resilient in the midst of threats to resources. The inherent belief system among communities particularly in the targeted areas is that a drought or flood disaster is caused by God or by a supernatural being. Droughts and floods among these communities have often been understood from a religious point of view. This view has, therefore, often influenced climate adaptation and mitigation approaches of these communities. For example, rain-makers perform rituals to call for rainfall and stop or prevent floods.

Highlighting such a belief system is very important because it can have implications for modern adaptation and mitigation efforts against the negative impacts of climate change.

Traditional governance system

The Transitional Constitution of the Republic of South Sudan 2011 and the Local Government Act, 2009 recognize the traditional governance systems within the modern nation state of South Sudan. The Land Act, 2009 classifies the land into communal, public and private lands, and places the ownership and management of communal land in the hands of the local governments and traditional authorities. Although these laws do not mention climate change, they talk about managing the land in accordance with the environmental and social impact assessment principles and other environmental protection and management principles. In accordance with the Local Government Act, the local government councils established at the municipal and county levels are responsible for land administration and environmental management. In this regard, communities at the grassroots levels play a role through consultation in environmental and social impact assessments in relation to land acquisition and other relevant activities.

The Local Government Act¹⁷ recognizes and establishes two types of traditional authorities, namely: kingdoms and chiefdoms. Traditional authorities in our focal areas are from Dinka, Nuer and Shilluk ethnic groups found in Lakes, Warrap, Upper Nile and Northern Bar el Ghazel States. Traditional economic activities of the Dinka, Nuer and Shilluk, which include cattle keeping, crop growing, fishing, and hunting, are vulnerable to negative impacts of climate change. Governance institutions have been developed around running these economic activities. We will see later how they have built resilience to shield against climate shocks and disasters.

The Dinka and Nuer do not have a centralized traditional political authority. They can be best described as ethnic confederacies held loosely by social, cultural and linguistic commonalities. Traditional political power and governance among the Dinka and Nuer are vested in small units of their societies usually in the forms of clans and territorial settings. The Local Government Act (s. 113 (b)) recognizes these traditional structures in their decentralized forms covering traditional territories and organized along clan lineages. These levels of political and social institutions regulate natural resource use and the environment, among other important matters (UNDP, 2011). The council of elders protects the territorial integrity of the clan or section. The elders also negotiate territorial rights and access to new pastures, lands, territories, rivers, lakes and other crucial water points.

¹⁷ See section 113 of the Local Government Act, 2009

Unlike the Dinka and Nuer, the Shilluk people have a centralized monarchy with sections and clans run by chiefs. Although the Shilluk political and social power is centralized, chiefs at the lower levels still play key roles in terms of resource use and governance.

Traditional adaptation and mitigation measures

Communities use traditional methods to store and preserve seeds for planting in the next season. However, during severe drought and flood that are followed by a famine, people run out of seeds to use for planting. When these events strike, communities consume all of the seeds in a desperate attempt to survive.

In an event of floods, traditional councils of elders mobilize people to build dykes to prevent floods. The dykes are built using traditional tools. This method has been passed down from generation to generation since time immemorial. The dykes are often ineffective because they get overwhelmed by floods, a situation that can be avoided with an improved modern technology. For instance, in recent years, more effective modern dykes have been built in some flood prone areas in Bor and Twic East Counties in Jonglei State to replace old traditional dykes.

During the flood, local communities take advantage of fishing opportunities when fish numbers increase. To fish, communities use spears, hooks and fishing nets. They also dry fish to preserve it. However, the effectiveness of these fishing tools has been limited, compared to the modern fishing tools. Although communities have in recent years got access to modern fishing nets, which are more effective and efficient, very little large-scale commercialization and market access have taken place. There is limited institutional capacity to develop markets for fish. Communities also lack preservation capacities, as traditional preservation techniques are often limited. Modern techniques of preservation can allow fish to stay fresh for days.

In the event of drought, elders negotiate with elders from communities not affected to have access to pastures, water and other means of livelihoods. Some clans control territories on the banks of rivers and lakes, which provide better pastures and access to water during the drought. As an adaptation means, a clan would migrate to this territory during the dry season and migrate back to highlands during the rainy season. These practices enable livestock to have access to green pastures and water during the dry season, hence continued milk production.

In recent years, communities in Jonglei state have moved to Central Equatoria, Eastern Equatoria and Lakes States to escape conflict and flood disasters. Such disaster -induced migrations were not negotiated with host communities, and as a result, there have been high tensions with host communities due to competition over resources and cultural clashes. This traditional means of gaining access to other territories can be improved through dialogues and agreements between migrant and host communities.

Pastoralist communities burn dry pastures to generate the growth of green pastures but this has some environmental consequences in terms of causing destructive fires and emissions of greenhouse gases. Fishing communities also establish fishing rotation system where restrictions are placed on fishing territories to allow replenishment. This practice is common among the fishing communities around the Sudd wetlands. Communities understand that overgrazing and overfishing deplete resources. As a result, they practice rotational grazing and fishing to maintain the ecological balance upon which the communities depend. The decentralized political and social structure allows communities to become more involved and to develop traditional ecological knowledge to protect the environment (Diamond, 2005). The magnitude of climate change appears to have overwhelmed traditional coping mechanisms and this needs strong adaptation and mitigation measures supported by political leadership, modern technical expertise and financial resources that are not available locally.

Conclusions and Recommendations

This paper has reviewed relevant policies and institutional frameworks for climate change adaptation and mitigation, environmental, and natural disaster risks reduction in South Sudan. While the focus is on climate change, environmental, and natural disaster risk reduction policies, the paper has also examined seeds, agriculture, livestock, wildlife, fishery, land, food security, forestry, electricity and petroleum policies to establish if climate change adaptation and mitigation measures have been built into them.

Most relevant institutions have inadequate capacity for climate change adaptation and mitigation. Institutional frameworks in response to climate change, environmental, and natural disaster risks are also at nascent stages. The institutions examined in this report are considered part of climate change adaptation, mitigation, and disaster risks reduction institutional framework because of their role in either contributing to climate change impacts or helping the country adapt or mitigate the impacts.

The biggest challenge that the study found is that these nascent institutions have been weakened by lack of technical know-how, financial resources, and by low priority of environment and climate change issues on government agenda. Climate change overwhelms traditional adaptation and mitigation approaches, and this requires strong modern approach, support from political leadership, and financial investments at the grassroots levels.

Majority of the available policies are undergoing drafting process. Second, only half of the policies pursue climate change adaptation, mitigation and disaster risks reduction measures to a varying extent. These include policies on food security, environment, forestry, wildlife, fisheries and disaster management.

The government should integrate climate change adaptation and mitigation measures and tools into policies on petroleum, energy, finance, agriculture, water resources, disaster management, forestry, fishery and wildlife sectors. This will not only allow the people and economy to stay resilient to climate change induced floods and droughts, it will also provide an opportunity for South Sudan to achieve sustainable development and contribute to global climate change mitigation efforts through the reduction of greenhouse gas emissions. We hereby recommend the following policies and tools for climate change adaptation, mitigation and disaster risks reduction in South Sudan.

1. Raise awareness to mainstream climate change adaptation and mitigation thinking in policy making in all sectors.
2. Enact climate change legislation and regulations to legalize and operationalize climate change policy response.
3. Establish a national climate change authority equipped with full technical expertise, political leadership support, and financial resources to enforce standards, incentives and punitive measures, and to raise, coordinate, and manage climate change financial resources to build resilience and adaptation to and mitigation against climate change. The authority should function as follows:
 - Set and monitor emission standards for all sectors and issue fines against businesses and sectors whose activities are not in line with climate change adaptation and mitigation requirements;
 - Coordinate international climate conventions;
 - Design climate change financing mechanisms in collaboration with the Ministry of Finance;
 - Work in collaboration with the ministry responsible for land to ensure the design of land use policy is in line with climate change adaptation and mitigation measures;
 - Receive overall political and policy support from the president and the cabinet and get legislative empowerment and financial oversight from the parliament;
 - Collaborate with South Sudan Metrological Service to get reliable and accurate weather and seasonal information to predict rainfalls, droughts and floods;
 - Work in collaboration with South Sudan Wildlife Service to protect wildlife species from climate change impacts;
 - Work in partnership with the Ministry of Electricity, Dams, Irrigation and Water Resources to reduce emissions of GHG, establish irrigation systems to improve agriculture in droughts prone and water scarce areas, and put in place rain water harvesting and hydrological monitoring technologies;
 - Collaborate with the Ministry of Agriculture, Forestry, Tourism, Animal Resources and Fisheries to put in place climate change adaptation and mitigation programs and policies to enable agriculture, forestry, tourism,

- livestock and fisheries stay resilient to climate change induced droughts and floods;
- Work in collaboration with South Sudan Relief and Rehabilitation Commission (SSRRC) to reduce climate related disaster risks;
 - Work in collaboration with the Bureau of Standards to set less emission intensive standards for equipment and goods used in South Sudan.
4. Speed up the creation of enabling activities required for UNFCCC, REDD+, UNCBD and UNCCD, among others, for international climate financial resources to flow to South Sudan in support of its adaptation and mitigation efforts.
 5. Establish punitive measures for dirty and emission intensive technologies in the petroleum, electricity production, mining and infrastructure sectors.
 6. Base licensing, permitting, renewal of licenses & permits and approvals on environmental audit, environmental and social assessments and implementation of environmental management system aimed at achieving sustainable development in general and adapting to climate change and minimizing emissions of greenhouse gases in particular.
 7. Establish climate change funds, to finance adaptation and mitigation measures and programs, and build transparency and accountability system to govern the funds. The funds should come from international climate financing mechanisms and from internal taxing of unsustainable and emission intensive sectors of the economy. The funds should be used to:
 - Establish strategic reserve food silos for the drought and flood periods and put in place transparency and accountability measures to prevent abuse of such a system;
 - Establish insurance programs for crops and livestock in flood and drought prone areas. Collaboration should be made with national financial and insurance institutions, international financial and insurance institutions as one of the ways to make it successful;
 - Put in place rain-water harvesting technology and establish irrigation system and water points in water scarce areas. This can begin with assessment and mapping of drought prone and water scarce areas, needs identification, and capacity development;
 - Establish incentives for companies and institutions to use clean and less CO₂ emission intensive technologies;
 - Build dykes in flood prone areas to protect communities and businesses from flood;
 - Develop early warning system programs at the grassroots levels to inform farmers and livestock keepers of looming flood and drought. This system

can be developed in collaboration with relevant state ministries, communities, South Sudan Relief and Rehabilitation Commission, Ministry of Environment, Ministry of Agriculture, South Sudan Meteorological Service, Water Resources, and Hydrology Departments of MEDIWR;

- Establish climate change adaptation and mitigation committee at community levels to enhance traditional ecological knowledge and traditional climate change measures;
- Develop drought and flood resilient seed systems. Researching and developing drought and flood resilient seed system should be preceded by an evaluation of existing seed resilient system projects to establish how these projects have performed and whether there are good examples to build on. Such an evaluation should include an assessment of traditional resilient seed systems to determine the resilience of traditional seeds against droughts and floods. This can provide an opportunity to determine what does work or does not work so that the new climate change seed resilient system is built on what works within the local context.

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