

Republic of South Sudan's National Adaptation Programme of Actions (NAPA) to climate change



**Ministry of
Environment**



Executive Summary

South Sudan is a least-developed country located in east-central Africa. It is the world's newest country, having gained independence from Sudan in July 2011 after a prolonged period of civil war. In addition to the negative impacts of long-term conflict, communities in South Sudan are also experiencing the negative effects of a changing climate. In general, the country is experiencing substantially warmer and drier weather, and the combination of these effects leads to more droughts. In addition, rainfall is becoming more erratic, which is increasing the frequency and severity of floods. These climate change effects in turn decrease agricultural productivity, upon which the majority of the population depend for their livelihoods. Unless communities adapt to these climatic changes, climate change will hinder socio-economic development and contribute to existing tensions and conflict in South Sudan.

National Adaptation Programmes of Action (NAPAs) serve as simplified, rapid and direct channels for Least Developed Countries to identify and communicate priority activities to address their urgent and immediate adaptation needs. NAPAs emerged from the multilateral discussions on adaptation measures within the UN Framework Convention on Climate Change (UNFCCC). South Sudan's NAPA therefore specifies 5 priority activities (referred to as Priority Adaptation Projects) for effective climate change adaptation across the five identified priority thematic areas, namely: i) Environment; ii) Water Resources; iii) Agriculture; iv) Disaster Risk Reduction; and v) Policy and Institutional Framework.

The NAPA preparation process followed the guidelines outlined by the UNFCCC Least Developed Countries Expert Group. Seven main steps were followed:

- i) establishment of NAPA Team;
- ii) synthesis of available information;
- iii) inception workshop and thematic working group discussions to establish climate change problems and possible adaptation projects/options based on available information;



- iv) thematic working group meetings to identify and draft a list of 28 Adaptation Project Options;
- v) project prioritisation workshop for screening, ranking and prioritising identified Adaptation Project Options;
- vi) development of NAPA project profiles for five Priority Adaptation Projects; and
- vii) public review process.

The final set of Priority Adaptation Projects (Annex A) as well as priority thematic areas were selected/prioritised using participatory discussions with a broad range of stakeholders. These five Priority Adaptation Projects therefore represent the most urgent and immediate adaptation needs in the country. However, it is also noted that the other Adaptation Project Options (Annex B) identified through the NAPA process remain important and that ideas/activities/elements can be blended across projects and thematic areas when designing final project concepts for implementation in the country.

The NAPA process also identified other guiding principles for adaptation projects in South Sudan:

- Adaptation projects should promote conflict resolution and peace-building.
- Gender equality should be considered in the design of adaptation projects.
- Adaptation projects should target those groups most vulnerable to climate change impacts.
- Adaptation projects should contribute to the further development of legislative and regulatory frameworks in South Sudan.
- Adaptation projects should promote livelihood diversification.
- Capacity building – of human, institutional, technical and financial resources – should be included in the design of adaptation projects.
- Adaptation projects should promote long-term research on climate change adaptation, including the collection of baseline information.
- Indigenous knowledge should be included in the design of adaptation projects.



- Land tenure must be considered when deciding the location for adaptation projects.

Priority Adaptation Projects	
Environment	Promotion of reforestation and agroforestry to reduce vulnerability to droughts and floods
Water Resources	Sustainable management and conservation of wetlands in South Sudan
Agriculture	Promotion of climate-smart agricultural techniques to improve livelihoods and food security under changing climatic patterns
Disaster Risk Reduction	Establish improved drought and flood Early Warning Systems in South Sudan through improved hydro-meteorological monitoring network
Policy and Institutional Framework	Strengthening the institutional capacity of the Government of South Sudan to integrate climate change into national policies and planning processes



Foreword

South Sudan attained its independence on 9th July 2011 and has since then taken its rightful place by joining global efforts in addressing environmental issues by acceding and becoming party to the United Nations Framework Convention on Climate Change (UNFCCC) on 17 January 2014. The compilation and production of this National Adaptation Programme of Actions (NAPA) is the first step by South Sudan towards fulfilling its commitments and obligation under the UNFCCC and becoming a full member of the Global Environment Facility (GEF).

South Sudan is vulnerable to the impacts of climate change thus the identification and the implementation of the 28 projects in this document will enable the country to adapt and implement its development agenda with minimum impacts to the environment. Simply put, the livelihoods of its citizens will be enhanced. As climate change impacts could severely undermine economic growth in South Sudan, this NAPA represents an important opportunity for the formulation and implementation of policies on climate change adaptation that are vital for sustainable development.

The process for preparing ***The National Adaptation Programme of Actions*** has been very helpful in achieving a better understanding of the links between adaptation to climate change and our government's ongoing efforts at poverty alleviation. It is important that South Sudan's existing goals, strategies, institutions, policies, plans and treaties/agreements form the framework to support the Implementation of the NAPA. The participatory and stakeholder-driven approach was essential in understanding the extent to which poor communities and assorted livelihoods across the country are already acutely vulnerable to climatic variability. Indeed, potential synergies between identified Adaptation Project Options and national policies and MEAs were included as a project prioritisation criterion.



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South Sudan is now poised to address the impacts of Climate Change and embark on a Green Development Path.

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List of Acronyms

CAMP	Comprehensive Agriculture Master Plan
COP	Conference of the Parties
GDP	Gross domestic product
GEF	Global Environment Facility
IDMP	Irrigation Development Master Plan
IDPs	Internally displaced persons
LDCs	Least Developed Countries
LEG	Least Developed Countries Expert Group
MCA	Multi-criteria analysis
MEAs	Multi-lateral environmental agreements
MOE	Ministry of Environment
NAPA	National Adaptation Programme of Actions
NBSAP	National Biodiversity Strategy and Action Plan
NGOs	Non-governmental organisations
NTFPs	Non-timber forest products
PSC	Project steering committee
SSDP	South Sudan Development Plan
UNEP	United Nations Environment Programme
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNFCCC	United Framework Convention on Climate Change



1. Introduction and setting

South Sudan is the world's newest country, having gained independence from Sudan on 9 July 2011. It is a landlocked country in the Sahel Region, in Eastern-Central Africa, and is bordered by: Sudan to the North; Ethiopia to the East; Kenya, Uganda and the Democratic Republic of Congo to the South; and Central African Republic to the West (Figure 1). South Sudan has a total land area of approximately 620,000 km². The country has an abundance of natural resources, including fertile soils, water, mineral wealth and oil. Despite its wealth of natural resources, years of conflict and marginalisation have left South Sudan as one of the most underdeveloped countries in the world. The prolonged conflict between Sudan and South Sudan has undermined traditional social structures and community coping mechanisms and has had negative social impacts on affected communities.

In addition to the negative impacts of long-term conflict, communities in South Sudan are also experiencing the negative effects of a changing climate. In general, the country is experiencing substantially warmer and drier weather, and the combination of these effects leads to increasing evapotranspiration and more droughts. This in turn decreases agricultural productivity, upon which the majority of population depend for their livelihoods. Unless communities adapt to these climatic changes, climate change will aggravate South Sudan's fragile situation and will contribute to existing tensions and conflict.

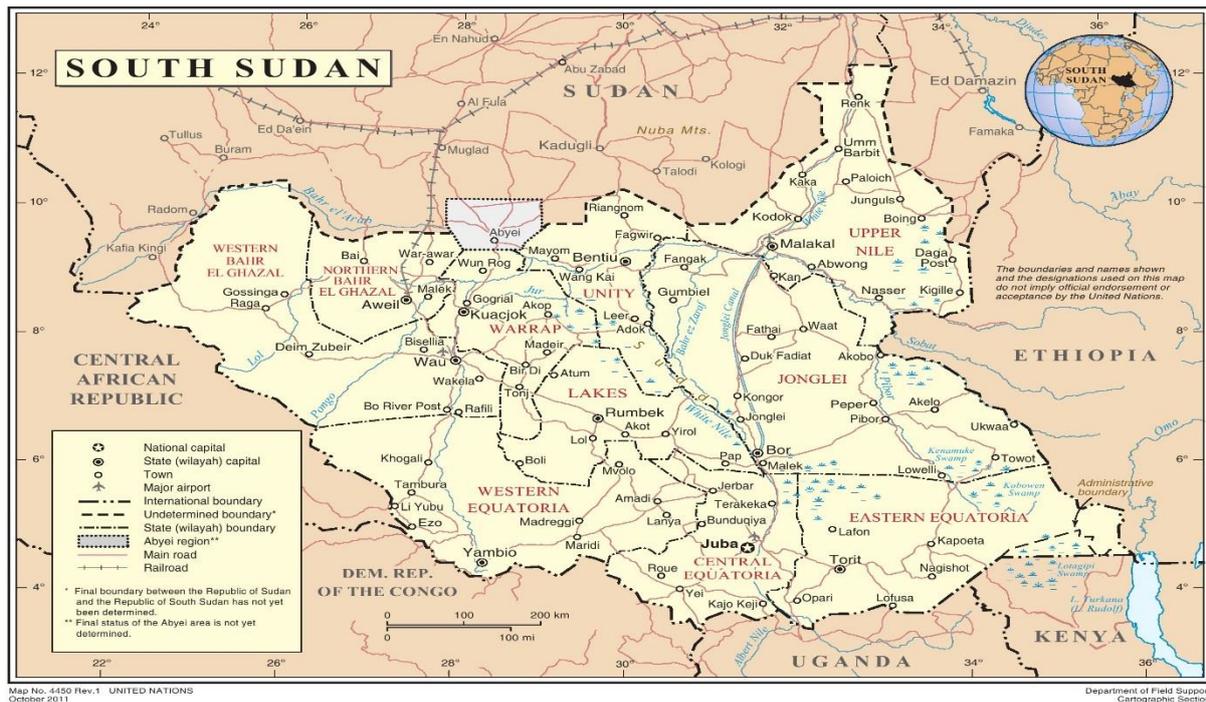


Figure 1: Map of South Sudan

Geography and population characteristics

Prior to independence in 2011, the 5th Sudan population and housing census in 2008 estimated the total population of what is now South Sudan at 8.26 million, of which 83% are living in rural areas. Since the referendum there has been an influx of returnees, primarily from northern areas, and current population is roughly estimated at 12 million people. In 2011, the annual population growth rate was estimated at 4%. South Sudan is characterised by a multiplicity of ethnic groups, speaking at least 50 different indigenous languages. The ten largest ethnic groups constitute ~80% of the population. Tribal affiliations are strong and many South Sudanese still identify more strongly with their ethnic and linguistic background than with a national identity. The population of South Sudan is also young, with half (51%) the population under the age of eighteen and 72% under the age of thirty.

Administratively the country is divided into ten states, which correspond to three historical regions of the Sudan: i) Bahr el Ghazal, which includes Northern Bahr el Ghazal, Western Bahr el Ghazal, Lakes and Warrap; ii) Equatoria, which includes Western Equatoria, Central Equatoria and Eastern Equatoria; and iii) Greater Upper

Nile, which includes Jonglei, Unity and Upper Nile. The ten states are further divided into 86 counties.

South Sudan is characterised by expansive grasslands, swamps and tropical rain forest straddling both banks of the White Nile River. The country is situated in the Nile catchment area, receiving water from the highlands of the Central African Republic, Democratic Republic of Congo, Ethiopia and Uganda. Altitude varies from 600–3000m above sea level. The lowest point of the country is in the extreme north of upper Nile State and the highest in the mountains of Eastern Equatoria State.

Economy

The economy of South Sudan consists predominantly of oil extraction, small-scale agriculture, and livestock-raising. South Sudan is endowed with oil reserves, and the revenue generated by the oil sector accounts for 98% of public sector revenue. This makes South Sudan highly reliant upon a single and volatile commodity as a source of revenue. The overdependence on oil increases the fragility and vulnerability of the country to external shocks. Furthermore, there is little domestic production for markets, even for agricultural products. South Sudan consequently remains one of the least developed countries in the world.

Poverty is widespread, particularly in the rural areas – which are home to more than 6.9 million people. Approximately 51% of South Sudan's population lives below the national consumption poverty line and are living on an equivalent of less than US\$ 1 per day. Over 75% of households are dependent on crop farming or animal husbandry as their primary source of livelihood. South Sudan's Gross Domestic Product (GDP) in 2014 was approximately US\$ 13 billion, of which agriculture contributed ~15%. Even when harvests are good, 20% of the population is food insecure and require emergency assistance and food aid.

Climatic patterns

South Sudan lies within the tropical zone between latitudes 3°N and 13°N and longitudes 24°E and 36°E. The climate ranges from Tropical Semi-Humid with a short rainy season in the north, to Tropical Wet-Dry and Tropical Rainy climates with longer wet seasons in the south. South Sudan receives ~1 billion m³ of rain annually, which can be classified into two major rainfall regimes – unimodal and bimodal. The unimodal rainfall regime occurs in the north with a six month wet season from May to October. The southern part of the country has a bimodal rainfall regime with high rainfall for 7-8 months a year, which ranges from 500-600 mm annually to 1500 mm annually. Rainy seasons are influenced by the annual shift of the Inter-Tropical Convergence Zone and the shift to southerly and south westerly winds, which leads to higher temperatures and humidity as well as increased cloud cover. There are prominent variations in rainfall and the length of the dry season. However, there is little temperature variation over the country or within season. Mean annual temperatures vary between 26°C and 32°C.

Natural resources

South Sudan has substantial surface water resources, with four main river basins, namely: Bahr el Jebel, Bahr el Ghazal, White Nile and River Sobat. The White Nile traverses the country from south to north and forms the Sudd, a vast swamp which measures 30,000–40,000 km² in extent. The Sudd Wetland is one of the main hydrological features of South Sudan and is created by the overflow of the Nile over an extensive area, which is composed of permanent and seasonal swamps. Over 5% of South Sudan is covered by permanent wetlands and floodplains, with a network of seasonally variable wetlands interlacing multiple small flood plains. Seasonal floods sustain vast grazing lands, which are essential to pastoral communities.

The potential sustainable fisheries production from the River Nile, the Sudd and Bahr el Ghazal and Sobat Rivers and floodplains has been estimated at 100,00–300,000 tonnes per annum. Traditional methods including spears, hooks and fishing nets are

used. The effectiveness of such tools, as well as preservation methods for drying fish are limited. Commercial fishing therefore remains largely unexploited and there is limited institutional capacity to develop the fisheries market.

South Sudan's is endowed with diverse natural forests and woodlands. Dense forests are located within the Greater Equatoria, Greater Bahr el Ghazal and Upper Nile states. Unfortunately, data on the economic potential of forest resources are not available as records were lost during the civil war. Large areas of the country exhibit low-density woodland savannah vegetation of mixed scrub and grassland with a wide range of trees from rainforest species to temperate climate species – such as mahogany, teak and eucalyptus to pines and cypresses respectively. Prior to the start of the civil war, forest reserves measured 17,460 km² in extent while plantations – largely teak – measured 1,879 km². However, the demand for land for residential and agricultural purposes, fuelwood and charcoal has resulted in rapid deforestation over the past decade. It is estimated that the current annual loss of forests and other wooded land in South Sudan is at 277,630 hectares.

South Sudan has been classified into seven agro-ecological zones, which have been determined taking into account the following considerations: livelihood patterns (crop production, livestock rearing, off-farm income generation); physical geography; agro-ecology; and market access. This zoning is intended for use in policy formulation and development planning, as well as an introductory guide to livelihoods and food security in South Sudan (Table 1 and Figure 2). In addition, the zones will be instrumental in early warning and response planning.

Table 1: Agro-ecological zones

Greenbelt (<i>Western Bahr el Ghazal; Western, Central and Eastern Equatoria</i>)	Rely almost exclusively on agriculture. Smallholder rural and urban/peri-urban livestock keeping is focused on poultry and goats – few cattle. Traditional and modern beekeeping and wild gathering of honey are additional sources of income.
Ironstone Plateau (<i>Northern and Western Bahr el Ghazal; Warrap; Lakes; Western, Central and Eastern Equatoria</i>)	Heavily dependent on crop production. Parts are largely agro-pastoral with livestock production the predominant source of income. During periods of distress, the sale of livestock is a source of income.
Hills and Mountains (<i>Central and Eastern Equatoria; Jonglei</i>)	Both agriculture and pastoralism are practiced. Reliance on cattle increases during difficult years.
Arid/Pastoral (<i>Jonglei; Eastern Equatoria</i>)	Driest zone, with one cropping season. Swamps are used for grazing during the dry season. Characterised by nomadic pastoralism with a strong reliance on livestock. Small-scale crop production supplements livestock production.
Nile and Sobat Rivers (<i>Jonglei; Unity; Upper Nile</i>)	Abundance of water resources and good vegetation for grazing but flooding hampers access. An important dry season grazing area. Crops are also grown.
Western Flood Plains (<i>Northern Bahr el Ghazal; Lakes; Warrap</i>)	Main source of income is agro pastoralism, which is supplemented by fish and wild foods. Livestock are important for both food and income.
Eastern Flood Plains (<i>Jonglei; Upper Nile</i>)	Inhabited by both pastoralists and agro-pastoralists. Low-lying terrain and black cotton soils pre-dispose the area to flooding.

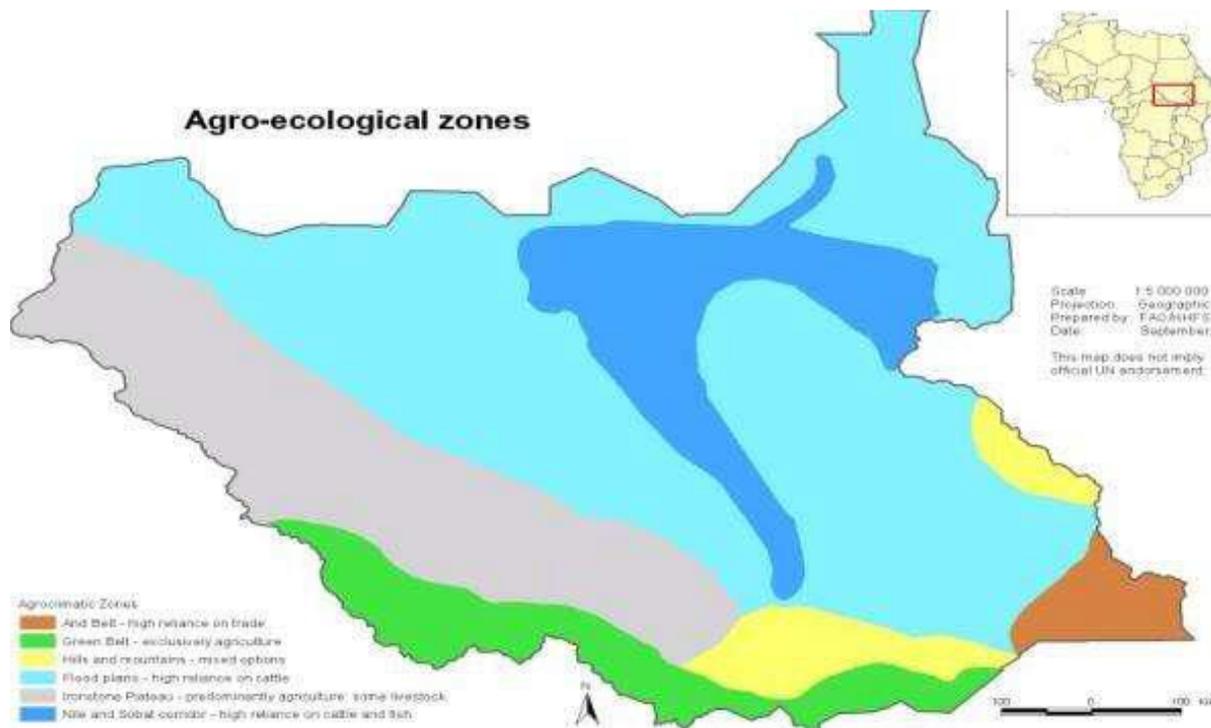


Figure 2: Agro-ecological zones in South Sudan.

South Sudan's status under the United Framework Convention on Climate Change (UNFCCC)

As it only became an independent country in July 2011, South Sudan has had limited active participation in multi-lateral environmental agreements (MEAs). However, since independence, the country has joined global efforts to address environmental issues by becoming party to the three Rio Conventions – United Nations Framework Convention on Climate Change (UNFCCC), United Nations Convention on Biological Diversity (UNCBD) and United Nations Convention to Combat Desertification (UNCCD).

South Sudan acceded to the UNFCCC on 17 February 2014. The compilation of this NAPA represents the first step by the country towards fulfilling its commitments and obligations¹ under the UNFCCC. Further enabling activities, scheduled for 2016, will

¹ as required by Articles 4.1 and 12.1 of the UNFCCC

also see the country develop its Initial National Communications and undertake a National Capacity Self-Assessment.

As climate change impacts could severely undermine economic growth in South Sudan, this NAPA represents an important opportunity for the formulation and implementation of policies on climate change adaptation that are vital for sustainable development going forward.

2. Framework for adaptation programme

Factors contributing to current vulnerability to climate variability

Reliance on rain-fed subsistence agriculture

Traditional subsistence agriculture is the dominant economic activity in South Sudan with approximately 78% of households reliant upon crop farming and animal husbandry as their main source of livelihood. Typically, such farmers rely upon rain-fed agriculture and use traditional methods of farming. This combination renders them highly vulnerable to climate variability, particularly erratic rainfall. Unfavourable weather conditions – such as persistent droughts and annual flooding – also result in crop and livestock losses. Droughts are also causing encroachment of the desert southwards, while floods have destroyed forests in low-lying areas, particularly in areas close to the Sudd Wetland and White Nile River.

Increased deforestation

Since gaining independence, immigration and natural population growth in South Sudan have resulted in an increased demand for charcoal and fuelwood, as well as land for agricultural and residential purposes. The rate of deforestation has consequently accelerated. Recent maps on land cover changes indicate a dramatic shift from woodland and forest to cultivated land and bare soil. Deforestation and habitat degradation has decreased the ability of woodland and forest ecosystems to provide important goods (such as non-timber forest products) and services (such as water provision) to rural communities. This increases the vulnerability of rural communities to climate variability, as the goods and service provided by these ecosystems buffer communities against the crop failures associated with erratic rainfall, floods and droughts. Deforestation is also having a negative impact on biodiversity and wildlife conservation in South Sudan.

Increased soil erosion

As a result of deforestation, overgrazing and bush fires, soil erosion in South Sudan is increasingly becoming a problem. Consequently rivers, lakes, dams and irrigation canals are silting up, reducing the supply of water for drinking and irrigation. Soil quality is also declining, which negatively affects agricultural productivity.

Reduced water quantity and quality

Within the last two decades, a number of previously perennial rivers along the border with the Central African Republic have become seasonal. This has had significant ecological impacts, as well as adverse effects on livelihoods within South Sudan. The decreased water flow and associated siltation of rivers is causing congestion of irrigation channels and drops in the water table. Swamp areas are therefore decreasing and trees are dying because of the lack of water. There has also been a change in the water quality, which has had adverse impacts on fisheries. Water quality is being adversely affected by the increasing concentration of people in urban areas and the application of chemicals and toxic products, including fertilisers and pesticides, sewage and industrial effluent. Pollution from the oil industry is also a serious risk to wetlands, particularly in the Unity and Upper Nile states.

Limited technical capacity to understand and predict climate change

The prolonged period of civil war in South Sudan caused, *inter alia*: i) insufficient investment in education, particularly at the tertiary level; and ii) skilled professionals to leave the country. These factors have contributed to a general lack of technical capacity within the country to understand and predict the effects of climate change. This situation is exacerbated by the limited availability of necessary technologies, such as weather stations and geographic information systems, to measure and monitor climate variability. The limited technical capacity to predict climate variability and change constrains efforts to reduce the vulnerability of poor communities.

Limited institutional capacity to cope with climate variability

There are several institutional capacity constraints in South Sudan that limits the ability of the government to reduce climate change vulnerability. Firstly, as a new country, many policies and strategies related to environmental management and agriculture are nascent and do not explicitly include climate variability and change. Secondly, there are inadequate institutional arrangements at the national, state and county levels for effective coordination, planning and implementation of climate change adaptation interventions. Finally, as a least developed country, South Sudan has limited financial resources available to implement programmes aimed at reducing vulnerability to climate change. These institutional capacity constraints limit the integration of climate change adaptation into national policies and development planning processes in South Sudan. This limits both short- and long-term planning for climate change adaptation.

Expected impacts of climate change

Observed climate variability

Climate data are scarce for South Sudan because of the long period of civil war and the historic focus of many studies and data sets on northern Sudan. However, based on regional trends and meteorological data from the mid 1970's to late 2000's, it has been shown that: i) summer rainfall has decreased by 15–20% across parts of South Sudan; particularly the north-east; and ii) temperature has increased by more than 0.4°C per decade over the past 30 years.

In addition to this, observed trends and anecdotal evidence indicate that:

- i. the duration and timing of rain has become erratic with the rainy season being delayed and shorter;
- ii. some areas are receiving less rain and consequently the water tables are dropping;
- iii. the region that receives 500 mm or more of rain has contracted, increasingly exposing populations in northern areas to rainfall deficits; and
- iv. the desert is expanding southwards.

Further to the above trends, the frequency of floods has increased over the last eight decades, with floods having occurred in 1946, 1962-1965, 1978-1979, 1988, 1999, 2006, 2011, 2012, 2013 and 2014. Droughts are also becoming more frequent. Approximately 56% of the rural population surveyed in the National Baseline Household Survey in 2009 identified droughts and floods as the top source of vulnerability in South Sudan. The other top sources of household vulnerability include the death or loss of cattle, and crop diseases and pests – all of which are attributable to some extent on changing climate conditions.

Expected climate change impacts

Because of the limited availability of climate data, no specific climate change scenario models have been found for South Sudan. However, if present rainfall trends continue, by 2025 the decreasing rainfall currently experienced mainly in the north-eastern parts of the country will spread south-westward. In addition, rainfall is likely to become increasingly erratic causing an increase in both floods and droughts. Temperatures are also likely to continue increasing, which will exacerbate the effects of droughts.

Future climate change trends will have an adverse effect on the availability of water resources and consequently agricultural productivity. Most of South Sudan is covered by the Bahr el Ghazal, Nile and Sobat River catchments that join to form the White Nile. In contrast to the Nile, the Sobat River and the Bahr el Ghazal river catchments have a strong seasonal character. Research on these two catchments suggests that an increase of 2°C in temperature might cause the natural flow to fall to 50% of the current average. Rising temperatures and uncertain rainfall could also impact on the Sudd wetland, which is not only an important source of fish and products, but also a wetland of global biodiversity importance.

In addition to reducing water availability, future climate change will also accelerate environmental degradation and desertification. The increased frequency and severity of extreme climate events will have widespread negative socio-economic impacts on people in terms of food security, health and safety.

NAPA and its relationship to South Sudan's development frameworks

As a new country, South Sudan's policy and legislative framework continues to develop. The current basis of this framework is the Transitional Constitution of the Republic of South Sudan (2011). In the preamble of the Transitional Constitution, it states that the people of South Sudan are 'conscious of the need to manage our natural resources sustainably and efficiently for the benefit of the present and future generations and to eradicate poverty and attain the Millennium Development Goals'. Since the signing of the Comprehensive Peace Agreement in 2005, policies and legislation which were developed during the pre-independent period were gradually replaced and renewed. Currently, the majority of these policies are in the final consultation and approval phase and have draft status. Moving forward, the finalisation of these policies will support South Sudan to achieve the Sustainable Development Goals.

In general, the draft South Sudan National Environment Policy calls for the development of a national strategy for climate change adaptation and mitigation; the formulation of a climate change policy for South Sudan; and support to efforts to reduce community vulnerability to climate variability and change. South Sudan has not yet developed its climate change policy and strategies; however, adaptation strategies or plans have been incorporated in its development plans.

It is important that South Sudan's existing goals, strategies, institutions, policies, plans and treaties/agreements form the framework to support the Implementation of the NAPA. Indeed, potential synergies between identified Adaptation Project Options and national policies and MEAs was included as a project prioritisation criterion (see Section 4). The following important frameworks offer opportunities to assure integrated resource and environmental management, disaster risk preparedness and climate change adaptation, and were considered in the design and prioritisation of Adaptation Project Options.

The South Sudan Development Plan (SSDP) 2011–2016 is the main guiding document for the development of the country, which addresses conflict management, poverty reduction and economic development. The SSDP contributes

towards achieving the vision for the country as set out in the South Sudan Vision 2040. The objectives of the SSDP include: i) ensuring sustainable development through enforcing social and environmental impact assessments for all development programmes and projects; ii) acceding to and ratifying applicable and beneficial multilateral environmental treaties, conventions and agreements; iii) ensuring economic development is environmentally sustainable; and iv) developing a national early warning system and enhancing environmental awareness to reduce risks of disasters.

The South Sudan National Environmental Policy has been drafted on the premise of protecting and managing the environment. The draft policy recognises that without adaptation and mitigation measures, climate change will likely have adverse effects on the environment and livelihoods of South Sudanese. In addition, the policy highlights the potential for climate change to “exacerbate food insecurity, biodiversity loss, water shortages and conflicts due to scarcity of water resources”. In response to the challenges posed by climate change, the policy proposes the development of a climate change policy and mechanisms for adaptation and mitigation.

The Comprehensive Agriculture Master Plan (CAMP) was formulated in 2015 and details the Government of South Sudan’s plan for expanding the agricultural sector. The CAMP was developed to: i) address hunger and food insecurity; ii) improve rural livelihoods and generate income” iii) and diversify the economy through an innovative and competitive agricultural sector. Within the CAMP, over 110 indicative sub-sector project profiles have been developed to guide decision-makers in the crop, forestry, livestock and fisheries sub-sector. The actions required to increase agricultural production across all sub-sectors are detailed in these project profiles. In addition, the project profiles address various barriers to development in the relevant sub-sector including climate variability and change.

To achieve South Sudan’s agricultural development objectives, it is necessary to make provision for and manage water resources. The Irrigation Development Master Plan (IDMP) has therefore been developed in support of the CAMP to achieve sustainable irrigated agriculture and other productive uses. Implementation of the IDMP would improve food security, reduce poverty and contribute to economic

growth and development. The IDMP recognises the threat of climate change – and erratic rainfall in particular – on agriculture and consequently identifies opportunities for managing water. Irrigation scheme development programmes will identify means of reducing the risk and vulnerability of crops to seasonal and climate variability. These schemes will assist in planning and implementing adaptation and mitigation measures to reduce the vulnerability of agriculture to the negative effects of climate change. Simultaneously, these schemes will also contribute to the national objectives of food security, job creation, poverty reduction, income growth and economic development.

The UNDAF 2014-2016 sets out the substantive contributions of the UN agencies funds and programmes to achieving the development goals set out in the SSDP. With reference to the specific objectives of the NAPA process and reducing the vulnerability of communities, the UN's focus – amongst others – on fostering inclusive and pro-poor growth and reducing food insecurity is of particular relevance. This will be achieved through supporting: i) sustainable agriculture and livelihood diversification of small landholders; ii) sustainable land management, natural resources and environment; iii) the reduction of risks from natural disasters; iv) sustainable energy sources; v) enhanced private sector development; and vi) the expansion of basic social infrastructure.

Rationale for development of the NAPA

At the Seventh Session of the Conference of the Parties (COP) to the UNFCCC, it was decided that the least-developed countries (LDCs) would be provided support to address urgent and immediate needs and concerns to adapt to the adverse effects of climate change.

The rationale for South Sudan's NAPA rests on the low adaptive capacity of the population, which renders them in need of immediate and urgent support to start adapting to current and projected adverse effects of climate change. Furthermore, through both the NAPA development and implementation process with the associated technical and institutional capacity development, the NAPA will lay the foundation for climate change adaptation in the medium to long term.

Objective of the NAPA

The overarching objective of the NAPA document is to communicate to the international community priority activities that will address South Sudan's urgent and immediate needs for adapting to the adverse impacts of climate change. Specifically, the NAPA process aimed to: i) identify a list of potential adaptation activities; ii) formulate priority adaptation project profiles; iii) build capacity for adapting to longer-term climate change and variability; and iv) raise public awareness on the urgency to adapt to the adverse effects of climate change.

Potential barriers to NAPA implementation

A number of barriers may affect the implementation of urgent and immediate adaptation activities identified by the NAPA process. These include the following.

- Internal conflict and security concerns.
- Lack of a clear and transparent institutional framework for climate change adaptation. This leads to overlapping mandates and responsibilities, which can create conflicts of interests among stakeholders. In addition, there is a lack of environmental regulatory mechanisms.
- Limited coordination between newly formed ministries and line departments at both national and state level to maximise climate change adaptation gains from national initiatives – including action plans, policies, programmes and projects.
- Insufficient capacity – institutional and technical – at both national and state level to implement the proposed activities. There is a shortage of human resources and skills for the implementation of potential adaptation initiatives.
- Poor infrastructure, especially roads, making it difficult to access rural areas.
- Economic challenges and limited budget for implementation of proposed activities to address environmental problems.
- Low level of environmental awareness among the general public.
- Low level of literacy.
- High level of poverty.

These barriers must be considered and addressed in the design of the projects identified through the NAPA process.

3. Identification of key adaptation needs

The predicted effects of climate change pose a serious challenge to food security and poverty reduction in South Sudan. Recent extreme weather events, exacerbated by ongoing conflict, have led to critical food shortages. Floods and natural disasters have contributed to the displacement of people, a situation that is compounded by conflict and extreme poverty. The NAPA process seeks to identify key adaptation activities that will meet the needs of the vulnerable communities in South Sudan.

The identification of adaptation needs involved wide consultation with various stakeholders in the public and private sector, including line ministries, academics, non-governmental organisations (NGOs) and civil society. Through these consultations, national stakeholders identified five key thematic areas in which immediate adaptation interventions are required:

- Environment;
- Water Resources;
- Agriculture;
- Disaster Risk Reduction; and
- Policy and Institutional Framework.

The identification of these key thematic areas was discussed and validated at the multi-stakeholder inception workshop. Following the inception workshop, thematic working groups were formed to further discuss and identify key adaptation needs within each theme. Each thematic working group comprised of 8 – 15 theme-specific specialists from government, academia, NGOs and civil society. The key adaptation needs identified through stakeholder consultation and by each thematic working group are presented below.

Key adaptation needs

Environment

Key adaptation needs identified for the environmental theme – including forestry, wildlife, biodiversity and renewable energy – during stakeholder consultations are as follows:

- Promote agro-forestry practices as a way of diversifying land production systems and promoting alternative livelihood options.
- Promote reforestation of degraded landscapes/watersheds using multi-use forest species to increase community safety-nets and diversify livelihoods .
- Develop forest reserves and management plans to protect watersheds and improve future water availability.
- Promote alternative sources of energy to reduce deforestation and the consequent loss of livelihood options.
- Improve the enforcement of environmental regulations.
- Establish conservancies and protected areas to buffer local communities and biodiversity against climate change impacts.
- Establish water points for wildlife in protected areas to reduce the negative effects of droughts on animal populations.
- Introduce eco-tourism to protect wildlife and provide alternative livelihood options to communities surrounding protected areas.
- Increase awareness of local communities on climate change and environmental protection.
- Introduce fire management plans to prevent the spread of wildfires during periods of drought.
- Establish seed/gene banks to protect threatened species and identify climate-resilient varieties.
- Introduce an integrated natural resource management approach.

Water Resource Management

Key adaptation needs identified for water resources management during stakeholder consultations are as follows:

- Undertake assessments to identify areas prone to shortages under climate change and inform integrated water resources management.
- Promote the development of water harvesting structures, including dykes, water reservoirs and canals, to increase water availability.
- Improve water and sanitation infrastructure in urban areas to improve water supply and quality.
- Develop supplementary irrigation systems in rural areas to improve agricultural production and increase food security.
- Establish a regulatory framework for the monitoring of water quality, including penalties for pollution of water sources.
- Develop a solid waste management plan to ensure water quality is maintained.

Agriculture

Key adaptation needs identified for the agricultural theme – including crop and livestock production, as well as fisheries – during stakeholder consultations are as follows:

- Implement rangeland management plans to control overgrazing and ensure fodder availability under climate change conditions.
- Identify and promote the use of drought-resilient livestock varieties.
- Promote aquaculture as an alternative livelihood option.
- Protect and preserve wetlands and water resources, including the regulation and management of such water bodies.
- Introduce supplementary irrigation technologies to improve agricultural production and increase food security.
- Undertake research on climate-resilient technologies and species, including drought- and disease-tolerant crop species.
- Strengthen agricultural and veterinary extension services to train farmers on climate-resilient agricultural techniques.
- Introduce conservation agriculture techniques to improve production.
- Promote the implementation of projects identified in the Comprehensive Agricultural Master Plan, with a focus on those projects that benefit vulnerable communities.

Disaster Risk Reduction

Key adaptation needs identified for disaster risk reduction during stakeholder consultations are as follows:

- Improve collection, analysis and dissemination of weather information to better predict extreme weather events.
- Strengthen/establish drought and flood early warning systems in South Sudan to reduce the impact of droughts and flood on rural communities.
- Improve water supply and sanitation systems to mitigate the negative impacts of floods.
- Promote alternative sources of energy to reduce deforestation and the consequent loss of important livelihoods.
- Develop regulatory framework for the management of the oil sector to reduce environmental degradation and flood-proof waste disposal facilities.

Policy and Institutional Framework

Key adaptation needs identified for policy and planning during stakeholder consultations are as follows:

- Increase awareness, education and training of staff regarding climate change adaptation.
- Mainstream climate change into sectoral policies and programmes.
- Promote and enabling environment for climate change adaptation policies and plans.
- Conduct capacity building for climate change adaptation at national as well as regional level.
- Introduce emissions standards for monitoring and evaluation of environmental performance.

Adaptation Project Options

Based on adaptation needs identified, each thematic working group developed between five and seven Adaptation Project Options for potential implementation in South Sudan. These Adaptation Project Options address the adaptation needs of

local communities and have the potential to decrease vulnerability of sectors relative to climate variability, extreme events and long-term climate change. Overall, 28 Adaptation Project Options were identified across the five thematic areas (see Annex B). These options have been prioritised using project prioritisation criteria (see Section 4) to identify the Priority Adaptation Projects (see Section 5 and Annex A).

4. Criteria for selecting priority activities

As described above (see Section 3), 28 Adaptation Project Options were identified across five priority thematic areas. A multi-criteria analysis (MCA) was used to rank and prioritise the Adaptation Project Options identified within each of these five themes. This multi-criteria analysis was complemented by a simple Expert Opinion ranking system to validate the results and distinguish between projects that scored similarly in the MCA.

Multi-Criteria Analysis (MCA)

Project prioritisation criteria

A set of 15 criteria were developed to prioritise the Adaptation Project Options identified within each of the five themes. These criteria were developed based on: i) criteria recommended by the Least Developed Countries Expert Group (LEG)²; ii) stakeholder consultation, notably feedback from the inception workshop; and iii) discussions within each of the thematic working groups. The final selection of criteria (Table 2) was confirmed at a project prioritisation workshop. All the criteria identified are relevant to the national context in South Sudan.

² Least Developed Countries Expert Group. 2002. Annotated guidelines for the preparation of national adaptation programmes of action.

Table 2: Project prioritisation criteria

	Criteria	1st order Weight: 2.5	2nd order Weight: 1.5	3rd order Weight: 1
1	Loss of life	X		
2	Loss of livelihood	X		
3	Food security	X		
4	Water availability, quality and accessibility	X		
5	Biological diversity	X		
6	Conflict resolution and peace-building	X		
7	Sustainability	X		
8	Equity	X		
9	Synergy with national policies and MEAs		X	
10	Essential infrastructure		X	
11	Land-use management		X	
12	Cost-effectiveness		X	
13	Capacity building		X	
14	Reduction of GHG			X
15	Environmental degradation			X

Weighting project prioritisation criteria

At the project prioritisation workshop, five break-away discussion groups – comprising stakeholders from government, academia and NGOs – weighted the 15 project prioritisation criteria. This was done by first categorising each criterion as 1st, 2nd or 3rd order, and then assigning a relative weight to each order of criteria. The results obtained from each break-away discussion groups were combined to produce a final weighting for all criteria. The combined results were validated with all participants at the project prioritisation workshop.

Scoring Adaptation Project Options

Within each thematic working group, each Adaptation Project Option was scored against the 15 project prioritisation criteria. Because of a lack of data for applying quantitative techniques, each Adaptation Project Option was scored on a simple scale which indicated a negative impact (-1), no impact (0), positive impact (1) or strongly positive impact (2) for each criterion (see Annex C).

Prioritising Adaptation Project Options

For each Adaptation Project Option, the scores obtained for each criterion were multiplied by the relevant weight and then summed to obtain a final prioritisation score. These final scores were used to rank Adaptation Project Options in order of importance within each of the five thematic areas (see Section 5 for these results). In general, the top-ranking Adaptation Project Option in each thematic area has been elaborated as the Priority Adaptation Projects for implementation in South Sudan (see Annex A).

Expert opinion ranking

To discriminate between projects that scored similarly in the MCA, each Adaptation Project Option was also assigned an expert opinion ranking score. To obtain this score, each specialist within each thematic working group was asked to rank the Adaptation Project Options based on his/her expert opinion. The rankings submitted by each specialist were averaged to determine the final score.

5. List of priority activities

During the NAPA process and the conceptualisation of the Adaptation Project Options, a number of important, cross-cutting principles applicable to all adaptation projects in South Sudan were identified. These principles are presented before Priority Adaption Projects are identified.

Guiding principles for all adaptation projects

- ❖ *The final design of adaptation projects should integrate adaptation needs from multiple sectors and pursue complementary activities.*

The Adaptation Project Options included in the NAPA are confined to single thematic areas and designed to target specific climate change problems. This is appropriate considering the process that was followed and the need to identify the most urgent adaptation needs. However, it is recognised that climate change adaptation is a cross-cutting issue and should not necessarily be considered within a single theme. Furthermore, it is recognised that there are many synergies between the different Adaptation Project Options and their indicative activities. For example, projects concerned with increasing water availability to communities would be complemented by activities that promote water-efficient farming practices. It is therefore recommended that during the final design of adaptation projects an integrated approach is taken and appropriate activities from complementary Adaptation Project Options are incorporated.

- ❖ *Adaptation projects should promote conflict resolution and peace-building.*

Conflict resolution and peace-building are priority goals for South Sudan. It is recognised that climate change impacts, and the resultant competition for limited natural resources, may contribute to conflict between communities. Similarly, it is also recognised that ongoing conflict exacerbates the vulnerability of affected communities to climate change. This should be considered in the design of adaptation projects.

❖ *Gender equality should be considered in the design of adaptation projects.*

The predicted impacts of climate change will have a greater impact on women than men, because women rely heavily upon the extraction of natural resources, which will be negatively affected by climate change. Any negative effect on natural resources will therefore have a direct impact on women's livelihoods. For example, women are traditionally responsible for household duties – including collecting water and firewood for domestic use – and cultivating land in rural areas. The decrease in availability of such resources will require women to spend more time travelling to locate drinking water or firewood. They will therefore have less time for other income-generating activities. Furthermore, women have less capacity and financial resources to adapt to climate change impacts. Currently, the literacy rate among men is more than double that among women, whilst the gender parity index indicates that girls are dropping out of the school system much earlier than boys. Poverty levels are also higher among female-headed households – 57% of the population living in female-headed households are poor compared to 48% in male-headed households. Climate change will exacerbate these disparities and further restrict the socio-economic development and empowerment of women in South Sudan. Gender equality is therefore recognised as an important issue in South Sudan and should be integrated into the design and implementation of all adaptation projects. This will allow opportunities for mainstreaming gender considerations into climate change – and other – policies and plans.

❖ *Adaptation projects should target those groups most vulnerable to climate change impacts.*

Farmers that rely on rain-fed subsistence agriculture, women-headed households, pastoralists in areas that are experiencing desertification and internally displaced persons (IDPs) are among the groups most vulnerable to climate change impacts in South Sudan. Adaptation projects should target these vulnerable groups first.

❖ *Adaptation projects should contribute to the further development of legislative and regulatory frameworks in South Sudan.*

The governance of natural resources requires enabling legislation and regulatory/enforcement mechanisms to be in effect. However, as a newly established country with a history of conflict, many policies and plans in South Sudan are still in a

draft format and few regulatory mechanisms are in place. This results in the uncontrolled use of natural resources and environmental destruction. Furthermore, the absence of policies, plans and legislation hinders the initiation of projects where there is no framework to guide the development and implementation thereof. Adaptation projects should therefore contribute to addressing policy gaps within the relevant sector and facilitate the development of appropriate legislative and regulatory frameworks.

❖ *Adaptation projects should promote livelihood diversification.*

Most of the rural population is dependent upon rain-fed subsistence agriculture for their livelihoods. Rain-fed agriculture is vulnerable to climate change impacts, including erratic rainfall, floods and droughts. Livelihood diversification is therefore seen as an important adaptation strategy in South Sudan. There are opportunities to develop alternative and additional livelihood strategies across all of the thematic areas identified in the NAPA, and this should be promoted in the final design of the adaptation projects.

❖ *Capacity building – of human, institutional, technical and financial resources – should be included in the design of adaptation projects.*

There is limited human, technical, institutional and financial capacity to undertake climate change adaptation interventions in South Sudan. Capacity building activities, including training and development of institutional frameworks, should therefore be included in the design and implementation of adaptation projects.

❖ *Adaptation projects should promote long-term research on climate change adaptation, including the collection of baseline information.*

Currently, there is limited information on climate change available in South Sudan. This is because of limited capacity and infrastructure to collect data, the history of conflict – including the loss of information – and insufficient mechanisms to store relevant information. The scarcity of relevant information means that important studies, such as vulnerability assessments, cannot be completed. In addition, there is a lack of baseline information against which to measure the effect of different adaptation interventions. This makes it difficult to properly evaluate project outcomes, as well as identify best practices. Adaptation projects, therefore, should

promote long-term research on climate change adaptation, and ensure that the relevant baseline information required for proper monitoring and evaluation is collected.

❖ *Indigenous knowledge should be included in the design of adaptation projects.*

Many communities have developed strategies to cope with climate variability appropriate to their geographic location and ecological context. This can include different farming techniques, specific crop varieties or small-scale adaptation technologies. This indigenous knowledge should be incorporated into the design of adaptation interventions to ensure that these interventions are appropriate to the local context.

❖ *Land tenure must be considered when deciding the location for adaptation projects.*

Adaptation projects may involve large-scale restoration or protection of natural resources. To ensure that these interventions are sustainable, land tenure must be considered in the design and implementation of adaptation projects.

Priority Adaptation Projects

This section presents the results of the Adaptation Project Option prioritisation process (Section 4) and identifies the top Priority Adaptation Project in each of the five thematic areas (Table 3 – 7). Please refer to Annex 1 for detailed project profiles for each Priority Adaptation Project including further information on: i) location; ii) climate change adaptation rationale; iii) objectives, outcomes, outputs and indicative activities; iv) implementation arrangements; v) risks and barriers; vi) monitoring and evaluation; vii) estimated financial resources required; and viii) duration. Please refer to Annex 2 for a brief description of the remaining Adaptation Project Options that were identified.

Although project profiles are only developed for Priority Adaptation Projects, it is important to note that project ideas/activities/elements can be blended across projects and thematic areas when designing final project concepts for implementation in the country.

It is also important to note that all Adaptation Project Options are considered important for immediate implementation in South Sudan. While it was necessary to identify the most urgent Priority Adaptation Projects, the remaining Adaptation Project Options should not be disregarded. Concepts or activities from the remaining Adaptation Project Options should be included in the final adaptation projects.

Environment

As the top-ranked project in both the MCA and expert opinion ranking (Table 3), Adaptation Project Option 1A “Promotion of reforestation and agroforestry to reduce vulnerability to droughts and floods” is considered as the Priority Adaptation Project within the Environment thematic area. See Annex 1 for the project profile.

Table 3: Prioritisation of Adaptation Project Options for Environment

No	Project Description	MCA		Expert Opinion	
		Rank	Score	Rank	Score
1A	Promotion of reforestation and agroforestry to reduce vulnerability to droughts and floods	1	50	1	2.50
1B	Introduction of climate change-resilient, participatory and sustainable forest management	1	50	2	2.86
1F	Promotion of renewable energy	3	44	3	3.21
1C	Landscape approach to wildlife conservation and management	4	43.5	6	5.07
1G	Creating resilience in mountain communities in the face of climate change	4	43.5	7	5.21
1D	Expansion of the protected areas in South Sudan	6	41.5	5	4.93
1E	Integrating climate change into biodiversity conservation and planning	7	41	4	3.57

Water Resources

The Adaptation Project Option 2D “Sustainable management and conservation of wetlands in South Sudan” ranked first according to the MCA and second according to the expert opinion ranking (Table 4), and is therefore considered as the Priority Adaptation Project within the Water Resources thematic area. See Annex 1 for the project profile.

Table 4: Prioritisation of Adaptation Project Options for Water Resources

No	Project Description	MCA		Expert Opinion	
		Rank	Score	Rank	Score
2D	Sustainable management and conservation of wetlands in South Sudan	1	40	2	2.43
2E	Introduction and expansion of irrigated agriculture (for crop and livestock production)	2	39	3	3.14
2A	Introduction of rainwater harvesting techniques to increase water supply under conditions of climate change	3	38	1	1.86
2B	Enhancing resilience to rainfall variability through rangeland rehabilitation and water resources management	3	38	5	4.43
2F	Community-based sustainable utilisation and management of wetlands in selected parts of South Sudan	5	37.5	6	4.86
2C	Protection of water resources through improved waste management	6	29	4	3.29

Agriculture

As the top-ranked project in both the MCA and expert opinion ranking (Table 5), Adaptation Project Option 3D “Promotion of climate-smart agricultural techniques to improve livelihoods and food security” is considered as the Priority Adaptation Project within the Agriculture thematic area. See Annex 1 for the project profile.

Table 5: Prioritisation of Adaptation Project Options for Agriculture

No	Project Description	MCA		Expert Opinion	
		Rank	Score	Rank	Score
3D	Promotion of climate-smart agricultural techniques to improve livelihoods and food security under changing climatic patterns	1	47.5	1	1.80
3E	Enhancing agricultural production under climate change conditions through infrastructural development and strengthening of agricultural extension services	2	44	3	2.70
3C	Development of the livestock sector through enhanced rangeland management, increased knowledge and improved animal health systems to reduce the vulnerability of pastoral communities to climate change	2	44	4	3.30
3A	Enterprise and value chain development in the fishing industry to improve livelihoods and reduce vulnerability to climate change	4	37	2	2.60
3B	Diversifying livelihood options to cope with a changing climate through the introduction of aquaculture away from riverine areas	5	34	5	3.60

Disaster Risk Reduction

Adaptation Project Option 4D “Reforestation and tree planting to combat desertification” achieved the highest score in the MCA (Table 6). However, a similar project was identified as the Priority Adaptation Project in the Environment thematic area (see Table 3). Therefore, to avoid duplication, Adaptation Project Option 4A “Establish improved drought and flood early warning systems in South Sudan through improved hydro-meteorological monitoring network”, which ranked second in the MCA and first in the expert opinion ranking, is considered at the Priority Adaptation Project in the Disaster Risk Reduction thematic area. See Annex 1 for the project profile.

Table 6: Prioritisation of Adaptation Project Options for Disaster Risk Reduction

No	Project Description	MCA		Expert Opinion	
		Rank	Score	Rank	Score
4D	Reforestation and tree planting to combat desertification	1	43.5	4	3.67
4A	Establish improved drought and flood early warning systems in South Sudan through improved hydro-meteorological monitoring network.	2	42	1	1.67
4C	Increasing knowledge on climate change and environmental issues through a national awareness-raising campaign and inclusion into school curricula	3	39	2	2.17
4B	Reduction in water-borne diseases due to flooding and river overflow resulting from extreme climate events.	4	35.5	2	2.17
4E	Improved environmental management in the oil industry to reduce the impact of floods and droughts	5	30	5	5.00

Policy and Institutional Framework

Four Adaptation Project Options (5A, 5B, 5C and 5E) achieved similar scores and ranks in the MCA and expert opinion ranking (Table 7). Because of this, as well as the complementarity between them, it was decided to combine these four Adaptation Project Options into a single integrated Priority Adaptation Project. See Annex 1 for the project profile of this integrated Priority Adaptation Project.

Table 7: Prioritisation of Adaptation Project Options for Policy and Institutional Framework

No	Project Description	MCA		Expert Opinion	
		Ranking	Score	Ranking	Score
5E	Building institutional arrangements for climate change adaptation at state, county, payam and boma levels	1	49	4	3.10
5C	Establishing institutional mechanisms for climate change adaptation financing/funding	2	48	3	2.80
5B	Integrating Climate Change Adaptation and Mitigation Measures into all Sectorial Policies in South Sudan	3	46.5	2	2.30
5A	Building or Strengthening Institutional Arrangements to Develop Climate Change Resilience	4	44	1	2.00
5D	Support to enabling policy environment on climate change	5	25.5	5	4.20

6. NAPA Preparation Process

The South Sudan NAPA preparation process, coordinated by the NAPA Team, can be summarised as consisting of seven steps.

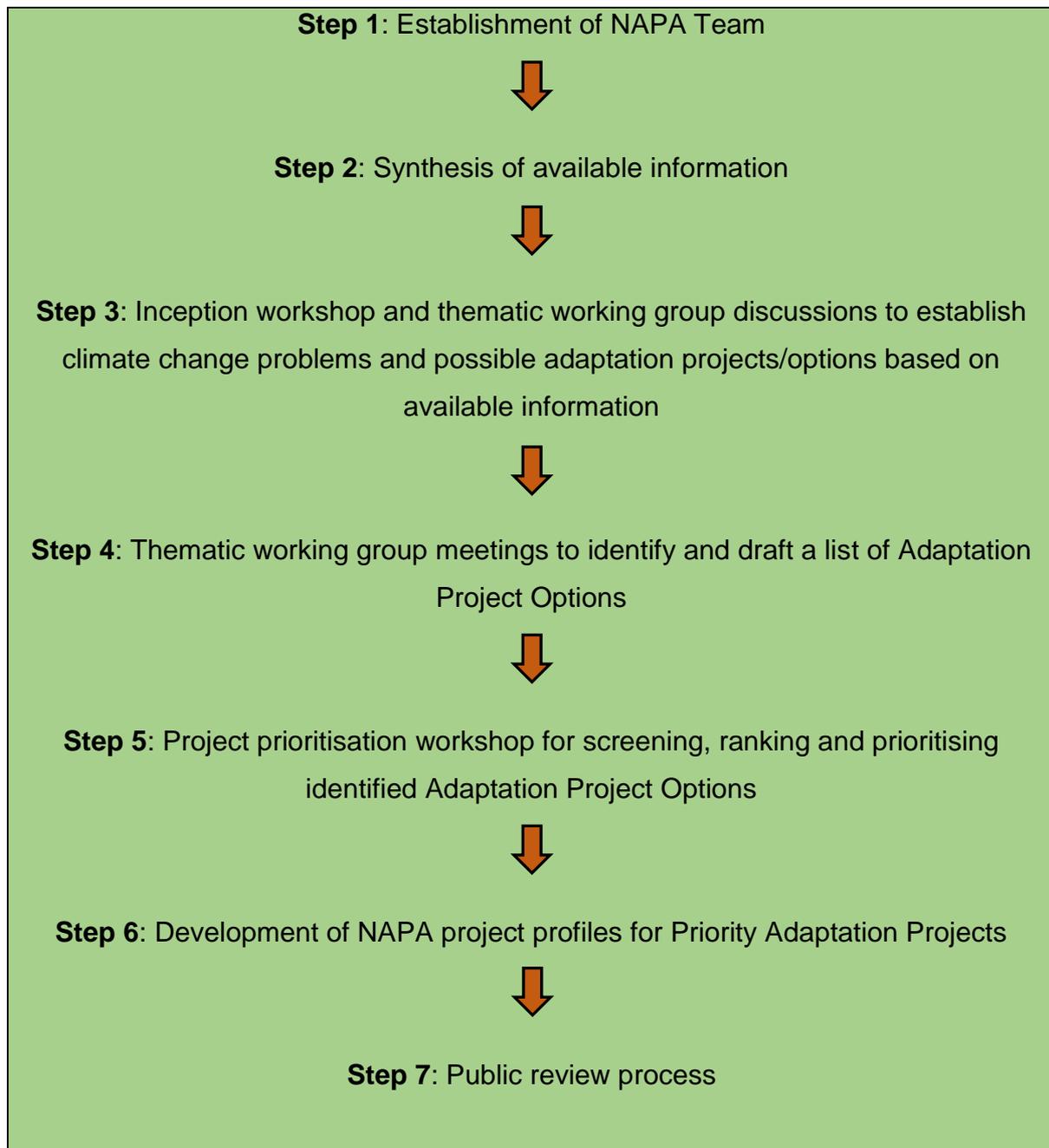


Figure 3: An outline of the steps used in the South Sudan NAPA preparation process.

Step 1: Establishment of NAPA Project Team

The Ministry of Environment initiated the development of the NAPA for South Sudan. Within the Ministry, a NAPA Team was formed to administer and coordinate the NAPA process.

A multi-disciplinary Project Steering Committee (PSC) was also established, with representatives from different line ministries and academia. The role of the Project Steering Committee was to provide overall guidance and strategic oversight for the project.

Step 2: Synthesis of available information

All relevant information available, including existing climatic data, assessments of vulnerability and development plans, was reviewed and synthesised. Within the synthesis, information on the observed and projected climate change trends in South Sudan was analysed. This step was necessary to identify which socio-economic sectors are most vulnerable to the impacts of climate change. This review acted as the foundation for the next steps of the NAPA process.

Step 3: Inception workshop and thematic working group discussions to establish climate change problems and possible adaptation projects/options based on available information

A participatory process, involving multiple stakeholders from the public sector, private sector, NGOs and academia, guided the preparation of the NAPA. Furthermore, the NAPA adopted a multidisciplinary and complementary approach building on existing plans, programs and national sectoral policies. The main objective of the consultative process was to publicise the project activities, and solicit inputs and feedback from all stakeholders on the identification and prioritisation of Adaptation Project Options. Because of the tense political situation and potential security risks in South Sudan at the time that the NAPA was prepared, stakeholder consultations with local communities were limited. To try and ensure that community-level concerns were identified, relevant organisations (such as NGOs) with extensive

experience working on the ground with various communities where targeted for participation in the NAPA preparation process.

The consultative process began with a national inception workshop in Juba to raise public awareness of the NAPA process and identify climate change related problems. Stakeholders at the workshop represented a range of institutions – government, development partners, NGOs and academia – and expertise. The involvement of diverse stakeholders ensured that broad ranges of adaptation needs were identified.

From the inception workshop, five key thematic areas in which immediate adaptation interventions are required were identified: i) Environment; ii) Water; iii) Agriculture; iv) Disaster Risk Reduction; and v) Policy and Institutional Framework. Thematic working groups representing the five thematic areas were formed at the inception workshop and were tasked with identifying relevant climate change problems and potential adaptation projects/options. Local experts and specialists from government, academia and NGOs formed these groups.

Step 4: Thematic working group meetings to identify and draft a list of Adaptation Project Options.

The thematic working groups met on several occasions following the inception workshop to identify a list of 28 Adaptation Project Options for potential implementation in South Sudan. Further thematic working group discussions were held to develop the project prioritisation criteria essential for ranking the Adaptation Project Options.

Step 5: Thematic working group meetings and project prioritisation workshop for screening, ranking and prioritising identified Adaptation Project Options

A national project prioritisation workshop was held in Juba with representatives from all five thematic groups, the NAPA Team, the PSC, and additional stakeholders from line ministries and NGOs. The project prioritisation workshop served to: i) review and validate the Adaptation Project Options; ii) review and validate the project

prioritisation criteria developed by the thematic working groups; iii) weight the project prioritisation criteria; and iv) validate the final scoring and ranking of Adaptation Project Options.

Step 6: Development of NAPA project profiles for Priority Adaptation Projects

Project profiles were developed for the Priority Adaptation Projects identified through the MCA and validated at the project prioritisation workshop (Annex A). The project profiles developed were based on discussions within each thematic group. The draft project profiles were disseminated to all members of the thematic working groups, as well as relevant line ministries, for discussion and review. Comments received were incorporated into the final project profiles that were presented for public review.

Step 7: Public Review Process

A public review process was undertaken in order to solicit public opinion on the NAPA draft document, including the Priority Adaptation Projects. A number of activities were undertaken to gather public opinion:

- A national validation workshop was held in Juba where the draft NAPA document was presented. The Minister of Environment led the workshop. Journalists from at least 5 local TV stations and newspapers attended this workshop and reported on the NAPA document.
- Draft NAPA documents were disseminated to line ministries, NGOs and academia for comment.

Feedback received through this public review process was incorporated in the final NAPA document.

7. Reference List

FAO and WFP. 2015. *Special Report: FAO/WFP Crop and Food Security Assessment Mission to South Sudan*.

Famine Early Warning Systems Network – Informing Climate Change Adaptation Series. June 2011. *A Climate Trend Analysis of Sudan*.

Food Security Information Network. 2013. *Capacity Assessment of South Sudan*.

Government of the Republic of South Sudan. 2011. *South Sudan Development Plan 2011-2013*.

Ministry of Agriculture, Forestry, Cooperatives and Rural Development and Ministry of Livestock and Fisheries Industries. 2015. *Comprehensive Agriculture Master Plan*.

Ministry of Electricity, Dams, Irrigation and Water Resources. 2015. *Irrigation Development Master Plan (Draft Framework)*.

Ministry of Environment. 2012. *Environmental Impacts Risks and Opportunities Assessment: Natural resources management and climate change in South Sudan*.

Ministry of Environment. 2012. *National Environment Bill*.

Ministry of Environment. 2012. *South Sudan National Environment Policy 2012*.

Mohamed, Y., and Savenjie. H. 2014. Impact of climate variability on the hydrology of the Sudd wetland: signals derived from long term (1900-2000) water balance computations. *Wetlands Ecology Manage.* <http://doi.10.1007/s11273-014-9337-7>.

Republic of South Sudan. 2011. *South Sudan Vision 2040*.

South Sudan National Bureau of Statistics. 2012. *National Baseline Household Survey 2009*.

South Sudan National Bureau of Statistics. 2012. *South Sudan MDG Status Report 2012*.

Selby, J., Hoffman, C. 2014. Beyond Scarcity: Rethinking water, climate change and conflict in the Sudans. *Global Environmental Change*.

<http://dx.doi.org/10.1016/j.gloenvcha.2014.01.008>

The Sudd Institute. 2015. *Assessment of Policy and Institutional Responses to Climate Change and Environmental Disaster Risks in South Sudan*.

United Nations. 2015. *South Sudan: Humanitarian Response Plan 2015*.

United Nations South Sudan. 2014. *United Nations Development Assistance Framework 2014-2016*.

Annex A: Priority Adaptation Project profiles

Environment

Promotion of reforestation and agroforestry to reduce vulnerability to droughts and floods

Project area: Eastern Equatoria

Rationale/justification: Goods and services provided by forests are important sources of livelihoods – particularly for rural communities – in South Sudan. These goods and services include water provision, non-timber forest products (NTFPs) and charcoal. However, forest resources are being lost rapidly because of human activities including extraction for firewood and charcoal, commercial timber logging, agricultural expansion and forest fires. Indeed, firewood and charcoal are the most-used sources of energy in South Sudan with over 96%³ of the population relying thereon for cooking and lighting⁴. Furthermore, the extraction of firewood and charcoal from South Sudan is currently occurring outside of any legal framework on resource- and benefit-sharing, and often without legal agreement from community land-owners. Although South Sudan retains the majority of its forest cover, deforestation is currently occurring at a rapid rate and if this were to continue could lead to a near total loss of forest cover within 50 years.

Rapid deforestation, and the consequent loss of important ecosystem goods and services, is reducing the ability of forests to buffer communities against the crop failures associated with floods and droughts. Such problems will continue unless wider participation of individuals, households and both rural and urban communities is secured in planting and maintaining trees. Considering the weak capacity of the government to protect the country's forests – with a limited number of personnel and resources, as well as no legislative and regulatory framework – the engagement of

³ 86% of the population rely on firewood, 10% of the population rely on charcoal.

⁴ South Sudan National Bureau of Statistics. Report for South Sudan 2011. National Baseline Household Survey 2009.

local communities in forest management can be an efficient and cost-effective means of reducing the current rate of deforestation and improving livelihoods and food security in target communities. The proper utilisation and management of forest resources and ecosystems will therefore safeguard the basis of rural livelihoods and contribute to sustainable food security and economic development.

Objectives:

1. Promote sustainable forest-based livelihoods and reduce deforestation.
2. Rehabilitate degraded landscapes through reforestation, thereby reducing soil erosion and loss of arable land.
3. Promote agroforestry and encourage individual households to sustainably produce wood, fruit and fodder.
4. Promote the conservation and protection of forest.

Long-term outcomes:

1. Production of non-timber forest products, such as fruit, fodder and honey, enhanced.
2. Awareness of communities on planting, growing and managing trees increased.
3. Vulnerable rural communities implement agroforestry as a means of addressing food security and deforestation.
4. Degraded water catchments protected and rehabilitated.

Short-term outputs:

1. Forestry nurseries established and existing nurseries upgraded.
2. Local communities are trained on appropriate forest restoration and agroforestry techniques.
3. Degraded land has been afforested.
4. Multi-purpose trees are integrated with crop and livestock production systems.
5. Farm, homestead and agroforestry practiced.

Indicative activities:

- Promote agroforestry practices in rural communities.
- Strengthen forest extension system and develop a strong relationship with farming communities through frequent visit and interactions.
- Undertake market assessments and value chain analyses for forest products.
- Develop markets and value chains for forest products, including NTFPs.
- Develop sustainable management plans for timber (and charcoal) harvesting.
- Assist communities to determine size and boundary of marginal land for allocation to individual households in the community for tree planting.
- Rehabilitate degraded forests, focusing on tree species that generate multiple non-timber forest products and generate alternative livelihoods (for example bee keeping and acacia gum harvesting).
- Establish new or upgrade existing community forest nurseries.
- Promotion of alternative energy options.
- Capacity-building and awareness-raising of rural communities, including training of community members to integrate tree planting and management in their farming systems.

Implementation: The Ministry of Forestry in collaboration with the Ministry of Agriculture will be responsible for overseeing the implementation of this project. A Project Steering Committee will be established with representatives from different stakeholders who will guide the project management. The Project Steering Committee will work in collaboration with departments at state level.

Risks and barriers:

- Limited technical capacity of local communities to implement forest restoration techniques.
- Conflicting land use between reforestation activities and agriculture.
- Lack of enforcement for national plans and regulatory instruments pertinent to forestry conservation and development.

Monitoring and evaluation: Monitoring and evaluation will be carried out on regular basis and more specifically after the rainy season and in the late dry season. Village

committees, forest extension agents and specialists will conduct frequent monitoring and evaluation. An independent assessment team will also be selected and conduct evaluations at the mid-term and end of the project.

Financial resources: \$ 10,000,000

Duration: 5 years

Water Resources

Sustainable management and conservation of wetlands in South Sudan

Project area: Nationwide (Sudd Wetlands, Machar Marshes Wetland, Bahr El-Ghazal Wetlands, Kineti Wetlands)

Rationale/justification: Wetlands are highly productive ecosystems and are important for attenuating floods, consequently buffering surrounding communities from the effects of natural disasters. Among their significant functions, wetlands: i) stabilise microclimates; ii) provide livelihood options such as fishing; iii) minimise natural disasters such as drought and floods; iv) recharge groundwater; v) act as natural filters and improve water quality; and vi) provide tourism/recreation opportunities. South Sudan has many important wetlands, however, knowledge and information regarding these wetlands is scarce. There is also limited understanding of each wetland's ecology, status and importance to the development of sustainable livelihoods in the country.

Communities living around wetlands are vulnerable to natural shocks and stresses, and lack capacities to withstand these shocks. Climate change is increasing the frequency and intensity of these shocks and stresses. Rainfall is becoming increasingly erratic and unreliable with climate models indicating a long-term decrease in rainfall coupled with an increase in temperature. During drought years, the floodplains – upon which the livelihoods of surrounding communities depend – dry up. During rainy seasons that usually last for ~ 6 months, the wetlands in South Sudan increase in size, flooding the surrounding areas. The flooding results in displacement of large numbers of people and threatens food security. In the wetland areas of Jonglei and Upper Nile States, highly variable rainfall and flooding – exacerbated by the recent conflict – has negatively affected communities' livelihoods that are already vulnerable to man-made disasters and conflicts. The predicted increase in the frequency and severity of extreme climatic events will therefore negatively affect wetlands.

Wetlands are also under increasing pressure from a growing population. Wetland ecosystems are being degraded through the unsustainable and poorly managed extraction of fish, fresh water, timber, fibre and fuel. Resource overexploitation including overgrazing and conversion of land for agriculture and settlement is exacerbating the effects of climate change on wetlands. These problems, unless addressed, will substantially diminish the benefits that future generations could obtain from wetland ecosystems, and reduce the ability of wetland ecosystems to provide livelihoods to surrounding communities. Therefore there is a need to increase the adaptive capacity of communities living around wetlands through the sustainable management and conservation of wetland resources. These management actions should include improved preparedness of surrounding communities for extreme events to lessen the vulnerability of people and property to flooding and drought.

Objectives: The main objective of this project is to conserve and sustainably manage wetlands in South Sudan to reduce the negative effects of floods and droughts on surrounding communities.

Long-term outcomes:

1. Technical capacity at the local and national level to integrate climate change adaptation into existing wetland management plans is strengthened.
2. Climate change vulnerability of communities living around wetlands is decreased through sustainable wetland management and the implementation of ecosystem-based adaptation interventions.
3. Communities living around the targeted wetlands have increased capacity to sustainably manage wetlands and adopt alternative livelihoods to decrease their vulnerability to climate change and reduce degradation of wetlands.

Short-term outputs:

1. Training on sustainable wetland management and climate change adaptation delivered to local and national authorities.
2. Management plans for wetlands developed, or existing plans revised, to integrate climate change adaptation for improved ecosystem services and livelihood security.
3. Degraded wetland areas restored using multi-use and climate-resilient species to improve water quality and supply and reduce the impact of floods.
4. Alternative livelihood options identified and adopted in communities surrounding wetlands.
5. Awareness-raising campaign conducted on: i) the ecosystem services provided by wetlands; and ii) the benefits of ecosystem-based adaptation for increasing the resilience of livelihoods and ecosystems to climate change.

Indicative activities:

- Undertake a detailed assessment and inventory of wetlands across the country.
- Promote the formal protection of selected wetland areas (e.g. gazette important wetlands).
- Develop and implement management plans, in consultation with local stakeholders, for important wetland areas.
- Train local communities and government staff on wetland management and climate change adaptation.
- Restore degraded wetland using ecosystem-based adaptation techniques.
- Conduct market assessments and value-chain analyses for wetland products (e.g. fish) and services (e.g. ecotourism).
- Identify and implement alternative livelihood options for communities living around wetlands.
- Create awareness among local communities about the valuable ecosystem services provided by wetlands.

Implementation: The Ministry of Environment in collaboration with the Ministry of Water Resources and the Ministry of Agriculture, Forestry and Cooperative Development will be responsible for the overall implementation of this project. A

Project Steering Committee will be established to guide the overall strategic direction and management of the project to ensure national ownership, alongside donors.

Risks and barriers:

- Communities living around wetlands are unwilling to participate in the programme
- Limited financial resources to enforce regulations included in sustainable wetland management plans.
- Lack of coordination between the multiple stakeholders involved in wetland management.

Monitoring and Evaluation: A multi-disciplinary Project Steering Committee will oversee the project. Regular progress reports will be submitted to all concerned bodies by the lead institution and field visits will be conducted. An independent assessment team will also be selected and conduct evaluations at the mid-term and end of the project.

Financial Resources: \$5,000,000

Duration: 4 years

Agriculture

Promotion of climate-smart agricultural techniques to improve livelihoods and food security under changing climatic patterns

Project area: Nationwide

Rationale/justification: Agriculture dominates the economy in South Sudan, with over 75% of the population reliant upon subsistence agriculture and livestock production for their livelihoods. Furthermore, over 95% of the total land area of South Sudan is considered suitable for agriculture. Despite this agricultural potential, the country is suffering from low agricultural productivity, food insecurity and poverty. The current poverty level in the country is 51%⁵, and over one third of the population are classified as severely food insecure.

The long-term effects of conflict, combined with erratic rainfall patterns, depleted livelihood options, limited humanitarian assistance and escalating food prices, continue to put pressure on food security. Agricultural productivity and value-added processes remain low because farmers rely upon traditional farming practices, with only 30% of households reporting any expenditure on agricultural inputs. For the most part, agriculture is based on small, hand-cultivated land units often farmed by women-headed households. Manual land preparation therefore limits the area that households can cultivate. These livelihood systems are dependent upon timely and ample rainfall, as well as access to water in the dry season. Climate change will increase the frequency and intensity of extreme weather events such as droughts and floods. Prolonged and severe droughts will result in severe water shortages and ultimately crop failures. Droughts also impact upon livestock. Over-stocking of livestock in combination with climate change and droughts have resulted in widespread degradation of the rangelands. Climate change will also lead to outbreaks and the emergence of new pests and livestock diseases.

⁵ South Sudan National Bureau of Statistics. Report for South Sudan 2011. National Baseline Household Survey 2009.

Currently, local communities lack the technical and financial capacity to adopt alternative agricultural techniques to cope with the negative effects of climate change. There is a need to introduce climate-smart agriculture to improve food security and increase the resilience of communities.

Objective: The primary objective of the project is to improve agricultural productivity in areas characterised by erratic rainfall through the introduction of climate-smart agricultural techniques to improve the living standards and livelihoods of vulnerable rural communities.

Long-term outcomes:

1. Vulnerability of subsistence farmers to climate change reduced.
2. Agricultural productivity and food security increased in areas characterised by erratic rainfall.
3. Livelihoods improved and employment opportunities increased.

Short-term outputs:

1. Community members and agricultural extension officers are trained on climate-smart agricultural techniques.
2. Climate-smart agricultural techniques, such as agroforestry and conservation agriculture, are implemented in target communities.
3. Climate-smart agriculture demonstration sites established in target communities.

Indicative activities:

- Implement climate-smart agricultural techniques in target communities.
- Establish climate-smart agriculture demonstration sites and encourage experience-sharing visits from surrounding communities.
- Introduce supplementary irrigation technologies, include drip-irrigation, for rain-fed crops.
- Undertake research on flood-resilient, short-maturing and drought-resistant crop varieties and promote innovation in the agricultural sector.
- Implement integrated pest management and disease control for crops and livestock.

- Promote conservation agriculture and agroforestry.
- Support small-scale farmers with increased access to agricultural inputs (including seeds and tools).
- Train farmers and extension field extension officers in climate-smart agriculture, animal husbandry practices and irrigation farming.
- Support the implementation and enforcement of Comprehensive Agriculture Master Plan (CAMP).

Implementation: The project will be implemented by the Ministry of Agriculture, Forestry, Cooperatives and Rural Development in collaboration with rural communities and civil society, including NGOS and CBOs, academic institutions such as University of Juba and other relevant stakeholders. A Project Steering Committee will be established with representatives from different stakeholders who will guide the project management. The committee will work in collaboration with departments at state level.

Risks and barriers:

- Communities are reluctant to alter traditional farming techniques and adopt climate-smart agricultural techniques for cultural reasons.
- Destruction of crops by livestock and wild animals.
- Inadequate land for grazing due to more land being cleared for agriculture and increasing livestock numbers.

Monitoring and evaluation: Monitoring and evaluation will be carried out on a regular basis. Regular progress reports will be submitted to all concerned bodies by the lead institution and field visits will be conducted. An independent assessment team will also be selected and conduct evaluations at the mid-term and end of the project.

Financial resources: \$ 9,000,000

Duration: 4 years

Disaster Risk Reduction

Establish improved drought and flood Early Warning Systems in South Sudan through improved hydro-meteorological monitoring network

Project area: National level

Rationale/justification: According to the IPCC, climate change is likely to increase the frequency and intensity of extreme climatic events such as floods and droughts. The impacts of these events will be severe on developing countries like South Sudan. Extreme climatic events can be monitored and predicted with current technologies such as climate models, satellites and radars. The Department of Meteorology in South Sudan, however, do not have adequate technical or financial capacity to provide accurate and timely user-specific weather and climate forecasts because of limited: i) facilities; ii) skilled personnel; and iii) technology. Currently, only five of the 28 hydro-meteorological stations located in South Sudan are operational. The country therefore relies upon regional climate models and data for its local forecasts. Communication, satellite and radar facilities that can support the generation of weather and climate information are also lacking. Consequently, there is limited climatic information available to identify areas in South Sudan that are vulnerable to the predicted impacts of climate change. There is also limited climatic information available to generate and disseminate flood and drought early warnings. Without a functional and efficient early warning system, communities are unprepared and therefore highly vulnerable to floods and droughts.

There is therefore a need to: i) strengthen the hydro-meteorological monitoring network across the country so that extreme climatic events can be accurately measured and predicted; and ii) establish flood and drought early warning systems to reduce the vulnerability of communities to climate change.

Objective: The main objective of the project is to establish a climate monitoring and Early Warning System for timely provision of accurate information for disaster preparedness to reduce the vulnerability of local communities to floods and droughts.

Long-term outcomes:

1. Hydro-meteorological monitoring network strengthened and Early Warning System established.
2. Impacts of extreme climatic events on life and property minimised.

Short-term outputs:

1. Hydro-meteorological monitoring stations rehabilitated/established.
2. Relevant government staff (e.g. Department of Meteorology) trained on climate data collection and forecasting.
3. Accurate and timely weather and climate forecasts.
4. Climate information database developed.
5. Flood and drought early warning generation and dissemination systems implemented.
6. Communities trained on early warning systems and appropriate response strategies.

Indicative activities:

- Assess the current hydro-meteorological monitoring network and identify capacity gaps.
- Install/rehabilitate hydro-meteorological monitoring stations.
- Assess existing early warning systems and identify gaps in the country.
- Improve climate monitoring and prediction facilities.
- Upgrade telecommunication network through modern technologies, which may include mobile networks and community radio.
- Improve data processing systems and automation of data quality control, analysis and archiving.
- Conduct an assessment of drought and flood risks, resulting in flood delineation and zoning maps.
- Develop capacity for flood risk management, including tools and models for flood forecasting, methods for flood risk mapping and EWS.
- Provide specialised training in climate modelling, information technology, meteorological equipment and instrument maintenance to relevant government staff.

- Develop disaster response strategies, at both local government and community level.

Implementation: The Ministry of Humanitarian Affairs and Disaster Management in collaboration with the Ministry of Water Resources will be responsible for overseeing the implementation of this project. A Project Steering Committee will be established with representatives from different stakeholders who will guide the implementation of this project. The Project Steering Committee will work in collaboration with departments at state level.

Risks and barriers:

- Resources to undertake planned activities may be inadequate, including: i) equipment; ii) staff; and iii) infrastructure.

Evaluation and monitoring: Monitoring and evaluation will be carried out on a regular basis. Regular progress reports will be submitted to all concerned bodies by the lead institution and field visits will be conducted. An independent assessment team will also be selected and conduct evaluations at the mid-term and end of the project.

Estimated project costs: \$ 12,000,000

Duration: 3 years

Policy and Institutional Framework

Strengthening the institutional capacity of the Government of South Sudan for adaptation planning and to integrate climate change into national policies and planning processes

Project area: National level

Rationale/justification: Institutional capacity constraints limit the integration of climate change adaptation into national policies and development planning processes in South Sudan. This limits both short- and long-term planning for climate change adaptation. Institutional capacity constraints include:

- inadequate institutional structure that is mandated to address climate change considerations across sectors;
- inadequate institutional arrangements at the state, county, payam and boma levels for effective planning and implementation of climate change adaptation interventions;
- limited financial resources to undertake climate change adaptation interventions;
- lack of a financial mechanism to mobilise funds for climate change adaptation;
- limited understanding of climate change among policy- and decision-makers across sectors; and
- few experienced and well-trained personnel to undertake and support climate change adaptation efforts.

There is a need to address these institutional capacity constraints to promote the inclusion of climate change adaptation in national/sectoral policies and plans, which will in turn increase the resilience of South Sudan to climate change impacts.

Objective: The main objective of the project is to strengthen the institutional and technical capacity of the Government of South Sudan to coordinate and support the integration of climate change adaptation into relevant policies, plans and associated processes. In addition, the project aims to strengthen institutional arrangements that

will facilitate building readiness for the GCF and the establishment of an effective NAP process.

Long-term outcomes:

1. National and sub-national institutional arrangements for climate change adaptation strengthened.
2. Integration of climate change adaptation into sectoral policies.
3. Financial mechanism to fund climate change adaptation interventions established.
4. Institutional arrangements for an effective NAP process strengthened.

Short-term outputs:

1. Institutional and technical capacity needs assessment undertaken.
2. Appropriate climate change institution established.
3. Relevant national and sub-national government staff trained on climate change adaptation.
4. Guidelines and policy briefs on integrating climate change into sectoral policies produced.
5. Revisions to integrate climate change adaptation into sectoral policies proposed.
6. Awareness-raising campaign on climate change among policy- and decision-makers conducted.
7. Climate change adaptation fund (or a similar, appropriate financial mechanism) established.

Indicative activities:

- Conduct an institutional and technical capacity needs assessment.
- Review institutional structures to identify gaps and opportunities to strengthen institutional arrangements that can allow the country to cope effectively with climate change.
- Provide training to relevant government staff at a national and sub-national level on climate change adaptation.
- Encourage experience-sharing visits between sub-national institutions.

- Establish a multi-sectoral national platform (for instance an inter-ministerial committee) to facilitate cross-sectoral coordination on climate change and disaster risk reduction policies and plans.
- Establish a climate change authority (or a commission) that can coordinate, regulate, plan and implement climate change adaptation interventions.
- Establish a national climate change adaptation technical advisory board to provide guidance to sub-national government institutions on climate change adaptation.
- Establish institutional arrangements for climate change adaptation at the state, county, payam and boma levels.
- Encourage collaboration with key non-governmental stakeholders.
- Develop and disseminate guidelines for mainstreaming climate change adaptation into policies and plans.
- Review existing relevant policies, plans and legislation to identify entry-points for climate change adaptation.
- Integrate climate change adaptation into sectoral policies, plans and legislation.
- Sensitize policy- and decision-makers on the impacts of climate change and the need to develop adaptation and mitigation policy measures to address it.
- Undertake research on climate change, the findings of which should be used to educate policy-makers including the public through the media and workshops.
- Develop a mechanism to finance climate change adaptation.
- Embed climate- financing mechanisms in financial institutions of the government (Ministry of Finance and Economic Planning).
- Establish regulatory and institutional mechanisms – based on the polluter pays principle – to generate and mobilize climate change funds.
- Establish a clear and transparent system to manage climate adaptation funds.

Implementation: The Ministry of Environment will be responsible for overseeing the implementation of this project, in close collaboration with all other relevant national ministries. An inter-ministerial Project Steering Committee will be established to guide the implementation of this project. The Project Steering Committee will work in collaboration with sub-national departments.

Risks and barriers:

- High-level political will is required to establish institutional arrangements and revise sectoral policies.
- Other important development goals are prioritised ahead of climate change adaptation.

Evaluation and monitoring: Monitoring and evaluation will be overseen by the Project Steering Committee. Indicators will be drawn from existing sectoral monitoring processes, as well as new indicators established. An independent assessment team will also be selected and conduct evaluations at the mid-term and end of the project.

Estimated project costs: \$ 4,000,000

Duration: 4 years

Annex B: Adaptation Project Options

Environment

Thematic group:	Environment - Forestry (1A)
Proposed title:	Promotion of reforestation and agroforestry to reduce vulnerability to droughts and floods
<i>See the project profile in Annex A.</i>	

Thematic group:	Environment - Forestry (1B)
Proposed title:	Introduction of climate change-resilient, participatory and sustainable forest management.
Identify a priority location/geographic area:	Central, Eastern and Western Equatoria, Western Bhar El Ghazal
Justification:	Rural communities rely on forest resources for their livelihoods. However, poor forest management has allowed widespread degradation of forests. This degradation includes unsustainable wood harvesting for charcoal, uncontrolled forest fires and urban encroachment into forest reserves. Increasingly erratic rainfall will reduce agricultural production and therefore increase the reliance of rural communities on forest resources. There is a need to introduce sustainable community forest management practices.
Indicative activities:	<ul style="list-style-type: none"> • Rehabilitate degraded forests, focussing on tree species that generate multiple non timber forest products and generate alternative livelihood options . • Introduce participatory, sustainable forest management, including REDD+.

	<ul style="list-style-type: none"> • Create national parks/reserves. • Revise forestry policies. • Implement capacity-building and awareness-raising programmes for rural communities. • Establish a forest research and technology dissemination centre. • Train community forest fire fighters.
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Thematic group:	Environment – Wildlife (1C)
Proposed title:	Landscape approach to wildlife conservation and management.
Identify a priority location/geographic area:	Jonglei, Lakes, Eastern Equatoria, Greater Pibor Administrative Area (GPAA) and Central Equatoria
Justification:	Habitat loss and human encroachment into wildlife corridors negatively effects the migration of wildlife species and severs connectivity of existing protected areas with key ecosystems. This is caused by infrastructure development, urbanisation and clearing of land for agriculture. Consequently, this limits the ability of these ecosystems to provide ecosystem goods and services to communities, who are increasingly reliant on these services as erratic rainfall reduces agricultural production. Furthermore, altered migratory movements of wildlife along drought-prone migration corridors and dispersal areas leads to increased human-wildlife conflict and disease outbreaks. Improved wildlife conservation and management will benefit local communities and biodiversity.
Indicative activities:	<ul style="list-style-type: none"> • Buffer communities from adverse effect of climate change on livelihoods through creation of co-managed conservancies across key wildlife corridors to ensure

	<p>connectivity of existing protected areas with key ecosystems and maximize opportunities for ecotourism development.</p> <ul style="list-style-type: none"> • Dredge seasonal river beds and swamps (in line with the decisions of the Council of Ministers) and open water points along the migratory routes and corridors. • Monitor and reduce conservation threats along migratory routes through the creation of law enforcement structures and ranger posts in strategic locations. • Develop sustainable land-use plans and natural resource management systems integrating conservation and sustainable environmental management practices (Jonglei and Eastern Equatoria, and north-eastern Central Equatoria States). • Increase awareness about the value of intact ecosystems.
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Thematic group:	Environment – Wildlife (1D)
Proposed title:	Expansion of the protected areas in South Sudan.
Identify a priority location/geographic area:	Jonglei, Lakes, Eastern Equatoria, Greater Pibor Administrative Area (GPAA) and Central Equatoria
Justification:	Intact ecosystems provide a range of goods and services to rural communities, who rely on forest resources for their livelihoods. Furthermore, protected areas provide livelihood options to communities, for instance through ecotourism. However, uncontrolled poaching, wildlife trafficking, infrastructure development, urbanisation and clearing of land for agriculture is negatively impacting upon protected areas in South Sudan. These negative effects will be exacerbated by climate change, as droughts and

	floods cause reduced agricultural yields and therefore the expansion of agricultural land into protected areas and an increase in poaching.
Indicative activities:	<ul style="list-style-type: none"> • Map migratory routes and identify important biodiversity areas. • Expand protected areas. • Create wildlife movement corridors. • Buffer communities from adverse effect of climate change on livelihoods through creation of co-managed conservancies across key wildlife corridors to ensure connectivity of existing protected areas with key ecosystems and maximize opportunities for ecotourism development. • Increase awareness in communities about the value of intact ecosystems. • Promote and develop alternative livelihood options for communities living around protected areas. • Monitor and reduce conservation threats along migratory routes through the creation of law enforcement structures and ranger posts in strategic locations.

Thematic group:	Environment – Biodiversity (1E)
Proposed title:	Integrating climate change into biodiversity conservation and planning
Identify a priority location/geographic area:	Nationwide, but particularly Eastern Equatoria, Western Equatoria, Jonglei/GPAA and Western Equatoria (biodiversity hotspots areas)
Justification:	Conservation of biodiversity is important for maintaining ecosystems, which provide people with a range of valuable goods and services, including food and water. However, biodiversity in South Sudan is threatened by a number of

	<p>factors, including: i) poaching; ii) the spread of invasive exotic species; and iii) rapid deforestation. Climate change is exacerbating the loss of biodiversity in a number of ways. Firstly, more frequent droughts and floods make indigenous plants more vulnerable to pests and diseases attacks. Secondly, increasingly variable temperature and precipitation patterns are resulting in changes in the distribution of threatened species. Thirdly, changing rainfall patterns are altering water flow in many rivers, affecting breeding and feeding habits of many aquatic species. Many streams in the country have already dried up and affecting wildlife movement patterns and migration trends of many migratory species of birds, animals and other organisms. Biodiversity conservation will lead to strengthening of ecosystem resilience and will consequently improve the ability of ecosystems to provide important services during increasing climate pressures. There is therefore a need to integrate climate change into biodiversity conservation efforts in South Sudan.</p>
<p>Indicative activities:</p>	<ul style="list-style-type: none"> • Increase public awareness about climate change and the importance of biodiversity. • Introduce Integrated Natural Resources management. • Promote biodiversity conservation and protection by designating biodiversity hotspots as biosphere reserves. • Promote reforestation, afforestation and agroforestry practices. • Undertake controlled fires. • Conduct research in areas like taxonomy of flora and fauna and establish of central biodiversity information database. • Develop a National Biodiversity Strategy and Action Plan (NBSAP)

	<ul style="list-style-type: none"> • Document and disseminate Indigenous Knowledge and traditional responses to climate change calamities (clearing house mechanisms).
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Thematic group:	Environment – Renewable Energy (1F)
Proposed title:	Promotion of renewable energy
Identify a priority location/geographic area:	Nationwide
Justification:	The majority of people in South Sudan rely on wood – including charcoal – as their main source of energy. Combined with rapid population growth, high levels of poverty and urbanization, the reliance upon wood is leading to the overexploitation of forest resources and extensive deforestation. Currently, there are insufficient alternative energy technologies available in South Sudan, and communities lack the capacity to implement these technologies.
Indicative activities:	<ul style="list-style-type: none"> • Introduce energy-efficient technologies, such as improved cook stoves. • Develop alternative livelihood strategies for communities which rely on charcoal production as their main source of income. • Promote alternative energy sources. • Establish institutions (for example energy research centre) who will be responsible for promoting renewable energy technologies. • Conduct capacity building training on renewable energies for local communities. • Develop a national energy policy.

Thematic group:	Environment – Mountain Ecosystems (1G)
Proposed title:	Creating resilience in mountain communities in the face of climate change
Identify a priority location/geographic area:	The Imatong Massif, Aloma Plateau, Upper Boma
Justification:	Mountain ecosystems in South Sudan are important forested areas, providing fresh water and forest resources to people. However, rapid population growth, high levels of poverty and urbanization, is leading to the overexploitation of these forest resources. Climate change, including increasingly erratic rainfall, is causing increased crop failures and thereby increasing the reliance of communities on the goods and services provided by mountain ecosystems.
Indicative activities:	<ul style="list-style-type: none"> • Promote conservation of mountain ecosystems. • Conduct public awareness-raising campaign about climate change and the value of mountain ecosystems. • Control wildfires. • Introduce Integrated Natural Resources Management. • Research and introduce best farming practices in mountain areas. • Develop a National Mountain Strategy and Action Plan (NMSAP) • Promote indigenous knowledge on soil erosion.

Water Resources

Thematic group:	Water resources (2A)
Proposed title:	Introduction of rainwater harvesting techniques to increase water supply under conditions of climate change

Identify a priority location/geographic area:	Jonglei, Lakes and Eastern Equatoria
Justification:	Erratic/unreliable rainfall and droughts are exacerbating the problem of water availability. South Sudan has a substantial freshwater resource base, however, the use of such resources is constrained by lack of capacity to sustain and ably utilise its water resources. Many households are not supplied with clean drinking water for domestic use, as well as for livestock. Water harvesting could be a valuable tool in increasing crop production, supplying water for domestic and livestock purposes.
Indicative activities:	<ul style="list-style-type: none"> • Undertake studies to identify suitable sites for water harvesting, small-scale irrigation dams and boreholes. • Construct/develop water harvesting structures and storage facilities, including rainwater harvesting facilities, dykes, water reservoirs and canals for pumping water. • Undertake training and raise awareness among local communities on effective storage and use of water.

Thematic group:	Water Resources (2B)
Proposed title:	Enhancing resilience to rainfall variability through rangeland rehabilitation and water resources management
Identify a priority location/geographic area:	Eastern Equatoria and Northern Bahr El Ghazal
Justification:	Rainfall variability/reduction and droughts have culminated in reduced surface water runoff. The rate of groundwater recharge has also decreased. Rangelands have deteriorated due to overgrazing, which contributes to

	increasing desertification. The scarcity of resources has led to social tension and internally displaced persons.
Indicative activities:	<ul style="list-style-type: none"> • Implement watershed management plans. • Introduce irrigation systems for pasture improvement and grazing management. • Implement soil conservation measures. • Develop a pilot project on introduction of ranch schemes. • Raise awareness in affected communities regarding water resources management. • Undertake research and assessments.

Thematic group:	Water Resources (2C)
Proposed title:	Protection of water resources through improved waste management
Identify a priority location/geographic area:	Nationwide (Bahr El-Jabel Basin, White Nile Basin)
Justification:	<p>Changing rainfall patterns – including on-set rains, irregular and uneven rainfall distribution, dry spells and torrential rains – result in droughts and floods. These unfavourable weather conditions combined with population growth and the discharge of wastewater, effluent and solid waste result into watercourses results in the increased pollution of already fragile and deteriorating water resources.</p> <p>Examples of such sources of pollution include: oil spills; sewage disposal; solid waste (e.g. plastic waste in rivers and stream in major cities of South Sudan); and acid rain from usage of diesel generators.</p>
Indicative activities:	<ul style="list-style-type: none"> • Establish a plant to prevent seepage. • Improve sanitation systems.

	<ul style="list-style-type: none"> • Develop environmental-health related infrastructure. • Develop urban water supply system. • Delineate river corridors. • Encourage the use of alternative sources of energy (solar, wind, geothermal, etc). • Develop and implement waste management policies and strategies, including: <ul style="list-style-type: none"> • Waste Management programme • Sewage management plan • Solid waste treatment plan or system (e.g. waste recycling) • Establish and enforce EIA regulations. • Introduce compensation/taxes (e.g. polluter pays principle). • Develop and implement indicators for monitoring water pollution • Increase government capacity and support practical solid waste management. • Increase community awareness. • Establish indicators and introduce water quality monitoring
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Thematic group:	Water Resources (2D)
Proposed title:	Sustainable management and conservation of wetlands in South Sudan
<i>See the project profile in Annex A.</i>	

Thematic group:	Water Resources (2E)
Proposed title:	Introduction and expansion of irrigated agriculture (for crop and livestock production)

Identify a priority location/geographic area:	National level (Upper Nile, Eastern Equatoria, Western Equatoria, Northern Bahr El-Ghazal States)
Justification:	<p>Dependence on seasonal rains has kept crop production and productivity low. High seasonal and inter annual rainfall variability affects crop production and food security. Climate change also affects the distribution of pests and disease, which will have a negative effect upon crops and livestock. In addition to the direct effects of climate change on agriculture, there are non-climate change-related threats which include:</p> <ul style="list-style-type: none"> • Poor irrigation systems and infrastructures • Inadequate institutional capacity (e.g. irrigation board and etc) for management of irrigation facilities • Limited funding for irrigation sectors • Lack policy for private sector involvement • Spare parts for the existing pumps • Lack of research • Poor road access to agriculture areas • Lack of awareness on importance of agriculture sector
Indicative activities:	<ul style="list-style-type: none"> • Establish/strengthen irrigation institutions – e.g. irrigation board, water associations. • Develop a policy on irrigation. • Introduce modernised irrigation techniques – use of drip system, sprinkler, etc). • Encourage Private Public Partnerships. • Develop capital support/funding mechanisms. • Promote the use of surface, ground water and rain-water in conjunction. • Promote management of the non-Nile rivers/streams. • Establish/strengthen agricultural research institutions. • Implement awareness raising programmes.

Thematic group:	Water Resources (2F)
Proposed title:	Community-based sustainable utilisation and management of wetlands in selected parts of South Sudan
Identify a priority location/geographic area:	Jonglei and Upper Nile states
Justification:	During rainy seasons, the wetlands expand in size and flood the surrounding areas. The flooding results in displacement of large number of people, affecting their livelihoods and raises issues of food security. In the wetland areas of Jonglei and Upper Nile States, highly variable rainfall and flooding exacerbated the recent conflict and has affected communities' livelihoods – that are already vulnerable to natural and man-made disasters and conflict.
Indicative activities:	<ul style="list-style-type: none"> • Establish flood early warning system for communities to counter and cope with natural disasters. • Undertaken an assessment and inventory of the Sudd Wetland including food services, biodiversity, ecology, land use, threats and opportunities to access nature provided livelihood sources • Develop an integrated management plan to manage the Sudd Wetland resources and ensure the local population conserves and use the wetlands ecosystem goods and services sustainably.

Agriculture

Thematic group:	Agriculture – Fisheries - Enterprise and Value Chain Development (3A)
Proposed title:	Enterprise and value chain development in the fishing industry to improve livelihoods and reduce vulnerability to climate change.
Identify a priority location/geographic area:	Riverine area (Bor, Terekeka, Kodok, Lake No, Adok and others).
Justification:	<p>Decreasing and irregular rainfall due to climate change results in reduced water availability and the shrinkage of water bodies, particularly wetlands. Furthermore, rivers are becoming increasingly seasonal which affects both the species and size of fish. In addition thereto, increased population growth and expansion of human settlements along watercourses has resulted in the pollution of water bodies affecting both water quality and fisheries. The lack of regulation or management of fisheries has resulted in unregulated fishing by the community which impacts upon the long-term sustainability of these resources.</p> <p>Opportunities for increasing the value of a catch exist, however, communities rely upon traditional fishing and fish processing techniques.</p>
Indicative activities:	<ul style="list-style-type: none"> • Introduce integrated watershed management to protect and preserve important waterbodies. • Promote community-run fishing enterprises. • Develop the value chain for fish. • Improve fishing practice (fishing gears). • Establish fish processing and preservation facilities. • Develop regulatory frameworks for fishing industry. • Strengthen the enforcement of regulations in the fishery sector.

Thematic group:	Agriculture – Fisheries - Aquaculture (3B)
Proposed title:	Diversifying livelihood options to cope with a changing climate through the introduction of aquaculture away from riverine areas
Identify a priority location/geographic area:	Non-riverine areas (Maridi, Yei, Kajo-Keji and others).
Justification:	South Sudan has abundant water resources and the fisheries sector shows enormous growth potential. However, fishermen depend primarily on riverine fishing. Increased population growth and expansion of human settlements along watercourses has resulted in the pollution of water bodies affecting both water quality and fisheries. In addition, climate change and the increasing frequency and intensity of droughts will result in the shrinking of these water bodies. Aquaculture or fish farming as an alternative is not yet well developed and the livelihoods of subsistence fishermen will therefore be threatened.
Indicative activities:	<ul style="list-style-type: none"> • Introduce aquaculture beyond riverine areas to reduce dependence on natural water bodies. • Conduct training for local community on fish farming. • Implement awareness-raising campaigns in local communities on climate change and the value of wetland/riverine ecosystems.

Thematic group:	Agriculture - Livestock (3C)
Proposed title:	Development of the livestock sector through enhanced rangeland management, increased knowledge and improved animal health systems to reduce the vulnerability of pastoral communities to climate change.
Identify a priority location/geographic area:	Lakes ,Jonglei, Eastern Equatoria (Kapoeta, Torit), upper Nile, unity, Central Equatoria (Terekeka), Northern Bahr el Ghazal
Justification:	The livestock industry is predominantly comprised of pastoral and agro-pastoral livestock production systems. Pastoralists have a nomadic lifestyle. The movement by pastoralists is largely constrained by the availability of water and diseases. Decreased rainfall due to climate change results in limited pasture, over-grazing and degradation of the rangelands. Weak extension service support to agricultural and livestock farmers is also a concern for farmers throughout South Sudan. Extension and veterinary/animal care services are extremely limited. This reduces communities' capacity to cope with outbreaks of disease and pests, which are expected to increase with climate change.
Indicative activities:	<ul style="list-style-type: none"> • Create awareness on natural resource management and conservation. • Promote environmental protection. • Introduce rangeland management in pastoral areas. • Strengthen livestock extension services. • Introduce semi-intensive livestock production. • Implement livestock disease surveillance. • Introduce and promote fodder crops and pasture management, conservation and use of hay. • Introduce drought-resistant breeds. • Establish livestock information and disease early

	<p>warning system.</p> <ul style="list-style-type: none"> Establish livestock infrastructure (including water points).
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Thematic group:	Agriculture – Climate-smart agriculture (3D)
Proposed title:	Promotion of climate-smart agricultural techniques to improve livelihoods and food security under changing climatic patterns
<i>See the project profile in Annex A.</i>	

Thematic group:	Agriculture – Extension services (3E)
Proposed title:	Enhancing agricultural production under climate change conditions through infrastructural development and strengthening of agricultural extension services.
Identify a priority location/geographic area:	Nationwide
Justification:	Farmers are threatened by food insecurity because of erratic rainfall and crop failure. Decreased rainfall due to climate change also results in limited pasture, which when combined with over-grazing results in the degradation of rangelands. Agriculture is currently low input, low output and low productivity. The predicted effects of climate change will have negative effects on productivity, reducing it further. Currently, development of the agricultural sector is restricted by limited research on climate-resilient technology and varieties. In addition, access to markets and inputs is limited with only 30% of households reporting any expenditure on agricultural inputs. Market access is also affected by poor infrastructure, such as roads to markets.

	<p>Furthermore, extension services are weak in South Sudan and farmers are not receiving adequate agricultural and veterinary support. The limited extension services also reduce communities' capacity to cope with outbreaks of disease and pests, which are expected to increase with climate change.</p>
<p>Indicative activities:</p>	<ul style="list-style-type: none"> • Promote agricultural extension services. • Undertake awareness-raising campaign on the effects of climate change to the agricultural sector. • Develop agricultural infrastructure (e.g. roads to connect to markets). • Promote storage of seeds (e.g. use of silos or post-harvest structures). • Promote the development of agribusiness. • Introduce improved seed varieties (drought- and disease-resistant, short duration). • Implement integrated pest management and disease control. • Undertake advocacy and campaigns on suitable taxation policies to promote agricultural activities. • Implementation and enforcement of comprehensive agriculture master plan (CAMP). • Promote women and youth empowerment in agribusiness activities.

Disaster Risk Reduction

Thematic group:	Disaster Risk Reduction – Hydro-meteorological network development and EWS (4A)
Proposed title:	Establish improved drought and flood Early Warning Systems in South Sudan through improved hydro-meteorological monitoring network.
<i>See the project profile in Annex A.</i>	

Thematic group:	Disaster Risk Reduction – Water-borne diseases (4B)
Proposed title:	Reduction in water-borne diseases due to flooding and river overflow resulting from extreme climate events.
Identify a priority location/geographic area:	<ul style="list-style-type: none"> • National level • Most vulnerable areas (Jonglei, Rumbek, Bentiu, Central Equatoria, Upper Nile)
Justification:	Climate models indicate an increase in frequency and severity of climate related events, such as flooding. The shortcomings in water quality and sanitation are directly reflected in the incidence of waterborne diseases, which are highly seasonal. The incidence of disease is greatest at the start of the wet season as rains and run off mobilise the faecal matter and pollution that has accumulated in the dry season in watercourses. Rapid population growth and the establishment of settlements in floodplains and partly blocking existing drainage basins and corridors, also contributes to increased flooding and the spread of waterborne diseases. Non-climate related factors which contribute to the vulnerability of local communities, such as poverty, malnutrition, lack of sanitation, adequate medical services, clean drinking water and low awareness.
Indicative activities:	<ul style="list-style-type: none"> • Conduct rapid assessment of flood risks, resulting in

	<p>flood delineation and zoning maps.</p> <ul style="list-style-type: none"> • Establish flood forecasting and warning systems. • Develop and implement flood mitigation measures. • Create buffer zones and relocate vulnerable communities away from flood-prone areas. • Undertake sanitation marketing (including enhanced waste management systems, creating awareness and demand for services). • Flood proof infrastructure (e.g. proper drainage systems including dykes) • Improve environmental health-related infrastructure. • Develop and implement policies, planning and implementation (e.g. National Environment Policy (2015); Disaster Management Policy (draft)) • Undertake capacity building for rapid response to extreme climate change events.
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Thematic group:	Disaster Risk Reduction – Education on Climate Change (4C)
Proposed title:	Increasing knowledge on climate change and environmental issues through a national awareness-raising campaign and inclusion into school curricula.
Identify a priority location/geographic area:	National
Justification:	There is currently limited awareness of climate change and disaster risk reduction and a lack of climate change education programmes. This limits the ability of communities to implement climate change adaptation and disaster risk reduction interventions. There is a need to increase awareness about climate change related hazards, and possible coping techniques, amongst the

	public. Furthermore, there is a need to educate children on climate change, environmental issues and disaster risk reduction. Educating school children will empower them to decrease the vulnerability of their communities to climate hazards.
Indicative activities:	<ul style="list-style-type: none"> • Implement a national awareness-raising campaign, targeting local community leaders in particular. • Include DRR, climate change adaptations and the environment as part of the formal primary and secondary school curricula. • Formal campaign in schools to launch the inclusion of Climate and the Environment (including DRR). • Link relevant ministries and institutions with the Ministry of Education to ensure that education is included as a sectoral priority.

Thematic group:	Disaster Risk Reduction - Reforestation (4D)
Proposed title:	Reforestation and tree planting to combat climate change
Identify a priority location/geographic area:	National (Lakes, Upper Nile, Unity, oil-producing areas)
Justification:	Intact forests ecosystems provide important buffers against extreme climatic events, such as strong winds and floods. Forests are also important for binding soil, thereby reducing erosion and the possibility of landslides. Finally, intact forests are important for water retention and improving water quality. However, South Sudan is currently experiencing rapid deforestation because of charcoal production, urbanization and agricultural expansion. This man-made disaster reducing the ability of

	forests to buffer communities against climate change hazards.
Indicative activities:	<ul style="list-style-type: none"> • Map land use and land cover through the completion of a State of the Environment Report for South Sudan. • Implement a national tree planting campaign (2 million trees each year for 10 years). • Implement the National Forestry Policy (2013) (including enforcement of replanting). • Introduce an awareness-raising campaign on climate change and the importance of forest resources. • Develop and implement national/community forest management plans. • Encourage community-based agroforestry. • Implement a national campaign for the promotion of climate-smart and non-oil based sources of energy. • Improve charcoal production programmes. • Promote energy-saving stoves. • Obtain support for REDD+ programmes.

Thematic group:	Disaster Risk Reduction – Environmental management in the oil industry (4E)
Proposed title:	Improved environmental management in the oil industry to reduce the impact of floods and droughts.
Identify a priority location/geographic area:	Oil producing areas
Justification:	Extreme weather and climate events – such as floods – are likely to increase in frequency and intensity under a changing climate. Because of a lack of environmental governance, oilfield chemical dumping is taking place. This includes untreated produced water as well as hazardous and solid waste being discharged from the oil

	<p>industry into watercourses. The increased incidence of flooding would increase the impacts of oil pollution on surrounding pastoral land and human settlements because of widespread water pollution, including contamination of groundwater resources. Widespread contamination of groundwater resources will then also limit water availability during periods of drought.</p>
Indicative activities:	<ul style="list-style-type: none"> • Climate-proof infrastructure in the oil sector to reduce negative climate change (e.g. floods) and associated environmental impacts. • Implement the Petroleum Policy and Environment Policy. • Enforce the legal framework governing oil production, community protection and environmental degradation including provision of services to surrounding communities. • Rehabilitate degraded land surrounding oil extraction points. • Increase awareness and civic education. • Create and enforce buffer zones around waste water ponds and waste management areas.

Policy and Institutional Framework

Note: Adaptation Project Options 5A, 5B, 5C and 5E are combined as a single project profile. See Annex A.

Thematic group:	Policy and Institutional Framework – Institutional arrangements (5A)
Proposed title:	Building or Strengthening Institutional Arrangements to Develop Climate Change Resilience
Identify a priority	National level

location/geographic area:	
Justification:	<p>Institutional capacity constraints limit the integration of climate change adaptation into national policies and development planning processes. This limits both short- and long-term planning for climate change adaptation. Institutional capacity constraints include:</p> <ul style="list-style-type: none"> • inadequate experienced and well trained personnel that can support the smooth, effective and efficient running of climate change institutional set up; • lack of appropriate tools and machinery to carry out the scientific research and monitoring to inform better decision making; and • inadequate appropriate, effective and efficient institutional structure that is mandated to combat climate change.
Indicative activities:	<ul style="list-style-type: none"> • Conduct an institutional and technical capacity needs assessment. • Provide training to relevant government staff at a national level on climate change adaptation. • Review institutional structures to identify gaps and opportunities to strengthen institutional arrangements that can allow the country to cope effectively with climate change. • Establish a climate change authority (or a commission) that can coordinate, regulate, plan and implement climate change adaptation interventions. • Establish an inter-ministerial committee to facilitate cross-sectoral coordination on climate change issues.

Thematic group:	Policy and Institutional Framework – Integration into sectoral policies (5B)
Proposed title:	Integrating Climate Change Adaptation and Mitigation Measures into all Sectorial Policies in South Sudan
Identify a priority location/geographic area:	At all levels of government (National, state, county and Payams)
Justification:	Climate change affects major economic sectors in South Sudan, including: water, environment, agriculture and forestry. The major limitations in the current policy development and legislative framework are that issues of climate change are not well understood by policy- and decision-makers. Therefore, climate change considerations are not taken into account in the development of both national and sectoral development plans.
Indicative activities:	<ul style="list-style-type: none"> • Develop and disseminate guidelines for mainstreaming climate change adaptation into policies and plans. • Review existing relevant policies, plans and legislation to identify entry-points for climate change adaptation. • Integrate climate change adaptation into sectoral policies, plans and legislation. • Establish an inter-ministerial committee to coordinate an effective integration of cross cutting issues into policies. • Sensitize policy- and decision-makers on the impacts of climate change and the need to develop adaptation and mitigation policy measures to address it. • Undertake research on climate change, the findings of which should be used to educate policy-makers including the public through the media and workshops.

Thematic group:	Policy and Institutional Framework – Financial mechanism (5C)
Proposed title:	Establishing institutional mechanisms for climate change adaptation financing/funding
Identify a priority location/geographic area:	National level
Justification:	There are inadequate financial institutional arrangements and capacity to finance climate change adaptation efforts in South Sudan. This inadequacy includes limited financial resources dedicated to finance climate change adaptation efforts and no institutional mechanisms embedded in the financial institutions to finance these efforts. In addition, inadequate transparency and accountability systems have sometimes led to the mismanagement of funds meant to address emergencies and disasters.
Indicative activities:	<ul style="list-style-type: none"> • Develop a mechanism to finance climate change adaptation. • Embed climate- financing mechanisms in financial institutions of the government (Ministry of Finance and Economic Planning). • Establish regulatory and institutional mechanisms – based on the polluter pays principle – to generate and mobilize climate change funds. • Establish a clear and transparent system to manage climate adaptation funds.

Thematic group:	Policy and Institutional Framework – Enabling policy environment (5D)
Proposed title:	Support to enabling policy environment on climate change
Identify a priority location/geographic area:	National level

area:	
Justification:	The lack of a conducive policy-making and implementation environment for climate change. A number of things make the policy environment unconducive. Firstly, there is inadequate political will as political leadership focuses on other more-pressing development priorities. Secondly, instability is partly to blame for the unconducive policy environment.
Indicative activities:	<ul style="list-style-type: none"> • Raise public awareness of the severe consequences of climate change so that the public can in turn encourage policy-makers to prioritize climate change issues. Awareness should be raised through the media (e.g. a show about climate change on South Sudan TV and the most popular radio stations) and by holding public events and workshops. • Incorporate climate change education into primary and high school curriculum. • Encourage the involvement of women and youth in policy formulation and implementation. • Support peace initiatives to provide a secure political environment.

Thematic group:	Policy and planning – Sub-national institutional arrangements (5E)
Proposed title:	Building institutional arrangements for climate change adaptation at state, county, payam and boma levels.
Identify a priority location/geographic area:	State, county, payam and boma levels.
Justification:	There are currently inadequate institutional arrangements at the state, county, payam and boma levels for effective planning and implementation of climate change adaptation interventions.

Indicative activities:

- Establish a national climate change adaptation technical advisory board to provide guidance to sub-national government institutions on climate change adaptation.
- Establish institutional arrangements for climate change adaptation at the state, county, payam and boma levels.
- Train staff across all four administrative levels on climate change adaptation.
- Encourage experience-sharing visits between institutions.
- Provide institutional and technical capacity building.
- Encourage collaboration with key non-governmental stakeholders.

Annex C: Adaptation Project Option Scoring

Environment

Criteria	Scores							Weight
	1A	1B	1C	1D	1E	1F	1G	
Loss of life	0	0	0	0	0	0	0	2.5
Loss of livelihood	2	2	1	1	2	2	2	2.5
Food security	2	2	1	1	1	1	2	2.5
Water availability, quality and accessibility	2	2	2	2	2	1	2	2.5
Biological diversity	2	2	2	2	2	1	2	2.5
Conflict resolution and peace-building	1	1	1	1	1	1	1	2.5
Sustainability	2	2	2	2	2	2	2	2.5
Equity	2	2	2	1	1	2	1	2.5
Synergy with national policies and MEAs	2	2	2	2	2	2	2	1.5
Essential infrastructure	1	1	0	1	0	2	0	1.5
Land-use management	2	2	2	2	2	2	2	1.5
Cost-effectiveness	2	2	2	2	1	2	2	1.5
Capacity building	2	2	2	2	2	2	1	1.5
Reduction of GHG	2	2	2	1	1	2	1	1
Environmental degradation	2	2	2	2	2	2	2	1
Total	50	50	43.5	41.5	41	44	43.5	
Rank	1	1	4	6	7	3	4	

Water Resources

Criteria	Scores						Weight
	2A	2B	2C	2D	2E	2F	
Loss of life	1	0	2	0	2	0	2.5
Loss of livelihood	2	2	0	2	2	2	2.5
Food security	2	2	0	1	2	2	2.5
Water availability, quality and accessibility	2	1	2	2	2	2	2.5
Biological diversity	0	1	0	2	-1	1	2.5
Conflict resolution and peace-building	2	1	0	0	1	0	2.5
Sustainability	0	1	2	2	1	2	2.5
Equity	2	1	0	1	2	1	2.5
Synergy with national policies and MEAs	2	2	2	2	2	2	1.5
Essential infrastructure	2	1	2	0	2	0	1.5
Land-use management	1	2	0	2	2	2	1.5
Cost-effectiveness	1	2	2	2	1	1	1.5
Capacity building	1	2	2	2	2	2	1.5
Reduction of GHG	0	1	0	1	-1	0	1
Environmental degradation	0	1	2	2	-1	2	1
Total	38	38	29	40	39	37.5	
Rank	3	3	6	1	2	5	

Agriculture

Criteria	Scores					Weight
	3A	3B	3C	3D	3E	
Loss of life	0	0	0	0	0	2.5
Loss of livelihood	2	2	2	2	1	2.5
Food security	2	2	2	2	2	2.5

Water availability, quality and accessibility	0	1	1	2	2	2.5
Biological diversity	1	1	1	1	0	2.5
Conflict resolution and peace-building	1	1	2	2	2	2.5
Sustainability	2	2	2	2	2	2.5
Equity	2	1	1	1	2	2.5
Synergy with national policies and MEAs	2	2	2	2	2	1.5
Essential infrastructure	1	1	1	1	1	1.5
Land-use management	1	0	2	2	2	1.5
Cost-effectiveness	2	1	2	2	2	1.5
Capacity building	2	2	2	2	2	1.5
Reduction of GHG	0	0	1	2	2	1
Environmental degradation	0	0	2	2	1	1
Total	37	34	44	47.5	44	
Rank	4	5	2	1	2	

Disaster Risk Reduction

Criteria	Scores					Weight
	4A	4B	4C	4D	4E	
Loss of life	2	2	2	0	0	2.5
Loss of livelihood	2	1	2	2	0	2.5
Food security	2	1	1	2	0	2.5
Water availability, quality and accessibility	0	1	0	1	2	2.5
Biological diversity	0	0	1	2	1	2.5
Conflict resolution and peace-building	1	1	1	1	1	2.5
Sustainability	2	2	2	2	1	2.5
Equity	2	2	2	1	1	2.5
Synergy with national policies and	2	2	2	2	2	1.5

MEAs						
Essential infrastructure	2	1	0	0	1	1.5
Land-use management	1	0	1	2	2	1.5
Cost-effectiveness	2	2	2	2	1	1.5
Capacity building	2	2	2	2	2	1.5
Reduction of GHG	0	0	0	2	1	1
Environmental degradation	1	0	1	2	2	1
Total	42	35.5	39	43.5	30	
Rank	2	4	3	1	5	

Policy and Institutional Framework

Criteria	Scores					Weight
	5A	5B	5C	5D	5E	
Loss of life	2	1	2	0	2	2.5
Loss of livelihood	2	1	2	0	2	2.5
Food security	1	1	1	0	1	2.5
Water availability, quality and accessibility	1	1	1	0	1	2.5
Biological diversity	1	2	2	0	2	2.5
Conflict resolution and peace-building	1	2	1	2	1	2.5
Sustainability	2	2	2	2	2	2.5
Equity	2	2	1	2	2	2.5
Synergy with national policies and MEAs	2	2	2	2	2	1.5
Essential infrastructure	1	1	2	0	1	1.5
Land-use management	1	2	2	1	2	1.5
Cost-effectiveness	2	2	2	2	2	1.5
Capacity building	2	2	2	2	2	1.5
Reduction of GHG	1	1	1	0	1	1
Environmental degradation	1	2	2	0	2	1
Total	44	46.5	48	25.5	49	
Rank	4	3	2	6	1	