GOVERNMENT REPUBLIC OF SUDAN

Ministry of Agriculture and Forests

Forest National Corporation

NATIONAL REDD+ STRATEGY AND ACTION PLAN

Revision

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Acronyms

BSM	Benefit Sharing Mechanism
CAADP	Comprehensive Africa Agriculture Development Programme
CC	Climate Change
CRs	Carbon Rights
CSOs	Civil Society Organizations
DIFD	Department of International Development-Gv.UK
DoD	Drivers of Deforestation & Forest Degradation
EIA	Environmental Impact Assessment
ERPs	Emission Reduction Programmes
ESFM	Environmental and Social Framework
FAO	Food & Agriculture Organization of United Nations
FCPF	Forest Carbon Partnership Facility
FNC	Forests National Corporation
FRA	Global Forests Resources Assessments-FAO
DD	Deforestation and degradation
GA	Gum Arabic
GB	Gum Belt
GAPAs	Gum Arabic Producer Associations
GEF	Global Environment Facility
GFDL	Geophysical Fluid Dynamics Laboratory
GgCO2e	Gigaton of Carbon Dioxide Equivalent
GGWSS	Great Green Wall of Sahara & Sahel
GMES	Global Monitoring for Environment and Security
GoS	Government of Sudan
GRM	Grievance Redress Mechanism
HADGEM	Hadley Centre Global Environment Model
HCENR	Higher Council for Environment and Natural Resources
ICRAF	International Centre for Research in Agroforestry
IDPs	Internally Displaced Persons
INDCs	Intended Nationally Determined Contributions
IPSL	Institut Pierre Simon Laplace (France)
LPG	Liquid Petroleum Gas
LULUCF	Land-use Land-use Change and Forests

MAF	Ministry of Agriculture and Forests
MinAF	Minister of Agriculture and Forests
MIROC	Model for Interdisciplinary Research on Climate and Earth System
MRV	Monitoring Reporting and Verification
NAIP	National Agricultural Investment Programme
NDS	National Development Strategy
NEPAD	New Partnership for Africa's Development
NGOs	Non-Governmental Organizations
NRSC	National REDD Steering Committee
NRS	National REDD+ Strategy
NSC	National Strategic Council
NWFPs	Non-wood Forest Products
PFM	Participatory Forest Management
PMU	Project Management Unit
RBP	Results-based Payments
REDD+	Reducing Emissions from Deforestation & Forest Degradation and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries
RoS	Republic of the Sudan
R-PP	Readiness Preparation Proposal
SECS	Sudanese Environment Conservation Society
SESA	Strategic Environmental and Social Assessment
SDG	Sudanese Pound
SFM	Sustainable Forest Management
SIS	Safeguards Information System
SNRM	Sustainable Natural Resources Management
TLU	Tropical Livestock Unit
TOE	Tons of Oil Equivalent
TWG	Technical Working Group
UNCCD	United Nations Convention on Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar ($)

EXECUTIVE SUMMARY

1. The Republic of Sudan (RoS) is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and is a REDD+ partner country. The objective of REDD+ is to reduce emissions from deforestation and forest degradation and increase carbon dioxide sequestration through the conservation of forest carbon stock, sustainable management of forests and enhancement of forest carbon stocks. REDD+ participant countries are eligible for results-based payments for verifiable emission reductions andor enhanced carbon stocks.

2. The RoS developed its REDD+ Readiness Preparation Proposal (R-PP) in 2014, and officially started the implementation of the R-PP in 2015 with an initial grant of USD3.8 million and an additional USD5 million in 2018from the World Bank´s Forest Carbon Partnership Facility (FCPF).

3. This National REDD+ Strategy (NRS) outlines how Sudan will implement REDD+ over a 10 year period from 2022 to 2032.

Country Background

4. The 2020 State of the Environment Report (SOE) outlines Sudan´s aspiration to be a key world player and meet its targets for social and economic development,as it begins an era of political stability and economic recovery. Sudan is committed to its Zero Hunger and Zero Thirst programmes, while also aspiring to meet targets under the Sustainable Development Goals (SDGs) . Under a new political environment, Sudan will make major policy shifts to meet its 2030 agenda as well as considerations for 2050 net-zero targets.

5. The RoS is highly vulnerable to climate change and climate variability, predominantly a result of climatic and non-climatic factors. Climatic factors constitute, in particular, temperature increases and infrequent precipitation. Air temperatures steadily increased over the period 1960 – 2009, with temperature increases between 0.2°C and 0.4°C per decade for the periods March – June and June – September. When averaged across all seasons, temperatures in the 2000-2009 periods are roughly between 0.8°C and 1.6°C warmer than they were in the 1960 – 1969 period. Rainfall is also very variable and is becoming increasingly unpredictable. During the period 1981 – 2012 the rainfall in the whole country was significantly lower compared to 1971 – 2000 (RoS, 2013)

6. As a Least Developed Country (LDC), multiple non-climatic stresses such as ecosystem degradation, complex disasters and conflicts, and limited access to capital, markets, infrastructure and technology has weakened people's ability to adapt to changes in climate. While there is been political change following years of economic sanctions, this situation continues to be a persistent challenge for the RoS, hence climate change mitigation and adaptation are important priorities for the Government.

Deforestation and Forest Degration

7. In 1958 it was estimated that the tree cover in Sudan was between 35-43 percent (Harrison and Jackson, 1958). This estimate was for the area that now encompasses both the Republic of South Sudan and the RoS. Due to the fact that the north of Sudan was categorized by desert/ semi-desert and the south contained the largest areas of forest, the formation of the Republic of South Sudan in 2011 led to a reduction in forest loss for RoS.

8. The amount of forest in the present day RoS is estimated to be approximately 19.2 million ha, covering 10.66 percent of the country (FRA 2015). In addition to geo-political changes, forest cover has declined considerably, with an estimated annual rate of deforestation of approximately 542,000 ha, or about 2.4 percent. This rate of deforestation places the country among the ten highest deforestation countries in the world.

9. Deforestation in Sudan is largely driven by commercial agriculture, followed by urban sprawl, infrastructure development, petroleum exploration, mining, and refugees and internally displaced people. Ranking undertaken exclusively by local communities in all states indicated that expansion of agriculture is the most important driver, followed by energy consumption, overgrazing, drought, fire, lack of awareness and infrastructure. Agriculture in Sudan comprises of both subsistence forms and commercial enterprises. Despite increasing urbanization, a large segment of the population is employed in the agricultural sector. Studies show thatthat up to 80 percent of the population depend on agriculture for income earning activities (MEPD, 2013).

10. This focus on agriculture, oil and mining has resulted in deforestation, degradation of forests and rangelands, and widespread pollution of land, water and air. Many of these threats will remain as long as the people's economic insecurities remain. For example, one reason for the degradation of pastures is that pastoralists are being forced to graze their animals in increasingly small spaces because of oil exploration, mining operations and the expansion of croplands.

11. The underlying causes of deforestation and forest degradation in the RoS range from governance challenges, weak law enforcement, economic pressures, poverty and demographic factors.The key underlying causes of deforestation include population growth, subsistence agriculture, increase in livestock population, legal and institutional gaps, and limitations in stakeholder participation in natural resource management.

12. The current population is estimated to be 43.8 million, having increased from 30.9 million in 2008 (Worldometer, 2020). The current growth rate is estimated at an average of 2.8 percent per year, with the population estimated to reach 55.3 million in 2030 and, 67.9 million in 2040. This high population growth and urbanization is likely to result in challenges fromincreased pressure on natural resources, specifically on forests as demand increases for for energy (fuel wood and charcoal), housing (timber), infrastructure development, urban sprawl, and agricultural land.

13. Livestock numbers have increased considerably resulting in a feedstock deficit. Feedstocks are estimated to be 128 million tons, which is below the estimated requirement of 133 million tons per year. The deficit in feedstock can result in significant animal mortalities in some years. The high numbers of animals are also having an impact on forest degradation, through intensive grazing of seedlings and herbaceous plants.

14. Subsistence farming provides a key role in the provision of food security, reduction of poverty, provision of employment opportunities, and stability for Sudanese citizens. A large number of people practice subsistence agriculture throughout Sudan, particularly in the western parts of the country. Poor people, who are not able to acquire permanent holdings on productive lands, will clear forest for short-term farming. This is often undertaken in a non-rotational manner, meaning that fields do not have time to return to secondary forest.

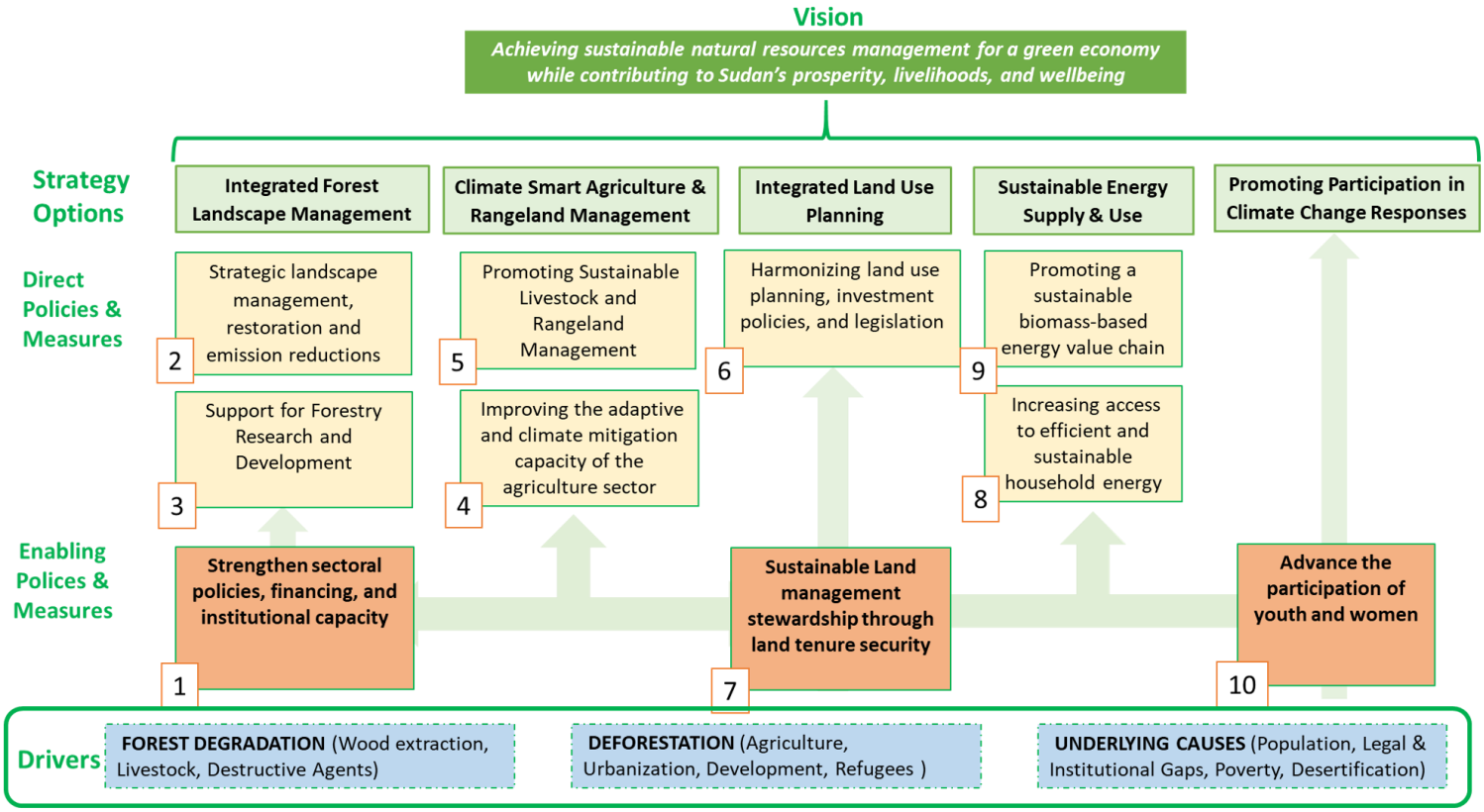
15. Existing policy and regulatory instruments for forest conservation and management have significant limitations, which include inadequate intersectoral coordination, inadequate institutional capacity, particularly at local levels; and poor law enforcement resulting in rampant illegal activities. Government institutions suffer from instability, underfunding, a lack of staffing and training, poor coordination, overlapping roles, and lack of skilled personnel.

The National REDD+ Strategy

16. The Vision for the Sudan National REDD+ Strategy is 'Achieving sustainable natural resources management for a green economy, while contributing to Sudan's prosperity, livelihoods, and wellbeing'. Within the objective of REDD+ to reduce emissions from deforestation and forest degradation and enhance carbon stocks through the conservation, sustainable management of forests and enhancement of forest carbon stocks, thishis strategy seeks to achieve these measures within a far broader vision that provides co-benefits, including enhancing livelihoods, protecting ecosystem services, and conserving biodiversity. To achieve the vision, there are five Strategy Options, which are multi-sectoral and take into consideration the national socio-political and economic context in Sudan.

17. The **Error! Reference source not found.**below summaries the Strategy, including the Vision, Strategy Options, and cross-cutting Policies and Measures (PAMs). The Strategy Options define the general direction that the RoS will take to achieve the vision of the REDD+ program. These strategic options will be programmatically implemented through the PAMs and actions. The NRS is supported by a strong social and environmental safeguards framework, benefit sharing framework, national forest monitoring systems encompassing a 5-year action capacity development plan, and monitoring and evaluation. During the process of developing the strategy, a number of alternative options were examined, before deciding on the post appropriate mix of actions.

Figure 1-1 NRS Outline of Vision, Strategy Options & PAMs



Feasibility Analysis

18. The feasibility analysis conveys how REDD+ and the Strategy Options fit into the context of the national economic development framework and to convey implications on existing policies and institutional establishments, including how deforestation and forest degradation are addressed. It further assesses the enabling conditions with respect to existing policies, regulatory measures, institutional settings, gaps and barriers that could limit the objectives of the NRS.

19. There are costs and investments required to implement the NRS and avoid or minimize displacement of emissions to other regions or sectors. Therefore, it is necessary to determine the cost and benefits that are likely to accrue from implementing the NRS. Such an analysis enables an understanding of the level of fund mobilization and benefit sharing. For this NRS, a cost-benefit analysis (CBA) was undertaken, in which each of the PAMs were evaluated for costs and benefits generated over a period of 20 years. This high-level exercise provides standardized information, allowing for the most effective and efficient PAMs to be selected and targeted.

20. The effectiveness of each of the PAMs was determined by estimating the costs of implementation based on the target actions required to meet each PAM. These activities were further diffused into budget actions and costed using national and international reference costs. The targets were set from reference ambitions for Sudan, such as the published INDC, the Sudan's First and Second National Communications under the UNFCCC, Sudan's REDD+ Readiness Assessment, 2019 FAO crop and food supply assessment mission (CFSAM) to Sudan, Sudan First State of Environment and Outlook Report, Sudan's forest reference emission levels/forest reference levels (FRELs/RELs), published research papers and other reports. Where data was not available, educated estimates based on comparable countries or other sources were made.

21. The CBA is based on the targets target actions from each PAM. The net present value and the internal rate of return were calculated on the basis of the costs and the monetary (economic) and non-monetary (social) values of the benefits from implementation of the PAMs.

22. The five Strategy Options and proposed intervention actions are highly relevant and respond to the identified drivers and underlying causes of deforestation and forest degradation. Quantitative and qualitative analysis shows that a combination of regulatory and institutional strengthening would have a greater impact on reducing deforestation and forest degradation.

23. The combined results of the CBA, economic valuation, and climate change mitigation potential show that the five Strategy Options will enable Sudan to address the direct and indirect drivers of deforestation and forest degradation, while contributing to national economic development agenda. With regards to the ten PAMs, the range of net present values and climate change mitigation potential show that there is need to take a balanced investment approach to draw maximum returns and social, environmental, and economic benefits. Implementing the NRS is estimated to require approximately USD 41.6 million during the first 10 years. From this investment, the NRS will generate and accrue USD415.2 million in carbon benefits over 20 years and net combined benefits (monetary, carbon and non-carbon benefits) more than US 3.9 billion over 20 years of which 41% is monetary benefits.

Table 1-1 Summary NRS Emission Reduction potential and implementation cost estimate

PAM	Potential Total CO2e impact (Gg)	Average CO2e impact per year (Gg)	Potential Net Income from Carbon (USD5.1/ton)	Cost estimate (US$)
1	161,728	8,086	41,240,556	9,770,000
2	1,067,987	53,399	272,336,664	12,825,000
3	33,680	1,684	8,588,444	670,000
4	201,350	10,067	51,344,244	7,210,000
5	45,798	2,290	11,678,432	3,360,000
6	16,840	842	4,294,222	970,000
7	25,260	1,263	6,441,333	1,480,000
8	33,680	1,684	8,588,444	1,540,000
9	25,260	1,263	6,441,333	1,070,000
10	16,840	842	4,294,222	1,240,000
Total	**1,628,423**	**8,142**	**415,247,891**	**41,635,000**

NRS Financing and Implementation Arrangements

24. The NRS is an important instrument that will contribute to the RoS´s climate response strategies. Several options will be considered to develop a financial vehicle to drive the implementation of the NRS, through which the required domestic and international funding will be raised, and financial allocations will be coordinated.

25. Financing of REDD+ interventions will require consideration of various modalities. This NRS proposes setting up a REDD+ or a National Climate Change Fund. Sudan will benefit from establishing a fund that harmonizes and rationalizes climate change finance, both from domestic and external sources, for the implementation of national climate change response priorities including REDD+, NAMA, NAPA and NDC, in line with the 2015 Paris Agreement. The purpose of the Fund will need to be clearly stated in a way that is understandable to all relevant stakeholders, applicants, and potential recipients. It will be necessary to determine the nature of the Fund, including the nature of monetary disbursements (loan, grant, or a mixture of both) and the nature of any non-monetary carbon benefits that may be granted.

26. Lessons can be learnt from other countries that have successfully established climate funds such as Rwanda which has established a multi-window climate fund. For Sudan, such a fund may have multiple windows, each of which will have a different disbursement modality. The types of projects that will be funded will also need to be fully identified and articulated. For example: funds may be required for administration and planning (e.g., establishing integrated land use management

plans, rangeland management); technology development and adoption (e.g., promoting climate change adaptive agricultural technologies); development of services (e.g., improved waste management and sanitization); capital development (e.g., climate proofed infrastructure for energy, telecommunication, transport and water sectors); capacity building (e.g., increasing knowledge and skills of various organizations in climate change management); and, education and awareness (e.g., promoting energy efficient technologies).

DOCUMENT STRUCTURE

27. This document has eight main sections starting with a brief overview (Section 1) outlining the vision, guiding principles and approach used to prepare the NRS. This is followed by a background (Section 2) summarizing the national economic and environmental context as well as the evolution of REDD+ in Sudan.

28. Sections 3 outlines the land use and land cover change scenarios, drivers and underlying causes of deforestation and required responses. The strategy options are described in more detail in Section 4 followed by a feasibility assessment in Section 5 which also includes an outline of financing options. A benefit sharing framework is presented in Section with high level proposal for benefit flow.

29. Sections 7 and 8 focus on the key elements for implementation of the NRS. These include the national forest monitoring and MRV framework for REDD+, social and environmental safeguards and monitoring and evaluation. Section 8 specifically outlines aspects of capacity building, and these are closely related to the NRS Action Plan presented in Annex 1.

1 Overview of the Sudan National REDD+ Strategy

1.1 Vision of National REDD+ Strategy

Achieving sustainable natural resources management for a green economy while contributing to Sudan's prosperity, livelihoods, and wellbeing.

30. In achieving this vision, the NRS focuses on synergizing with and contributing effectively to the National Development Strategy of the Ros, which aims to achieve a green prosperous country by 2030, while maximizing carbon and non-carbon benefits through improved sustainable natural resources management.

1.2 Guiding Principles

31. The NRS is based on a set of guiding principles.

32. **Pursue low-carbon development:** The overarching guiding principles are those set by the RoS. In its NDC, the RoS views the planning process as a way to reduce GHG emissions, or rather pursue low-carbon development, as an opportunity to strengthen national capacity, promote sustainable resource management, facilitate technology transfer, and identify synergies between national economic objectives and sustainable development. The NRS recognizes these objectives and the uniqueness of the country's variable climatic and geophysical conditions, low percentage of forest cover, and multiple stresses such as ecosystem degradation, complex disasters and conflicts, and limited access to capital, markets, infrastructure and technology which reduce the ability to adapt to changes in climate.

33. **Reducing vulnerability to climate change:** The NRS outlines the vulnerability of the RoS to climate change, which has been exacerbated due to the recent historical socio-political and economic situation. About 70% of the Sudanese population is dependent upon crop production animal husbandry for livelihoods. The agricultural sector faces significant risk from desertification of arable areas with humid agro-climatic zones shifting southward, rendering vast arable lands increasingly unsuitable for agriculture production.

34. **Alignment with national economic development objectives:** The NRS aligns with Sudan's Twenty-Five Year Development Strategy (2007-2031) which aims to reduce poverty by over 50% (MEPD, 2017). This NRS supports green economic recovery and a transition to low emissions, increased resilience to climate change, and sustainable development pathways in the forestry, agriculture, livestock, energy and mining sectors, as well as other cross-cutting areas. The NRS also recognizes that the pressure on natural resources and challenges that accompany economic growth are likely to increase over the next decade. Economic diversification and sustainable resource utilization will be key to ensuring that communities are resilient, while enjoying the benefits and having access to opportunities to improve livelihoods.

NRS PHASES	
PHASE I:	2022 –2026
PHASE II:	2027 – 2031
PHASE III:	2032– - BEYOND

35. It is envisaged that the successful implementation of REDD+ programme will ensure that the forest sector achieves 50% of the national emissions reduction target set in RoS's NDC by 2030 and will lead to the realization of low carbon development.

36. **Phased approach:** The RoS is in a socio-political and economic transitional phase that will require strategic prioritization, focused resource mobilization, and capacity building across all sectors. This requires flexibility and realistic planning and implementation of REDD+ activities. To develop capacity for landscape management, Emission Reduction Programs (ERPs)will be implemented in selected priority regions, with subsequent upscaling. As such, although NRS will be eventually implemented at national scale, the RoS shall initially prioritize REDD+ ERPs for addressing deforestation in hotspot areas, protection and restoration of natural forest areas. Accordingly, the strategic period for implementation of the planned activities is divided into short, medium and long-term phases.

37. In the short term (Phase 1), the NRS focuses on preparing ERPs, improving enabling conditions (forest policy and legislation, land tenure, governance, micro/macro zoning and land use planning, MRV, financing, forest extension and awareness, inter-sectoral coordination and institutional capacity) for REDD+ implementation. This also includes operationalization of the national forest monitoring system, mobilizing non-results-based investments, and designing and implementing prioritized REDD+ policies, social and environmental safeguards framework, and benefit sharing framework.

38. In the medium-term (Phase II) the NRS focuses on increased investments and scaling up REDD+ ERPs at a national scale and starts operationalizing results-based payment (RBP) at sub-national levels. The main target in this period is to attempt to bring net deforestation rate to 25% of 2018 levels.

39. In the long-term (Phase III), the goal is to roll out REDD+ ERPs at full national scale and operationalize national RBPs. In this period, the objective so make RoS's forests and land areas a net carbon sink and address 50% of national emission reduction target by 2040.

40. **Broad Stakeholder engagement:** This strategy represents the vision of a broad range of stakeholders, including government, forest-dependent communities, non-governmental organizations, CSOs, and the private sectors, including consultations with youth and women. Through extensive consultation and a collaborative process, which started in 2012, the government and stakeholders have worked to identify potential strategy options and practical interventions.

41. This process was supported by a range of feasibility studies, assessing land use, governance capacity and knowledge for sustainable forest management. Multi-disciplinary and multi-sector dialogue and commitment are essential to the long-term success of this strategy. At each stage of developing and implementing this strategy, engaging with all stakeholders has and will continue to be a fundamental requirement to ensure ownership and inclusiveness. This proactive and participatory approach has been guided by five key principles outlined in **Error! Reference source not found.**

Table 1-1 Stakeholder Engagement Guidelines

Principle	Description
Participatory and inclusive	Relevant stakeholders and experts, including men and women from vulnerable, marginalized forest-dependent groups and communities, and youth are included in the decision making on the design, implementation and evaluation of relevant REDD+ activities. They also participate in the implementation of relevant REDD+ activities whenever it is appropriate.
Transparency and accountability	This ensures a transparent feedback mechanism that is easily accessible and understandable to men and women from indigenous and non-indigenous local communities, in order to inform and improve current and future stakeholder engagement processes for REDD+.
Mutual understanding over shared responsibilities	Stakeholders understand how relevant REDD+ activities impact on themselves and agree what their roles and responsibilities are. This approach ensures the sustainability of the REDD+ programme
Human rights-based approach	Human rights-based approach identifies and differentiates rights holders and their entitlements from duty bearer and their obligations. Efforts are made to strengthen the capacities of rights holders to make their claims and duty bearers to meet their obligations
Gender and Youth Responsiveness	Promote the mainstreaming of gender in REDD+ planning, implementation, monitoringand knowledge management activities, to achieve gender-responsive REDD+ actionand contribute to SDG #5 on gender equality.

1.3 Approach to the Strategy

42. This strategy is anchored on five years of REDD+ readiness preparation to establish an implementation framework, supported by strong national ownership and strong political commitment. National ownership and participation of stakeholders (including the community and private sectors) are two critical principles that should be supported by robust and technically rigorous work across the environmental, economic and social aspects. As such, this strategy sets the framework for implementation at both national and in a decentralized manner at the sub-national level.

43. This strategy is accompanied by a number of analytical documents, including:

- Analysis of Drivers of Deforestation and Forest Degradation.
- Feasibility analysis of strategy options.
- Safeguards Framework: Strategic Environmental and Social Assessment (SESA), Environmental and Social Management Framework (ESMF) and Safeguards Information System (SIS).
- Feedback, Grievance and Redress Mechanism
- Benefit Sharing Framework.
- National Forest Monitoring System (NFMS), REDD+ Monitoring Reporting and Verification (MRV) and Forest Reference Emission Level (FREL).

44. The analytical work carried out during the REDD+ readiness phase provided valuable insights into the sectoral strengths, challenges, and opportunities in managing natural resources, in a manner that reduces the impact of human activities and ensures sustainable resource use. The REDD+ framework does not just take a single focus but is designed with the flexibility to complement a broad range of national programs, including those already under implementation and those planned for the future. The strategy stresses the need for multiple, flexible and collective interventions, which mutually reinforce each other within and across all sectors.

45. This strategy represents the vision of a broad range of stakeholders, including government, forest-dependent communities, non-governmental organizations, CSOs and the private sectors. Through extensive consultation and collaborative process, which started in 2012, the government and stakeholders worked to identify potential strategy options and practical interventions.

46. This process was supported by a range of feasibility studies, assessing land use, governance capacity and knowledge for sustainable forest management. Multi-disciplinary and multi-sector dialogue and commitment are essential to the long-term success of this strategy. At each stage of developing and implementing this strategy, engaging with all stakeholders has and will continue to be a fundamental requirement to ensure ownership and inclusiveness.

47. The consultation process also provided a framework that identifies strategic pillars that the NRS must support. These pillars fall into three broad categories illustrated in Figure 1-1.Thus, strategy options, policies and measures (PAMs) and eventual actions are formulated based on these strategic pillars.

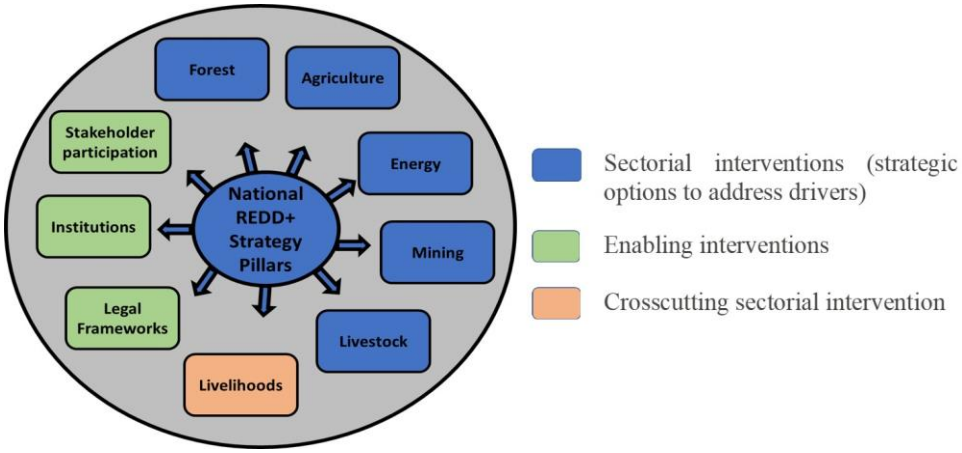


Figure 1-1 NRS Strategic Pillars

1.4 Crosscutting Themes

1.4.1 Gender Mainstreaming

48. As outlined under UN-REDD guidelines, gender mainstreaming relies heavily on stakeholders having a proper understanding of and knowledge on gender equality and women's empowerment concepts. Awareness raising and capacity building on gender among stakeholders is therefore crucial to help ensure gender is effectively mainstreamed. Such efforts will range from including training discussions on the need for and benefits of gender-responsive REDD+ processes and addressing misperceptions concerning gender issues, to building capacity on how to integrate gender considerations throughout the REDD+ policy cycle. Capacity building will take the form of specific training on gender approaches, the engagement of gender specialists in technical work, and the inclusion of gender elements in state level action plans.

49. Land degradation has a negative impact on food security and the incomes of the rural population. Women are made disproportionately worse off, since the scarcity of fuelwood and water adds to their workload. In conflict-affected areas land degradation remains a major cause of violence against women, who are subjected to attacks and sexual violence when venturing away from their homes seeking water and fuelwood (UNEP et al., 2013). Land degradation results in a scarcity of productive land, which heightens demand and competition for natural resources and often leads to conflict.

50. Matters of gender equality in relation to livestock, especially small animals, which are often owned by women who have no access to land, require specific attention. Women (and children) need to have priority access to animal products for consumption or sale because they reduce much of the drudgery of women's and children'swork when used for transport. It is, therefore, necessary that the NRS provides and creates the necessary enabling environment for reducing the burden on women.

51. Undertaking such activities with gender-responsive participation can inform effective and efficient REDD+ processes by more accurately taking into account the specific knowledge, distinct needs, perspectives and contributions of women and men from various groups. It can also increase the likelihood of widespread support, ownership, and sustainability of REDD+ processes. To achieve this, in addition to encouraging the nomination and participation of women in meetings, briefings on workshop topics should be circulated to all participants prior to the meetings (to ensure equal capacity to participate); mentors need to be identified early in the provision of REDD+ support and mandated to encourage gender equal participation; and regular reports should reflect the gender participation rates within supported activities.

1.4.2 Youth Participation

52. Climate change has increased levels of uncertainty about our future. However, it is the young people of today will be most affected in all aspects of their lives by the impacts of climate change, requiring them and future generations to meet increasing challenges across a range of sectors. The impacts of climate change are threatening crop and livestock production, forestry, fisheries, and aquaculture. Impacts on the agriculture sectors include increased water and land scarcity, soil and land degradation, loss of biodiversity and more frequent and severe weather events resulting in droughts and floods. These changes will perpetuate food insecurity, malnutrition, ill health, and migration, rendering youth particularly vulnerable.

53. Youth constitute the majority of the population in many countries, and they are showing strong social and environmental awareness, which has the power to transform our societies towards a low-carbon and climate resilient future. Youth are becoming increasingly active contributors to climate action, becoming **agents of change**, entrepreneurs, and innovators. Some of these youth-led initiatives in Sudan have won global awards, such as the Mutasim Nimir Center for Environmental Culture for its proposed project Documenting Local Climate Knowledge; the center received the Climathon Global Award for Culture Innovation, which is a celebration of transformative solutions tackling climate change on a local level. Many young people also participated in the World Bank Sudan ENB photo contest.

1.4.3 Grievance Mechanism

54. REDD+ seeks to do good for all parts of society. However, the existing and/or potential conflicts and grievances that could arise during the REDD+ readiness activities and implementation of REDD+ Strategy include: conflict over boundaries of forest reserves, conservation areas and national parks; authenticity of land titles; challenges with equitable revenue sharing; selective application of the law by the authorities;

wildlife/forest conservation, restricted exploitation of natural resources and the search for livelihoods for local communities; and land use and conflicts between local governments.

55. Conflict over the functions and benefits from forests and rangeland resources have been witnessed between the central government and state authorities in Sudan. The central authorities have concerns about wood supply for urban needs, especially construction and other infrastructure development, such as fuel wood, communications transmission poles, building poles, railway sleepers and construction timber. At the state level concerns about local needs, especially fuelwood, NWFPs and fodder for livestock, need to be considered.

56. The potential sources of grievances identified within the REDD+ readiness phaseinclude access to land and use of forest resources by forest dependent communities; access to the forests by fraudulent land titles; unauthorized trading on forest products; and unfair pricing and marketing policies of forest products. To avoid potential conflicts, it is necessary that REDD+ supports institutional capacity for development, professional conduct, eliminating policy conflicts between federal and state institutions, clarify roles and responsibilities, and support spatial planning including demarcation of boundaries of most forests and forest reserves, central forest reserves, district forest reserves, and private forests.

57. Grievances may also arise from ambiguity over the benefits and values from the REDD+ to direct beneficiaries or affected persons and other interested parties. The recent rush for gold mining has destroyed parts of natural forests where smallholders traditionally practiced cultivation, herding, fuelwood harvesting, wild fruit gathering or fishing. Use of poisonous products by thegold seekers has often endangered human and livestock lives.

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1.5 Strategy Options

58. The Strategy Options define the general direction that the RoS will take to achieve the vision of the REDD+ program. This NRS outlines five broad strategic options Table 1-2. These strategic options will be programmatically implemented through a set of policies and measures (PAMs) and actions, which collectively address the direct and underlying/indirect drivers of forest deforestation and degradation outlined under the strategic pillars.

59. The NRS is supported by strong social and environmental safeguards system, benefit sharing framework and monitoring and evaluation. During the process of developing the strategy, a number of alternative options were examined before settling on this final set of strategic aims and actions.

Table 1-2 Policies and Measure

STRATEGY OPTION	
STRATEGY OPTION 1: INTEGRATED FOREST LANDSCAPE MANAGEMENT	
PAM 1	*Strengthen sectoral policies, financing, and institutional capacity*
PAM 2	*Strategic landscape management, restoration and emission reductions*
PAM 3	*Support for forestry research and development*
STRATEGY OPTION 2: CLIMATE SMART AGRICULTURE AND RANGELAND MANAGEMENT	
PAM 4	*Improving the adaptive and climate mitigation capacity of the agriculture sector*
PAM 5	*Promoting sustainable livestock and rangeland management*
STRATEGY OPTION 3: INTEGRATED LAND USE PLANNING	

PAM 6	*Harmonizing land use planning, investment policies, and legislation*
PAM 7	*Sustainable land management stewardship through land tenure security*
STRATEGY OPTION 4: SUSTAINABLE ENERGY SUPPLY AND USE	
PAM 8	*Increasing access to efficient and sustainable household energy*
PAM 9	*Promoting a sustainable biomass-based energy value chain*
STRATEGY OPTION 5: PROMOTING PARTICIPATION IN CLIMATE CHANGE RESPONSES	
PAM 10	*Advance the participation of youth and women*

60. Section 4 describes the NRS options and PAMs in more detail including cost benefit analysis in Section 5

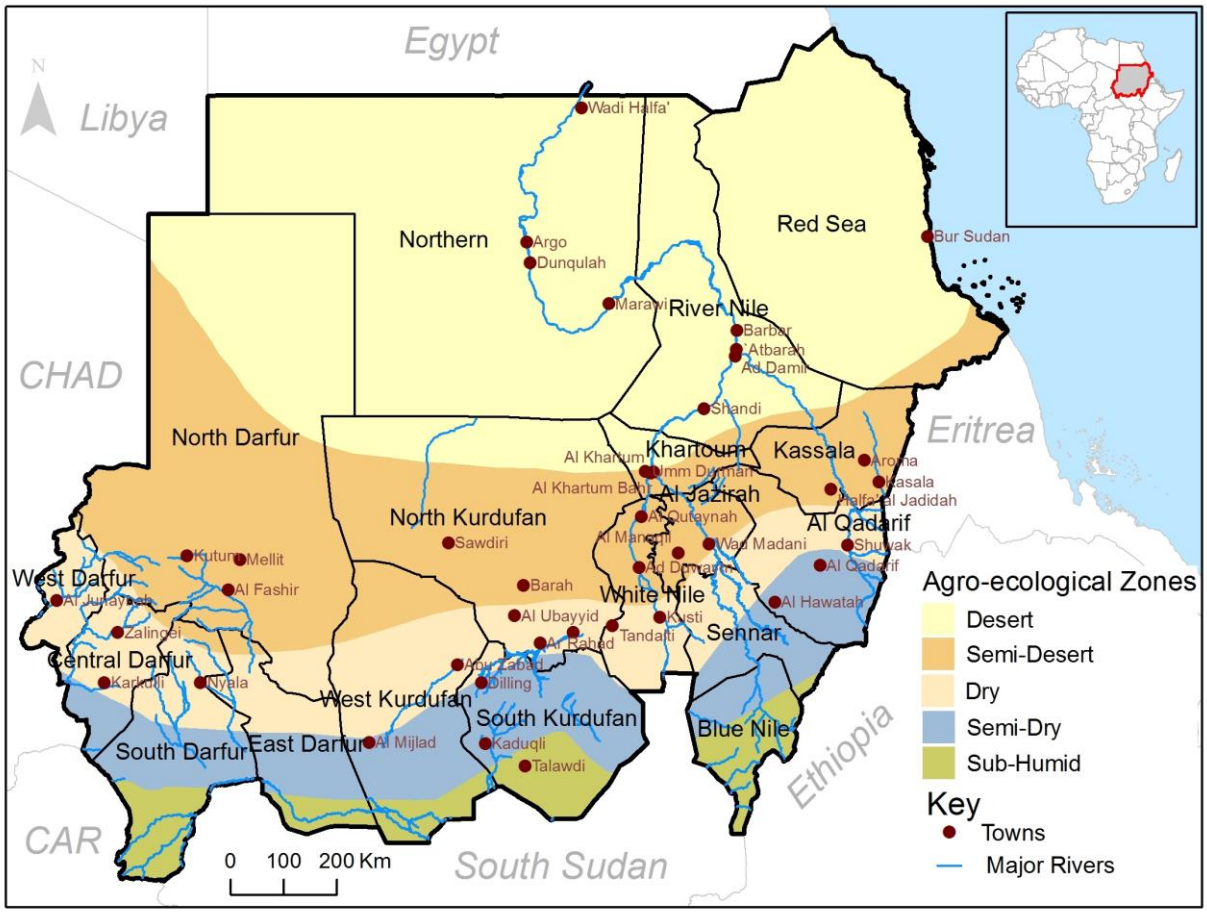
2 BACKGROUND

2.1 Geographic Context

61. Sudan is located strategically on the Red Sea, the most important ocean shipping route between two of the world's largest markets - Asia and Europe. The country borders Chad, Egypt, Eritrea, Ethiopia, Libya, and South Sudan and faces Saudi Arabia across the Red Sea. Port Sudan is near the Suez Canal, Djibouti, and the Gulf of Aden.

62. Sudan is a federal nation divided into 18 states (Ministry of Information 2018): Al Bahr al Ahmar (Red Sea), Al Jazirah (Gezira), Al Khurtum (Khartoum), Al Gedaref (Gedaref), An Nil al-Abyad (White Nile), An Nil al-Azraq (Blue Nile), Sennar (Sennar), Ash Shamaliyah (Northern), Kassala (Kassala), Nahr an Nil (River Nile), Sharq Darfur (East Darfur), Shimal Darfur (North Darfur), Gharb Darfur (West Darfur), Janub Darfur (South Darfur), Wasat Darfur (Central Darfur), Gharb Kurdufan (West Kordofan), Janub Kurdufan (South Kordofan) and Shimal Kurdufan (North Kordofan).

Figure 2.2 National territory of the Republic of Sudan showing the agro-ecological regions.



63. The area of the Republic of Sudan (RoS) is 1.88 million km² (188.6 million hectares). Of this area, 50.7 percent is bare rocks and soil and/or other unconsolidated materials. Approximately 39% of Sudan is desert. The majority of the land is composed of vast arid plains, interrupted by a few widely separated ranges of hills and mountains.

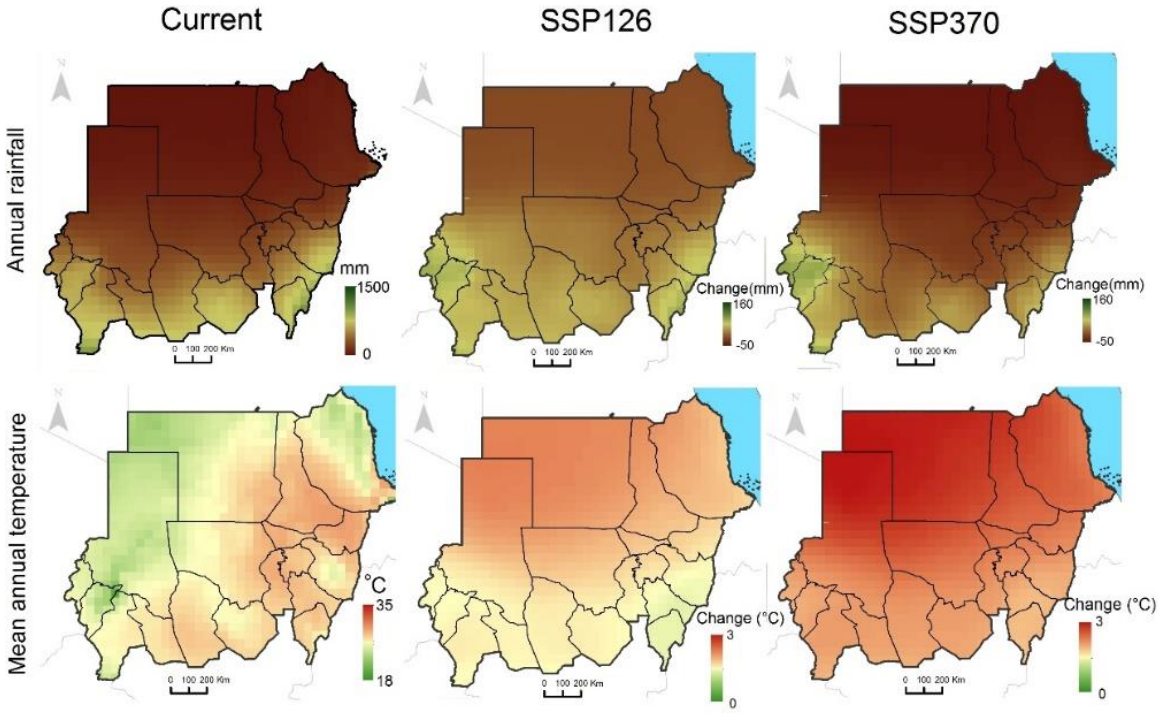
64. Sudan's climate is characterized by its diversity. The ecological zones extend over a wide range from the desert in the extreme north to the forests in the south, in addition to the freshwater and marine and coastal environments. Arid and semi-arid ecosystems constitute most of Sudan. Desert and semi-desert areas dominate the northern part of the country. In the east and west, and along the border with South Sudan, low and high rainfall savannah and Montana vegetation is prevalent. Annual rainfall in the north ranges

from close to zero near the Egyptian border, to about 200mm around the capital Khartoum. Along the southern border, rainfall rarely exceeds 700mm per year. The erratic nature of rain, and its concentration in short growing seasons, creates a vulnerable situation for rain-fed agricultural areas, the most prevalent type of agriculture in Sudan.

65. The country is classified into several agroecological zones (Figure 1-1). The ecological zones extend over a wide range from the desert in the extreme north (~45%), semi desert (~25%) in the north, and the semi-dry (~11%) and sub-humid (~4%) in the southern parts of the country. Desert and semi-desert areas dominate the northern part of the country.

66. Sudan's climate is heterogeneous with a clear rainfall gradient from the south to the north, driven by the Inter Tropical Convergence Zone (ITCZ). One rainy season per year is apparent (April to October in Khartoum). This rainy season is longer and more intense in southern parts of Sudan and decreases with latitude from the south to the north. Along the southern border rainfall is high, but parts of the Northern and Red Sea and North Darfur States receive no rainfall during the year (Figure 2-1). Annual average temperatures are around 30°C with little seasonal variation, with the temperatures also following the topography Figure 2-1. The is dominated by flat plains, with raised elevation in the Marrah Mountains to the west, the Nuba mountains to the south, and the Red Sea Hills to the east of the country.

Figure 2-1 Current and projected average rainfall and temperature by 2050



(Projections are averages of GFDL, MIROC6, IPSL and HADGEM models).

67. Climate projections show increases in temperatures by 2050. More increases of over 2°C are projected under the Shared Socioeconomic Pathway 370 (business as usual) than 126 (based on the Paris targets). The models agree on temperature changes, with uncertainty in rainfall projections. In the south-eastern and western parts, positive rainfall changes are projected together with temperature increases. This means that this will not translate to increased primary production as the rainfall will be lost through increased evaporation.

68. The vegetation system in Sudan follows the climate characteristics, where the desert region has vegetation only near watercourses, while the semi desert supports a mixture of grasses and acacia scrub (Figure 2-2). The dry and semi-humid areas consist of grasses, thorny trees, and baobab trees dominated by acacia trees. The *Acacia Senegal* species is especially dominant. In the wetter savannas in southern Sudan, there is more vegetation comprising grasses woodlands and forests. In these areas, croplands are also scattered cultivating sorghum and other crops during the rainy season (Figure 1-3). Biomass production is also mainly in the southern areas where it reaches up to 40t/ha while in the northern parts there is hardly any biomass (Figure 2-3). Southern Darfur, South Kurdufan, Blue Nile and Sennar, and Al Qadarif are the highest biomass production areas.

Figure 2-2Land cover map of Sudan showing the distribution of cover types

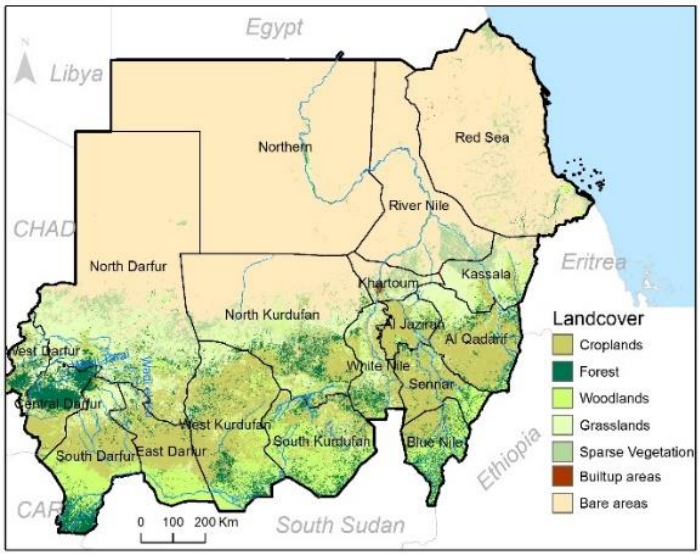
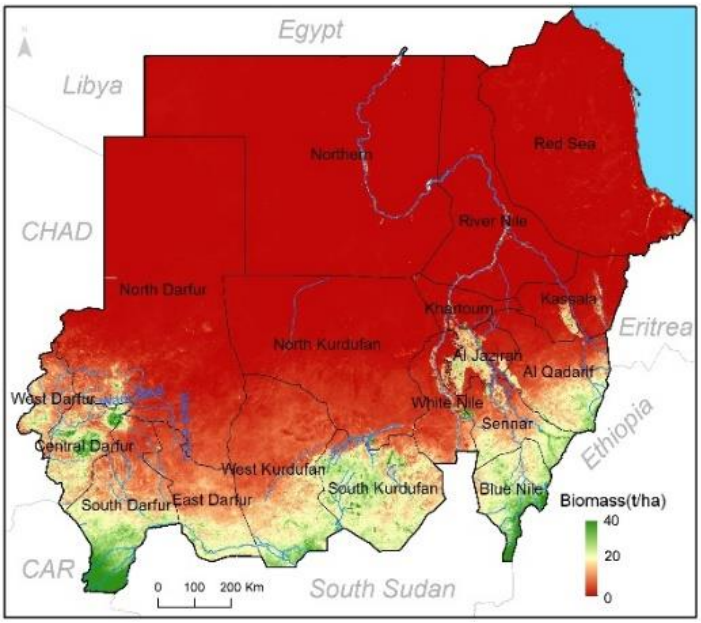


Figure 2-3Land cover map of Sudan showing the distribution of annual biomass production



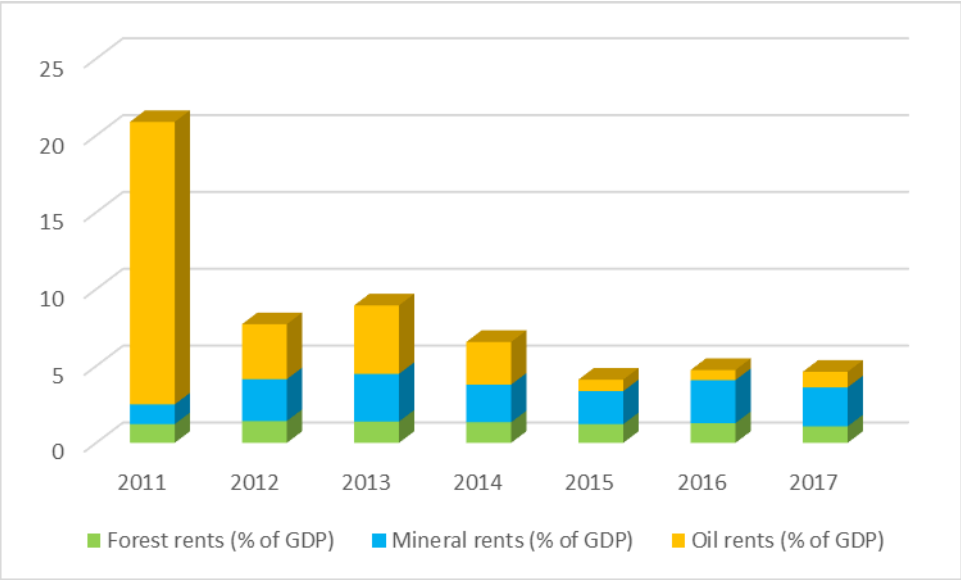
(Source: Global Monitoring for Environment and Security (GMES).

2.2 Socio-Economic Context

69. The RoSis a Least Developed Country (LDC), with substantial biodiversity and natural resources. The RoS signed and ratified the United Nations Framework Convention on Climate Change (UNFCCC) in 1993. The RoS is a member of several regional communities, including the Arab League, the Eastern and Southern Africa (ESA) group, and the Common Market for Eastern and Southern Africa (COMESA). It also has a preferencial agreement in the European Union (EU) market, under the “Everything but Arms” (EBA) initiative for least developed countries.

70. According to the African Development Bank (AfDB) (Africa Economic Outlook 2019)[1], about 63 percent of the RoS's land is agricultural, and only 15 to 20 percent of it is under cultivation, offering huge private investment opportunities. Largescale irrigated agriculture has the potential to create employment, and increase national income and foreign exchange earnings. Non-food agro-industry can accelerate growth by developing value chains that diversify the economy to compensate for loss of oil revenues since the cessation of South Sudan as illustrated in Figure 2-4

Figure 2-4 Key resource rents as a percent of GDP



71. The 2020 State of the Environment Report (SOE) outlines Sudan´s aspiration to be a key world player and meet its targets for social and economic development. Sudan is committed to its Zero Hunger and Zero Thirst programs, while also aspiring to meet targets under the Sustainable Development Goals (SDGs). Under a new political environment, Sudan will make major policy shifts to meet its 2030 agenda, as well as considerations for 2050 net-zero targets.

72. Sudan's outlook will largely be shaped by the size of its population. According to the Central Bureau of Statistics (CBS), the population of Sudan in 2011 was estimated at 44.4 million, but this declined by 23.5 per cent to 33.98 million following the secession of South Sudan (Central Bureau of Statistics 2018). In 2018 the country's population had expanded to 42 million and is estimated to grow to 57.3 million by 2030 (Central Bureau of Statistics 2018). The greatest impact of this population growth will be more competition for resources, especially land and water.

73. Further challenges also include low productivity growth in manufacturing and agriculture due to inadequate infrastructure, power shortages, and an unfavorable macroeconomic environment. The private sector is constrained by limited access to finance, a low-skilled labor force, and an inadequate legal and regulatory framework. The October 2017 lifting of US trade and economic sanctions was seen as advancing the dialogue on political sanctions and debt relief as well as re-engagement with the World Bank and the International Monetory Fund.

74. About 80% of the Sudanese population are dependent upon crop production animal husbandry for livelihoods. The agricultural sector faces significant risk from desertification of arable areas. Humid agro-climatic zones are shifting southward, rendering vast arable lands increasingly unsuitable for agriculture production hence crop production is declining and predicted to decline substantially for millet and sorghum as well as other cash crops in years to come. The area of arable land and pastoral systems, as well as the Gum Arabic belt, face continuing degradation resulting in a decrease in the ability to support livelihoods of dependent communities.

75. Reduced groundwater recharge, either through decreased precipitation or increased temperature and evaporation, has grave repercussions for Sudan. National studies have shown that soil moisture would further decline under future climate change. When coupled with increased water consumption, population growth, high variation in rainfall and the high rate of evaporation, a far gloomier looming water crisis

[1] https://www.afdb.org/en/documents/african-economic-outlook-2020

appears likely. Regarding the river Nile, there is a clear finding that under many climatic scenarios, water flow in the Nile River will decrease considerably, between 20% and 30% over the next 40 years (World Bank 2020).

76. Sudan's coastal zone faces several major climate-related hazards, namely sea level rise, increase of seawater temperature and salinity changes, in addition to storm surge intensification. Evidence shows that these climatic changes might result in more frequent coral bleaching events and widespread mortality decline in mangroves, remobilizing the fine sediments of salt marshes and increasing coastal turbidity. These events in turn are likely to affect sea grasses, coral reefs, and other marine biota.

77. The direct dependence of Sudanese communities on the natural environment for survival has contributed to competition and conflict over scare natural resources. Indeed, most of the past conflicts have been resource-based in nature, often between pastoralists and farmers. The prospect of climate change increases the urgency to find creative ways of bringing communities together in a spirit of adaptation, to share finite resources and encourage a collective responsibility towards sustainable management of local resources, in a way that will encourage investment in supportive, civil processes.

78. Given the wide range of economic and social benefits forests provide, information on the status of and socio-economic benefits is thus essential in evaluating progress towards sustainable forest management, together with the more usual statistics on the predominantly environmental value considered under the other themes. The NRS is complimented by an economic valuation study to identify the use values provided by the forestry sector, primarily for direct forest users, such as forest-dependent communities and the private sector (formal and informal).

2.3 Environmental Context and Climate Scenarios

79. The RoS is highly vulnerable to climate change and climate variability, predominantly a result of climatic and non-climatic factors, as illustrated in the 2007 National Adaptation Program of Action (NAPA). In particular, climatic factors constitute temperature increases and infrequent precipitation. Air temperatures steadily increased over the period 1960 – 2009, with temperature increases between 0.2°C and 0.4°C per decade for the periods March – June and June – September. When averaged across all seasons, temperatures in the 2000-2009 periods are roughly between 0.8°C and 1.6°C warmer than they were in the 1960 – 1969 period. Rainfall is also very variable and is becoming increasingly unpredictable. During the period 1981 – 2012 the rainfall in the whole country was significantly lower compared to 1971 – 2000(RoS 2013).

80. The 2007 NAPA stressed that multiple stresses such as ecosystem degradation, complex disasters and conflicts, and limited access to capital, markets, infrastructure and technology weakened people's ability to adapt to changes in climate.

81. In the RoS, forests are typically classified as either natural or plantation forests. They are further distinguished by ownership, whether governmental, institutional, communal, or private sector. At the state and national levels, forest management is entrusted to various institutions, agencies and community sectors that support and/or benefit from forest products and services (under the overall technical guidance of the Forest National Corporation (FNC) as stipulated under the Forest Act 2002). These institutions hold important roles and responsibilities of ensuring forests under their jurisdiction can benefit the country in terms of sustainable production levels and environmental protection.

82. However, over the past 40 years, the lack of integrated land use plans and coordination across institutions has resulted in uncontrolled land use changes and conversion of vast forest tracts into agricultural areas. The cutting of trees for fuelwood and for charcoal production occurs throughout Sudan, but the impact is more damaging in the north where resources are limited. Anecdotal data suggest that there is substantial and growing demand for fuelwood. Biomass supplies 56 per cent of energy demand in Sudan, of which a third is from fuelwood (Rabah et al., 2016). Projections for fuelwood consumption in 2020 range from 15.5 million cubic meters (Gafaar, 2011) to 25.7 million cubic meters, rising to almost 30 million cubic meters in 2030(FAO, 2010).

83. As of 2019, forests cover is estimated at 10.7 percent (Table 2-1)of the total area of the country. This means that reaching the ambitious Quarter Century Strategy (2003–2027) target of 25% forest cover would require a combination of radical policies, sectoral strategies, and significant investment. Forest cover in present Sudan has declined considerably and stands at approximately 19.2 million ha according to the Forest Resources Assessment (FRA, 2015). This is just over 10% of the country, with an estimated annual rate of deforestation of about 542,000 ha, or about 2.4%, placing Sudan among the world's ten countries with the highest deforestation rates (FAO FRA, 2015).

Table 2-1 Sudan´s Land Cover Classes (2012)[2]

Land Cover Class	Area (ha)	%
Agriculture in terrestrial and aquatic/regularly flooded land	23,710,025	12.6
Trees closed-to-sparse in terrestrial and aquatic/ regularly flooded land	18,733,182	10.0
Shrubs closed-to-sparse in terrestrial and aquatic/ regularly flooded land	22,231,327	11.8
Herbaceous closed-to-sparse in terrestrial and aquatic/ regularly flooded land	25,982,720	13.8
Urban areas	730,331	0.4
Bare rocks and soil and/or other unconsolidated material(s)	95,277,727	50.7
Seasonal/perennial, natural/ artificial water bodies	1,290,000	0.7
Total Sudan area	187,955,312	100.0

84. The total reserved area was 12.3 million hectares by the end of 2012, consisting of public, institutional, community, private and wildlife protected areas and national parks. All reserved forests (public, community, private) represent 4.54%, while protected areas (including wildlife protected areas) constitute about 7.12% of the total area of the country. The increase in public reserved forest area from 1.25 million ha in 1993, to approximately 12.3 million ha by the end of 2012, can be attributed to the Presidential Decree in 1993 and the community and private forest reservation which started in mid-1980s.

85. There are some 184 species of trees and shrubs, including 33 exotics together with a few endemic and near endemic species. Special areas with a wealth of rare species are found in the Red Sea Coast. Most of the wildlife resources of the country are found within the High Rainfall Wood Savannas, while wetlands on the Red Sea Coast, desert oases, dams, reservoirs and in-land lakes are important habitats for resident and migratory birds. The River Nile and the Red Sea Coast are part of the fly-over area for soaring and migratory birds from Eurasia to Africa. There are remnants of mangroves, sea grass beds, and associated marine fisheries, with a biodiversity that includes sharks, dugongs, turtles, and a variety of sea birds.

86. The RoS established two protected areas (Sanganeb and Dongonab-Mukawar Island), providing a good representation of the Red Sea marine ecosystems. Dungonab Bay and Mukawwar Island are turtle nesting sites and are recognized as internationally Important Bird Areas. The Dugong bird population may be the most important remaining population on the coast of Africa. The REDD+ will contribute to building and supporting established regional action plans (following regional surveys) already developed for corals, mangroves, turtles and breeding seabirds that are being implemented nationally.

87. Key statutory documents include the Wood and Forest Ordinance of 1901, The Forest Ordinance of 1908, Forest Conservation Rules of 1917, and the Forest Acts and Forest Policies of 1932. The statutes of 1932 have undergone continuous change by the development of the Forest Policy of 1986, Forest Legislation of 1989, and various ministerial decrees. The Forest and Renewable Natural Resources Act 2002is particularly notable in its call for the active participation of community and private sectors in forestry development and management. This legislation is widely perceived to have resulted in improved forest management practices, as well as increased levels of forest reserves and protected areas.

88. Of the total population, almost 70% of rural and nomadic are considered as forest-dependent for livelihood, wood energy and on round timber for buildings. 66% of the rural population uses wood as the main source of fuel for cooking and as construction material. The forestry sector contribution to GDP is in the range of 3-4%. Forests contribute about 12% of GDP through fuel wood, construction poles, charcoal, timber, food, gums, fodder, and native medicines

89. Forest development in Sudan commenced at the beginning of the 20th Century. Since then several important changes have occurred. These changes, legal and constitutional in nature, have introduced wide-ranging changes in forest management (FNC, 1989). Contribution of the entire forestry is under-estimated as the formal national accounts reveals an under-estimation of the forestry sector to the GDP in the range of 3%. This contribution is primarily accounted from annual exports of gum Arabic, and from

[2]FAO is finalizing the 2020/2021 Land cover map

numerous direct and indirect benefits such as environmental protection, soil amelioration, and work opportunities for rural population, building material and wood fuel.

90. The industrial sector typically accounts for less than 10% of the total wood consumption, out of which, over 98% is consumed as firewood at industrial and commercial facilities, with the remainder taken up by brick kilns, the lime industry, sawmills, and other wood-based industries in the country.

91. Historical per capita consumption of fuel wood was estimated to be 0.7 cubic metres per annum, which when converted into Ton/Oil Equivalent (TOE) could be valued at nearly 2 Billion United States dollars (USD). Moreover, Non-Woody Forest Products (NWFPs) are diverse and have substantial contribution to livelihoods at the household level, as well as to the national economy. The revenue from the annual export of Gum Arabic makes up 2.4% of total non-oil exports and 0.7% of total exports.

92. Forests generate income for the government at both federal, state and local levels, as well as for households and the private sector. Some of the income from direct sales of wood products, such as fuel wood, construction timber and sawn timber, are generally under the control of the government. There is also a diverse range of NWFPs that constitute potential sources for industrial development for local use and for export. Cottage industries could make up to 20-50% of rural household income, amounting to some USD 1 billion a year.

2.4 REDD+ Context

93. REDD was officially included in the UNFCCC agenda at the Conference of the Parties (COP 11) in Montreal in 2005. The “plus” was in the Bali Action Plan (COP13) in 2007,emphasizing the conservation and sustainable management of forests, and the enhancement of carbon stocks. Modalities, guidance and methods for parties were addressed at COP15 in Copenhagen in 2009 with the definition of the five REDD+ activities[3] and forest reference emission levels/forest reference levels (FRELs/RELs) in Cancun (COP16) and adopted the “Framework for REDD+” in Warsaw (COP19) in 2013. The Warsaw Framework is particularly important as it established how REDD+ would be implemented by setting:

- The work program on results-based finance
- Coordination of support for implementation
- Modalities for country level forest monitoring
- Guidelines and procedures for the technical assessment of FRELs/RELs; and
- Modalities for Monitoring, Reporting and Verification

94. The 2015Paris Agreement gave strong recognition to REDD+ through Article 5, by stating that parties should act to conserve and enhance forest carbon sinks by implementing and supporting policy approaches and incentives for REDD+. Decision 1/CP.21 (2015), paragraph 55 of the Paris Agreement emphasizes the importance of financial resources for REDD+ activities. Financial sources and coordination can include public and private, bilateral and multilateral sources. Globally, deforestation contributes between 17% and 20% to the global greenhouse gas (GHG) emissions (IPCC, 2007).

95. The Paris Agreement aims to strengthen the global response to the threat of climate change by keeping the global temperature rise this century to well below 2 degrees Celsius above pre-industrial levels, and to pursue efforts to limit the temperature increase even further to 1.5 degrees Celsius. Additionally, the Agreement aims to strengthen the ability of countries to deal with the impacts of climate change. To reach these ambitious goals, appropriate financial flows, a new technology framework and an enhanced capacity building framework will be put in place, thus supporting action by developing countries and the most vulnerable countries, in line with their own national objectives. The Agreement also provides for enhanced transparency of action and support through a more robust transparency framework.

96. While Sudan initiated the national dialogue on REDD+ in 2012, its REDD+ Readiness Programme (R-PP) officially started in 2015 when the RoS signed a contract with the World Bank (WB) to receive USD 3.8 million from the Forest Carbon Partnership Facility (FCPF). The FCPF first grant agreement of USD 3.8 million was signed in March 2015 and completed by the end of 2018. In March 2018, an additional grant agreement of USD 5 million was signed between the World Bank and the Government of Sudan to consolidate and complete a successful readiness preparatory phase for the country.

3Decision 1/CP.16 (2010) Paragraph 70 in the COP defines REDD+ activities as a) reducing emissions from deforestation, b) reducing emissions from forest degradation; c) conservation of forest carbon stocks; d) sustainable management of forests; and e) enhancement of carbon stocks

97. The objective of the REDD+ readiness and REDD+ future implementation activities is to enhance the RoS's ability to contribute to mitigating the impacts of climate change, in addition to enhancing sustainable forests management (SFM). The expected outcomes of the REDD+ programme to support the RoS's national goals of (i) conserving the country's renewable natural resources and (ii) facilitating sustainable land use management, eventually providing benefits to the millions of people that depend on forests for livelihoods and wellbeing.

98. Specific objectives include (1) institutionalizing the national REDD+ program at the national and sub-national levels through establishing fully functioning REDD+ management arrangements, and building technical and institutional capacities; (2) raising awareness and establishing effective mechanisms for stakeholder participation and consultation; (3) establishing a measurement, reporting and verification (MRV) system capable of serving national development objectives and international reporting requirements; (4) establishing a forest reference emission level or forest reference level (FREL/FRL); (5) developing a national forest monitoring system (NFMS); (6) information and monitoring system for non-carbon benefits, social and environmental safeguards and information and knowledge management sharing platforms.

99. In 2015, the RoS submitted its Intended National Determined Contribution (INDC). This was in line with Decisions 1/CP.19 and 1/CP.20 of COP to the UNFCCC to communicate INDCs "towards achieving the objective of the Convention as set out in its Article 2" (Decision 1/CP.20), i.e., "to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. REDD+ presents an opportunity for participatory national forest and land-use planning that can contribute to mitigating the impacts of deforestation and forest degradation from drivers and underlying causes across different sectors including agriculture, energy, mining, and infrastructure. The long-term protection of forests, better land use planning, and governance and policy and improved law enforcement will also contribute to the achievement of RoS's broader economic development and climate change goals.

3 LAND USE AND LAND USE CHANGE, DEFORESTATION AND FOREST DEGRADATION

3.1 Definition

100. In recent times, the Sudanese Forestry Community have adopted a revised definition of forest: 'Forest means land bearing a vegetative association and spanning more than 0.5 ha (or 0.42 ha which is an equivalent of a Sudanese feddan) with trees at least two meters high and a minimum tree canopy cover of 10 percent; or young forests stands that have not yet reached, but are expected to attain these thresholds in situ'. It does not include land that is predominantly under agricultural and/or agro-forestry production systems or urban land use. Although this definition has not yet been legally adopted, it has been utilized in the context of the RoS' REDD+, including the Forest Reference Emission Level/Forest Reference Level (FREL/FRL) and the National Forest Monitoring System (NFMS). The Global Forest Resource Assessment defines forest as land with trees spanning more than 0.5 ha, with trees higher than five meters and crown cover above 10 percent (FRA 2015). The RoS' definition is not consistent with the Global Forest Resource Assessment. However, the Intergovernmental Panel on Climate Change's (IPCC) Good Practice Guidance does not provide a single definition of forest, leaving it up to individual countries to determine(IPCC 2006).

101. The identification of drivers of deforestation and forest degradation is a critical component of the National REDD+ Strategy. Deforestation is a process of clearing and converting an area of forest on to a different land use, such as agriculture, mining, or infrastructure development. Forest areas that are temporarily un-stocked as a result of human intervention such as harvesting or natural causes, but are expected to revert to forest, are not considered as deforestation. Forest degradation is considered as a condition resulting in GHG emissions from activities in forest remaining as forest (i.e. that does not result in a land use change).

102. Deforestation and degradation should be viewed as separate processes, often resulting from different actors and drivers. Degradation is not necessarily a precursor to deforestation.

Common Global Drivers

a. Direct (proximate) causes: human activities or actions that directly impact forest cover and loss of carbon. Global examples include:
   - Deforestation: commercial agriculture, subsistence agriculture, mining, quarries, infrastructure and urban expansion.
   - Forest degradation: logging, fires, livestock grazing, disease and pathogens, firewood collection and charcoal production.

b. Underlying/indirect causes: complex interactions of fundamental social, economic, political, cultural and technological processes. These drivers are often distant from their actual area of impact.

:

103. The relationship between underlying drivers and direct drivers is nuanced and/but describes a set of interactions and motivations that drive decisions and behaviour in relation to forests. Underlying drivers can be hard to identify, but they are crucial for understanding the reasons that various actors clear or degrade forests.

104. A full assessment of the drivers of deforestation and forest degradation in the RoS was undertaken in 2018 (Tag 2018). This assessment included the identification and analysis of key drivers, agents, and underlying causes of deforestation and forest degradation; a review of legal, policy, and economic considerations; a review of key sectors, which included agriculture, forestry and other land uses; and, review of forest governance and related issues, including traditional customary land ownership and usage. The assessment report also developed a strategic agenda and recommendations to address the drivers.

105. The assessment of the drivers of deforestation and forest degradation used a combination of primary and secondary data. The assessment noted the limitations in existing secondary sources, with a lack of comprehensive data and studies on historic trends of forestry cover and degradation. These

limitations also included inconsistent use of land-cover change detection techniques, such as remote sensing. The primary data attempted to bridge these gaps through direct field observations and qualitative data collection, which included interviews, focus groups, and surveys. Notwithstanding these efforts, the quantitative limitations in data mean that it is not possible to present a comprehensive assessment of historic patterns or provide reliable predictions on future rates of deforestation and forest degradation based on past annual averages. However, a broad assessment is given of the likely future trends in each driver.

3.2 Deforestation Drivers

In 1958 it was estimated that the tree cover in Sudan was between 35-43 percent (Harrison and Jackson, 1958). This estimate was for the area that now encompasses both the Republic of South Sudan and the RoS. As shown in

106. the Global Forest Resource Assessments estimated a decreasing trend in forest cover over this area of land.

Table 3-1 Forest cover in former Sudan (FRA 2015)

Year	Forest Cover (Sudan)	
	Ha	Percentage Cover
1990	76.4 million	30.5 percent
2000	70.49 million	28.1 percent
2010	69.95 million	27.9 percent

107. Due to the fact that the north of Sudan was categorized by desert/ semi-desert and the south contained the largest areas of forest, the formation of the Republic of South Sudan in 2011 led to a reduction in forest loss for RoS. The amount of forest in the present day RoS is estimated to be approximately 19.2 million ha, covering 10.66 percent of the country (FRA 2015). In addition to geo-political changes, forest cover has declined considerably, with an estimated annual rate of deforestation of approximately 542,000 ha, or about 2.4 percent. This rate of deforestation places Sudan among the world's ten highest deforestation countries.

Agriculture

108. The expansion of agriculture is regularly cited as the main driver of deforestation in Sudan. These views are backed up in terms of the actual size of agricultural land, with the area planted having increased from 5.6 million feddans in 1953 to 41.3 million feddans in 2016. Agriculture in Sudan comprises of both subsistence forms and commercial enterprises. Despite increasing urbanization, a large segment of the population is employed in the agricultural sector. Estimates suggest that 70 percent of the population depend on agriculture for income earning activities (MEPD 2013).

109. This focus on agriculture, oil and mining has resulted in deforestation, degradation of forests and rangelands, and widespread pollution of land, water and air. Many of these threats will remain as long as the people's economic insecurities remain. For example, one reason for the degradation of pastures is that pastoralists are being forced to graze their animals in increasingly small spaces because of oil exploration, mining operations and the expansion of croplands.

110. Subsistence farming provides a key role in the provision of food security, reduction of poverty, provision of employment opportunities, and stability for Sudanese citizens. Although individual holdings are small, the aggregated impact is huge due to the large number of people practicing this form of agriculture throughout Sudan, particularly in the western parts of the country. Poor people, who are not able to acquire permanent holdings on productive lands, will clear forest for short-term farming. This is often undertaken in a non-rotational manner, meaning that fields do not have time to return to secondary forest.

111. The RoS' agricultural systems are characterized by low and possibly declining productivity, with 57 percent of all areas engaged in traditional agriculture, 34 percent mechanized, and only 9 percent irrigated. Many mechanized/ irrigated schemes were established on land that was formerly forest.

Livestock

112. The main impact of livestock is through overgrazing which occurs predominantly in the rainy season when livestock prematurely feed on saplings of grasses, forbs and shrubs. This reduces the chances for future propagation, and over time many of these grazing areas have become almost bare soil.

113. The livestock sector plays a critical role in the Sudanese economy and in the welfare of the whole population. It yields a flow of essential food, brings in a large amount of foreign exchange from export earnings, is a major means of transport, produces draught power in support of crop production and processing, provides dung for fertilizer and fuel and creates employment (SOE, 2020).

114. The livestock sector employs directly or indirectly about 40 per cent of the population and contributes valuable animal protein to the diets of all of Sudan's people.

115. Estimates for 2018 showed that Sudan's livestock population is 108.6 million, made up of 4.872 million camels, 31.837 million goats, 40.846 million sheep and 31.223 million cattle (FAO, 2018).

116. Sudan has the second largest and most diversified animal population in Africa. The annual livestock population has increased by 3.8 million in the last six years or by a rate of about 0.6 million every year. The main types of livestock systems are nomadic (householders move with animals and have no land base), transhumant (agro-pastoral system, with some migration), and sedentary/ village based (permanently settled farmers, with some animals, but a focus on crops).

117. There future impact of overgrazing will depend on the degree to which the production constraints on livestock production are addressed. These include expansion of agriculture, lack of water, seasonal nutritional deficiencies, infectious diseases, inadequate veterinary services, limited marketing, inadequate infrastructure, poor husbandry and a lack of feed resources.

Wood Extraction for Energy

118. Biomass provides the dominant primary energy supply, representing 54 percent of total supply, followed by petroleum (40 percent) and hydro power (6 percent). The proportion of biomass has decreased from 80 percent, although the total biomass input has increased due to increased demand for energy. The main consumer of biomass is the household sector, which uses 62 percent of total biomass consumption, predominantly for cooking. The majority of this is wood biomass, with firewood being predominantly used in rural areas and charcoal in cities. Cooking stoves are generally highly inefficient, and loss of energy also occurs in the conversion to charcoal. The service sector and industry, primarily brickmaking, are also big users of biomass.

119. The total annual consumption of wood is beyond the allowable cut in the ten States east of the Nile Basin (Northern, River Nile, Khartoum, Red Sea, Kassala, Gadaref, Gezira, Sennar, Blue Nile & White Nile States). The eight states to the west of the Nile Basin are within the allowable cut.

120. Drivers of energy demand are demographic (social) as well economic and environmental. Energy is critical in achieving economic development and growth. Radical changes in the development of the whole economy are expected during the coming decades. Energy policies, and the availability and cost of alternatives to wood for energy, such as LPG, will have an impact on energy demand and supply, and in turn forest degradation.

Urban Sprawl

121. The population of RoS has increased significantly over the past forty years. The rural-urban balance is also shifting, with the urban population growing at much higher rates. There is a tendency towards population concentration in large urban centers, such as Khartoum, Omdurman, and Khartoum north, with people being attracted by services, increased employment opportunities and higher standards of living. The development of urban areas requires heavy investments in infrastructure, energy and housing. Studies in Western parts of the country confirm that this land use change is resulting in loss of forests.

122. The current population is estimated to be 43.8 million, having increased from 30.9 million in 2008 (Worldometer 2020). The growth rate is estimated at 2.8 percent/ annum. In 1980 20 percent of the population was urban, rising to 33.7 percent in 2015, and an estimated 35 percent in 2020. The population is predicted to grow and the increase in urbanization to continue with the following estimates: 49.4 million in 2025 (urban 36.9 percent); 55.3 million in 2030 (urban 39.4 percent); and, 67.9 million in 2040 (urban 45.6 percent).

Infrastructure Development

123. In recent years Sudan has invested in improving the efficiency and effectiveness of its infrastructure, including roads, rail, communications, and energy development. A range of new highways and roads have been built, totaling 5,600 km in length (e.g., Port Sudan – Haiya – Atbara - Khartoum). These have predominantly been built in areas that were previously forest or contained scattered trees. The expansion of the road infrastructure opens up patches of forest that were previously inaccessible, making the areas more vulnerable to logging. Similarly, 16,000 km of railways have been built (e.g., Wadi Halfa - Abu Hamad - Atbara). These utilize wooden sleepers and in the early days used wood for power. A number of hydroelectric dams (e.g., Jebel Awlia, Roseries and the Twin Atbara and Setiet Dams) have been built, which resulted in the swamping of forests for reservoir basins and dam construction, as well as requirements for additional agricultural areas.

124. Sudan's infrastructure development has so far had a national focus, and there is much that remains to be done to achieve greater regional integration, by providing enhanced connections to neighboring countries.

Destructive Agents

125. Studies in Sudan show a range of biotic agents including humans; domestic and wild mammals; invertebrates (e.g., various beetles, termites and crickets); and invasive plants (e.g. Mesquite). Abiotic agents include fires, which may be natural or through humans (e.g., clearance of agricultural land); drought spells that can continue for years, and floods, which have a particular impact on riverine forests.

126. Disturbances are a natural and integral part of forest ecosystems. Biotic disturbances include pest and disease outbreaks, including invasive species, which can weaken or stress trees, potentially increasing both their susceptibility and vulnerability. Abiotic disturbances, which are caused by non-living factors, include meteorological events (cyclones, tornados and other storms), climatological (drought), hydrological (floods and landslides), geophysical (tsunamis and earthquakes), and anthropogenic (fire and pollution). These events can influence forest structure, composition and ecological functioning.

127. Climate change is resulting in an increase in the intensity, quantity and frequency of both biotic and other abiotic events, making forests more prone to damage. Many of these events will occur simultaneously. The increase of trade and ease of travel between countries is leading to an increase in the rate of spread of pests and disease.

Petroleum Exploration

128. Oil production has grown rapidly from 24.6 million barrels in 1999 to 183.5 million barrels in 2010 (EIA, 2011). The advent of oil exploration in many areas of Sudan, particularly in West Kordofan State, has been associated with negative impacts on forestry. By 2004, an estimated 579 million trees, mostly Acacia, had disappeared in the previous regions of Bahr Al Gazal and Southern Kordofan.

129. The exploration and development of petroleum extraction results in a range of environmental disturbances, degradation, and deforestation. The removal of forest and other vegetation is required for the development of infrastructure and facilities, including roads, pipelines, camps, field and central processing facilities, workshops, warehouses, and wells. These developments have also restricted access to traditional pastoralist users, resulted in the removal of large amounts of groundwater, restricted surface water flows, and resulted in oil spills and pollution.

130. Approximately two-thirds of oil production was lost due to the secession of South Sudan. However, despite most of the oil being in the south, refining and export infrastructure and pipelines are in the RoS. Most of the remaining blocks in RoS are still under preliminary exploration efforts. Oil production is viewed as critical to RoS' economic transformation from an agrarian based economy to one that is industry and service orientated.

Mining

131. Sudan has a range of non-hydrocarbon minerals of value including gold, chrome, copper, iron, manganese, asbestos, gypsum, mica, limestone and marble. In recent years there has been a rush in gold mining, both traditional and modern, with more than 80 companies involved in extraction and one million artisan miners. Activities cover 14 out of the 18 states. All these activities remove hundreds of thousands of square kilometers of vegetation mainly forests, range land and soils. They also interrupt ecosystem service flows, result in permanent farmland loss, and can lead to a range of pollution issues and health problems.

132. The loss of oil from South Sudan has resulted in the need to generate new sources of revenues, from activities such as gold mining. This has led to the encouragement of mechanization within the industry, although this is not without its challenges as many gold mines are located in outlying areas (Chevrillon-Guibert 2016).

Refugees & Internally Displaced Persons)

133. Sudan, particularly in the eastern States of Kassala, Gedaref and Red Sea, has received huge numbers of refugees for the last three decades. The highest numbers of refugees were during the 1990s, with 7,450,000 recorded. After secession of Republic of South Sudan in July 2011, 194,000 refugees entered the White Nile, South Kordofan and South Darfur States. In addition to refugees, during the past two decades, the RoS has generated more internally displaced people than any other country in the world, estimated at 5.14 million people (T. U. UNEP 2006). Refugees have come to Sudan from Eritrea, Ethiopia and Somalia, having fled from civil war and natural crisis. On arrival in Sudan refugees are placed in temporary camps by government authorities in cooperation with the United Nations High Commission for Refugees (UNHCR). Internally displaced people (IDP) are forced to leave their domains as a result of human conflict or natural disasters, such as droughts.

134. The increase in population from refugees and IDPs have exerted pressure on natural environments. While refugees receive assistance from UNHCR, IDPs do not, meaning that they need to find sources of income and the utilization of natural resources. Timber is required for the construction of temporary dwellings. Wood is also used for firewood and charcoal. This has resulted in the removal of natural vegetation and forests, which has impacted both natural environments and farmland. The arrival of additional people has also led to conflicts with local populations, due to the increased competition for wood, water, livestock grazing pasture, and crops. This in turn has put even greater pressure on the environment. As an example: the amount of firewood needed by South Sudan refugees' families for cooking is calculated to be over 10,000 tons of charcoal per year, which equates to the removal of about 5,268 feddans of forest.

135. There are over 1.1 million individuals estimated to be living in Sudan, as of November 2019. Political instability in the region, along with destructive impacts of climate change, such as droughts, will continue to result in the displacement of people, as a result of violence, food insecurity, and lack of access to basic services. It is estimated that by the end of 2020 there will be 1.14 million refugees living in RoS (UNHCR 2020).

Insecurity

136. In the aftermath of civil strife in most peripheries necessitated the declaration of many regions as "military operation zones", such as the montane vegetation zones of South Blue Nile, South Kordofan and Jebel Marra area in East Darfur.

137. Insecurity is described in relation to military conflict, which results in the formation of "military operation zones". Many people have to leave these areas, including foresters and other people involved in the management of natural resources. This may lead to illegal tree cutting, with sizeable quantities of sawn timber, saw logs, building poles and charcoal being hauled out. Furthermore, insecurity leads to influxes of refugees and the displacement of people, with associated environmental impacts that have been previously outlined.

138. Conflicts continue to affect the distribution of the population in the country, where significant migration waves have taken place mainly from the conflicted states to urban centers and neighboring countries. Khartoum continues to house people from the Darfur region, Blue Nile and South Kordofan, as well as refugees from South Sudan. Insecurity has forced the rural population to cease their farming and herding activities to work in in urban centers.

3.3 Underlying Causes of Deforestation and Forest Degradation

139. The underlying causes of deforestation and forest degradation in the RoS range from governance challenges, law enforcement, economic pressures, poverty and demographic factors.

140. **Population Growth:** The current population is estimated to be 43.8 million, having increased from 30.9 million in 2008 (Worldometer 2020). The current growth rate is estimated at an average of 2.8 percent per year, with the population estimated to reach 55.3 million in 2030 and, 67.9 million in 2040. The country is also characterized by a rapid shift towards urbanization, with the urban population estimated to increase from 35 percent in 2020 to 67.9 percent by 2040. High population growth and urbanization is likely to result in challenges in terms of service provision, infrastructure requirements, environmental sustainability, and resource management. This includes impacts on forests through requirements for energy (fuel wood and charcoal), housing (timber), infrastructure development, urban sprawl, and agricultural practices that lead to deforestation and forest degradation.

141. In addition to human population growth, animal numbers have also increased, particularly livestock numbers. The available feed sources for livestock are estimated to be 128 million tons, which is below the estimated requirement of 133 million tons per year. The deficit in feedstock can result in significant animal mortalities in some years. The high numbers of animals are also having an impact on forest degradation, through intensive grazing of seedlings and herbaceous plants. This is having a decline in the productive of plant species. The impact of overstocking is further compounded by climate change and droughts.

142. **Subsistence Agriculture:** Subsistence farming provides a key role in the provision of food security, reduction of poverty, provision of employment opportunities, and stability for Sudanese citizens. Despite increasing urbanization, a large segment of the population is employed in the agricultural sector. Exact figures are not available, but it is estimated that 70 percent of the population depend on agriculture for income earning activities (MEPD 2013). Although individual holdings are small, the aggregated impact is huge due to the large number of people practicing this form of agriculture throughout Sudan, particularly in the western parts of the country. Poor people, who are not able to acquire permanent holdings on productive lands, will clear forest for short-term farming. This is often undertaken in a non-rotational manner, meaning that fields do not have time to return to secondary forest.

143. **Legal and Institutional Gaps:** There are many weaknesses and loopholes that have been identified in existing policy frameworks and relevant legislation for forest conservation and management. These limitations include inadequate and limited coordination among different sectors responsible for natural resources utilization (e.g., Agriculture); a lack of institutional framework benefit sharing mechanisms that will promote community participation and involvement in forest management; inadequate institutional capacity, particularly at local levels; and poor law enforcement, which exposes the protection of forests and conservation due to the lack of controls around illegal activities.

144. Government institutions responsible for environmental management suffer from instability, underfunding, a lack of staffing and training, poor coordination, overlapping roles, and the loss of skilled personnel to the brain drain, among other problems. The country's civil society organizations experience some of these issues too. They have difficulty establishing strong functioning networks or alliances with government and other civil society organizations, though many of Sudan's civil society organizations have gained international and regional recognition. Technical deficiencies, lack of funding and restrictive government legislation have meant that most civil society groups are confined to urban areas (UNEP 2009; UNDP 2015).

145. **Lack of stakeholder participation:** There is a lack of genuine stakeholder participation or decision making, despite existing forest laws that allow for participatory forest management. Furthermore, the inadequacy of benefit-sharing mechanisms and lack of awareness has caused uncertainty and indifference among forest neighboring communities to protect and, therefore, sustainably manage natural resources.

146. **Crosscutting Issues:** overarching issues were identified as: a) natural environmental factors, such as climate change and desertification; b) socio-economic factors, specifically poverty.

147. **Economic Development:** Along with the general need to develop the economy, the loss of oil from South Sudan has resulted in the need to generate new sources of revenues from other activities. This is putting pressure on natural resources.

3.4 Required Responses to Drivers

148. The response to individual drivers requires a range of different and complimentary responses, as outlined in the table below.

Table 3-2 Direct and indirect drivers impact levels

Driver	Underlying Drivers	Impact Areas	Historic Impact Level	NRS Action Areas
Agriculture	Population growth; Urbanization; Poverty; Refugees & IRDS; Climate change; Desertification	Deforestation	High	Land information systems; Land tenure; Accessible finance; Capacity building; Climate smart landscapes
Livestock	Population growth; Urbanization; poverty; Refugees & IRDS; Climate change; Desertification	Forest Degradation	High	Integrated farming; alternative feed; Veterinary Services; Mapping and assessment; Water supplies
Wood Extraction for Energy	Population growth; Poverty; Economic Development; Legal and institutional gaps; Climate Change	Deforestation & Forest Degradation	High	National forestry and land policies; Plantations; Renewable energy; Efficient energy use
Urban Sprawl	Population growth; Urbanization; Refugees & IRDS; Legal and institutional gaps	Deforestation	Medium	National forestry and land policies; Environmental Impact Assessment; Land tenure
Infrastructure Development	Economic development; Legal and institutional gaps	Deforestation	Low/ Medium	National forestry and land policies; Environmental Impact Assessment; Land tenure
Destructive Agents	Economic development; Climate Change; Desertification	Forest Degradation	Low/ Medium	National forestry and land policies; Capacity building; Accessible finance; Certification
Petroleum Exploration	Economic development; Legal and institutional gaps	Deforestation	Low	National forestry and land policies; Environmental Impact Assessment; Land tenure
Mining	Economic development; Legal and institutional gaps	Deforestation	Low	National forestry and land policies; Environmental Impact Assessment; Land tenure
Refugees and IRDs	Conflict; Poverty; Climate change; Desertification	Deforestation & Forest Degradation	Low	National forestry and land policies; Mapping and assessment; Land tenure; Capacity building; Accessible finance
Insecurity	Conflict; Poverty; Climate Change	Deforestation & Forest Degradation	Low	National forestry and land policies; Mapping and assessment; Water supplies

4 DETAILED DESCRIPTION OF THE STRATEGY OPTIONS

149. The aims of REDD+ are to encourage developing countries to contribute to climate change mitigation efforts by: i) reducing GHG by slowing, halting and reversing forest loss and degradation; and ii) increasing removal of GHGs from the earth's atmosphere through the conservation, management and expansion of forests. This NRS seeks to achieve these measures, but within a far broader vision, in acknowledgement of the fact that the RoS' economy, society and culture are highly dependent on the country's natural resources.

4.1 STRATEGY OPTION 1: INTEGRATED FOREST LANDSCAPE MANAGEMENT

150. An integrated forest landscape management approach recognizes the inextricable links between forests, natural resources and the livelihoods, ecosystem services, and value chains that depend on them. These interdependent sectors and interests include agriculture, livestock, tourism, water management, erosion control, timber, and non-wood forest products. The benefits of an integrated approach are multi-faceted. Sustainable management of natural resources and forests ensures the protection of habitats and species. It also contributes to improving the lives of rural communities, while stimulating the national economy through promoting the development of sustainable value chains.

151. This Strategy Option addresses the underlying drivers of deforestation and forest degradation, as well as providing some actions that address more direct drivers such as wood extraction and cross-cutting issues. A key area of focus is in improving legal and institutional gaps by utilizing a combination of regulations, laws, policies, practices and financing options. The approach will be further complimented through capacity development and research and development, which will help sectors respond to emerging trends and challenges by developing innovative solutions. The overall approach will help unite different stakeholders around a common vision, ensuring an equitable and sustainable use of land to support rural livelihoods and the economy, while strengthening the health and resilience of the surrounding landscapes.

PAM 1. Strengthen sectoral policies, financing, and institutional capacity

Rationale

152. In addressing the drivers of deforestation, direct interventions are only successful when the necessary policies, regulatory frameworks, and adequate financing are in place and effectively applied. The lack of integrated land use plans and coordination across institutions has resulted in uncontrolled land use changes and conversion of vast forest tracts into agricultural areas over the past 40 years, resulting in considerable decline in forest cover throughout the country.

153. There are many weaknesses, gaps and loopholes that have been identified in existing policy frameworks and relevant legislation for forest conservation and management. These limitations include inadequate and limited coordination among different sectors responsible for natural resources utilization (e.g., agriculture, forestry, mining, livestock), and inadequate information systems. There are legal and institutional gaps in respect to stable and equitable forest tenure, benefit sharing schemes, and limitations in stakeholder consultation to promote community participation in forest management. There is inadequate institutional capacity, particularly at local levels, where there is weak law enforcement, which exposes the protection of forests and conservation due to the lack of relevant monitoring and reporting systems of controls around illegal activities.

PAM Objective

154. The objective of PAM 1 is to build federal and state level policy implementation, operations, and law enforcement capacity for sustainable forest management. The proposed afforestation and reforestation programs through this NRS and other programs already underway require institutional, organizational and community coordination and strong capacity for operationalizing reforestation and afforestation programs. This PAM builds on historic, current and planned government policy objectives in line with international agreement and conventions.

155. This PAM will include a review and organizational assessment for necessary reforms for an effective forestry sector, assessment of the potential of a long-term national forest programme (NFP), and revision and updating of the National Forest Policy Statement. There will be capacity building of personnel, improving institutional coordination, redefinition of designated functions and reformulation of management plans on sustainable forest management for the forest estate and protected or conservation areas. The

NRS will promote afforestation and reforestation through small holder and commercial plantations and complementary agroforestry systems for enhancing crop production and landscape protection. In addition, institutional capacity for national forest and land monitoring systems is essential and will enhance the ability of government to implement evidence-based policies. A fundamental aspect is to ensure such programs are adequately financed in the short, medium and long-term through establishment of a REDD+ Financing Facility.

PAM 1 Target Actions

PAM 1 Target Actions	Responsible Agencies
Improve forest sector regulations, laws, policies, and financing options to mainstream REDD+ actions: sector review and assessment of priority actions.	FNC governing bodies, Council of Ministers and the Presidency.
Support Revision and strengthening of the Sudan National Forest Policy Statement (NFPS) (2006, updated from Sudan's Forest Policy 1986).	FNC governing bodies
Support and improve policies to reduce deforestation and land degradation from refugee settlements.	Ministry of Interior, Commissioner of Refugees (CoR), FNC, REDD+ PMU
Development of National Forest Information Systems to support forestry and landscape management in Sudan (NFMS, MRV, FREL Development, Safeguards, Carbon Registry).	FNC, The Remote Sensing and Seismology Authority
State Level REDD+ implementation framework and financing options: Setting up a REDD+ Financing Facility and development of State REDD+ Action Plans (S-RAPs).	FNC, Individual States

Benefits and Risks

156. ***Environmental Benefits:*** Continuous improvement of forest laws is necessary to respond to challenges emerging from climate change, desertification, population growth and increase competition for land, and biomass energy demand. Review of existing policies, laws and regulation will benefit the country in identifying gaps and opportunities to address the emerging challenges and ensure prioritization of government expenditure.

157. ***Social & Economic Benefits:*** The RoS will benefit from establishing robust and enduring forestry sector policies, supported by well-resourced monitoring and reporting systems. Evidence-based policies will enable strategic economic and investment planning. The NFPS is an important instrument for the country to determine the long-term sector strategies, therefore, a review and updating of the NFPS will enable better sector planning including identifying measures to create opportunities for broader private sector involvement.

158. ***Risks:*** Policy reviews can take a long time and require significant investment, factors which can result in loss of momentum and prioritization. It is necessary that policy reviews identify strategic issues relevant to economic priorities and offer implementable recommendations, which do not result in perverse negative outcomes and impacts.

PAM 2. Strategic landscape management, restoration, and emission reductions

Rationale

159. Landscape deterioration is a significant challenge in Sudan and requires urgent and sustained responses. Forests play a significant role in integrated land use systems in RoS, providing vital resources for settled and nomadic people, the government, and the private sector. Of the total population, approximately 70% of rural and nomadic people are considered forest-dependent for livelihood, wood energy and for timber for buildings.

160. As a recovering economy and in political transition, Sudan has many competing priorities but responding and preparing for inevitable impacts of climate change is a key priority. This PAM addresses landscape

degradation and supports mitigation and adaptation measures outlined in Sudan´s NDC, NAPA, and also responds to the critical assessment in the first RoS State of the Environment Report (2020).

PAM Objective

161. The objective of PAM 2 is to reduce deforestation of natural forests by mobilizing resources to support the forestry sector, develop a sustainable forestry program to address wood deficit, improve silvicultural practices, enhance value chain management, improve investment and access formal financial services, and provide expansion of marketing opportunities. This PAM will involve the development of small holder forestry program and nurseries at state level. Through such a program, options can be considered for drought-resistant commercial tree species, using good-quality seeds and the investment in agroforestry systems, including the introduction of improved water management and harvesting techniques, which will make livelihoods more resilient in the face of higher temperatures and increasingly erratic rainfall.

162. The PAM focuses on measures to restore the productive capacity of Sudan´s natural capital while protecting remaining forests. Forests generate income for the government at both federal, state and local levels, as well as for households and the private sector. A multi-pronged approach is necessary to achieve landscape restoration and generate opportunities for addressing wood supply deficit, address community livelihood requirements and address GHG emissions.

163. Opportunities exist to restore landscapes and address deficits in key forest products such fuel wood, construction poles, charcoal, timber, food, gums, fodder, and native medicines. There is also a diverse range of non-wood forest products that constitute potential sources for industrial development for local use and for export. Sudan has traditionally been one of the world's largest producers and exporters of gum Arabic, a naturally hardened sap that is harvested from wild trees and utilized in many food and beverage industry products. In some parts of the country the acacia trees, which produce the gum, offer local people the only source of income. Cottage industries could make up to 20-50% of rural household income, amounting to some USD 1 billion a year. However, few smallholder rural producers in Sudan have access to affordable financial services, markets, infrastructure and technology.

PAM 2 Target Actions

PAM 2 Target Actions	Responsible Agencies
Smallholder forestry program in selected states for high value timber, fuelwood/biomass, and pole production and non-wood forest products (Initial target – Blue Nile and Sinnar States).	FNC, FAO, WB, Development Partners
State-wide forestry nursery systems to support community-based, afforestation, reforestation, and restoration of degraded lands.	FNC, Private Sector, Forest-dependent Communities
Capacity building for sustainable gum production value chain through sustainable finance and private sector engagement.	FNC, FAO, WB, Development Partners
Support sustainable forest management through development of capacity for and use of forest management plans (including selected coastal zones).	
Capacity development and institutional strengthening for fire management.	

Benefits and Risks

164. ***Environmental Benefits:*** Well-funded afforestation and reforestation programs supported by effective policy and regulatory implementation will address landscape degradation, wood deficit, reduce pressure on natural forest, prevent rampant encroachment uncontrolled agricultural expansion. Establishment and application of improved management of forests and watersheds through science-based approaches through research and development (PAM 3 and existing efforts) will help ensure sustainable utilization of natural resources. This will also lead to enhanced wildlife habitats, carbon emission reduction, and will limit soil erosion and reduce land degradation. The improved management of forests will increase the rate of natural water supply recharges, thereby improving water sources for multiple needs that include drinking, irrigation and hydropower generation.

165. ***Social and Economic Benefits****:* Employment and economic opportunities will be improved due to new programs that provide employment opportunities. The increase in availability of wood and non-wood forest products will result in improved productivity, income generating opportunities, returns, and an

increased ability to cope with climate change impacts. Forest communities could be further empowered through improved management and decision-making capacity in forests, potentially leading to improved social harmony. In addition to improving the social and economic benefits, including reduction of poverty, these approaches will also support wider benefits through ecosystem services.

166. ***Risks:*** Establishment of forests could result in illegal land acquisitions and grievances if carried out without adequate safeguard measures. Failure to properly follow proposed management plans could lead to increased impacts biotic and abiotic factors, such as the introduction of exotic species to the area and increase the likelihood of fires. There may be possible elite capture of benefits within community groups and the proliferation of illegal timber sales and non-wood forest products due to lack of effective enforcement.

PAM 3. Support for Forestry Research and Development

Rationale

167. A forestry research program is necessary to support long-term development of the forestry sector and continuous assessment of improved and innovative measures for landscape restoration, development of drought resistant species suitable for combating desertification, supporting agroforestry system to improve land productivity. A comprehensive forestry research is the key for a sound foundation of the forest sector. Therefore, it should take into account the changing societal, economic, and political framework conditions. It is also important to mobilize resources and stakeholder participation.

168. Challenges in forestry research include lack of capacity among scientists to implement research, lack of facilities and access to high-technology equipment and lack of research funding. The lack of human and institutional research capacity limits the contribution of science to sustainable forest management. It is, therefore, necessary to build and create the enabling environment for conducting research, including attracting funding from various donors; strengthening communication through various means of media; and sharing research outputs through scientific publications and presentations in conferences, meetings, and institutional collaboration.

PAM Objective

169. This PAM will support research and tertiary institutions as part of capacity building and contribution towards developing science-based production systems and achieving a highly skilled labor force. Specifically, there is a need to assess the state of forestry education and research to identify major issues and challenges confronting the forestry sector, and to initiate the process of charting future directions of forestry education and research.

170. Forestry research contributes significantly to the development and management of forest resources. Therefore, research on forestry should be as vigorous as the functions of forests in response to emerging trends and challenges, especially climate change and the continuously growing threat of desertification and biodiversity loss. Strategic collaboration and partnerships among stakeholders in forestry research is key in ensuring the continuation and enhancement of benefits from forests for humans, helping achieve a sustainable future for all.

PAM 3 Target Actions

PAM 3 Target Actions	**Responsible Agencies**
Revise and redesign of forest and rangeland research programmes and curricula.	Universities, FNC,
Establishment of centres of excellence through tertiary institutions – (Consideration of the establishment of a Forestry Research Development Institution)	Ministry of Higher Education and Scientific Research

171. ***Environmental Benefits:*** The existential threat from climate change requires a multipronged approach to addressing land degradation through advanced landscape management systems. There are significant environmental benefits from science-based sustainable forest and landscape management coupled with traditional knowledge. Research could provide knowledge and options for drought resistant species and better soil protection. Part of this NRS is to identify effective agroforestry systems that can enhance

agricultural productivity, while improving land management. Well-funded research could generate additional knowledge and innovative solutions.

172. Sudan will benefit from the fusion of different sciences, such as socioeconomics, biological sciences, with forestry, engineering, resources monitoring through remote sensing, agroforestry, agro-silvo, silvo-pasture, and agro-fishery.

173. ***Social and Economic Benefits***. Tertiary institutions will be able to produce human resources needed by society to create a knowledge-based economy. National forest policies would benefit from science, resulting in evidence-based policies. Reducing forestry research constraints has the potential to produce outcomes that have high public impact and improve interactions with and between policymakers and the general public. Mobilizing resources for forestry research on all aspects of sustainable forest management and capacity building will enable strengthen of science-based policy and strengthen expertise in forestry and general landscape management.

174. ***Risks:*** Research needs to be conducted in an ethical manner, without negativesocial and environmental impacts. There are risks of unintended consequences and lack standards that may include use of genetically modified species approaches that violate national environmental standards. Safeguard measures will need to be observed in all research activities.

4.2 STRATEGY OPTION 2: CLIMATE SMART AGRICULTURE AND RANGELAND MANAGEMENT

175. According to the World Bank, climate-smart agriculture (CSA) is an integrated approach to managing landscapes, cropland, livestock, forests and fisheries, which addresses the interlinked challenges posed by food security and accelerating climate change. CSA aims to simultaneously achieve three outcomes:

- **Increased productivity:** Produce more and better food to improve nutrition security and boost the incomes especially of 75 percent of the world's poor who live in rural areas and mainly rely on agriculture for their livelihoods.
- **Enhanced resilience:** Reduce vulnerability to drought, pests, diseases and other climate-related risks and shocks and improve capacity to adapt and grow in the face of longer-term stresses like shortened seasons and erratic weather patterns.
- **Reduced emissions:** Pursue lower emissions for each calorie or kilo of food produced, avoid deforestation from agriculture and identify ways to absorb carbon out of the atmosphere.

176. Land degradation and conversion of forested areas for anthropogenic purposes threaten Sudan's prospects for long-term food security, agricultural production and economic security. Over the last few decades there has been significant developments in mechanized agriculture in Sudan, including the dry and semi-dry regions of the country. Current estimates are that over 6.5 million hectares are currently under smallholder agriculture in the country(FAO 2011). However, the development of these agricultural areas is directly linked to large-scale forest clearance, loss of wildlife, and severe land degradation.

177. Intensive and over-cultivation of croplands, overgrazing of range and pastoral lands, slash and burn techniques, shifting cultivation, inappropriate use and quality of irrigation water are all contributing to degradation in Sudan(Sulieman 2012). Recurring droughts exacerbate this land degradation, impacting on land productivity(Elagib 2000). When human-induced land degradation and drought are coupled with desertification, Sudan is rated as one of the 10 most deforested countries in the world, with over half of the land classed as deteriorating and about 12 per cent needing urgent intervention (Dabanga 2019).

178. Given the situation, there is need for alternative development pathways for agriculture in the Sudan, particularly in the dry and semi-dry areas to reverse these current trends through appropriate land use management interventions. Such appropriate interventions should also contribute to socio-economic development through poverty alleviation, contribute to climate change adaptation and mitigation, and assist in halting desertification.

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PAM 4. Improving the adaptive and climate mitigation capacity of the agriculture sector

Rationale

179. Commercial agricultural expansion is the biggest driver of deforestation, while internally displaced people and refugees also adds to the competition over natural resources and farmland, and subsistence farming is seen as an important underlying driver in deforestation. Many parts of Sudan's agricultural sector are dependent on rainfed farming and livestock raising. Climate change is likely to pose major threats and risks to agriculture, increasing the need for using different coping strategies to adapt to the change. Crop failure may become more problematic as a result of climate change, through increased intensity of droughts and floods at certain times of the year.

180. Anecdotal evidence shows that mechanized farming is a major cause of land degradation and biodiversity loss on the country's central clay plains, due to the wholesale clearance of vegetation, water and soil erosion, monocultural farming practices and a lack of investment in soil quality (Government of Sudan, 2009). Indeed, the rural economy, which contributes to 70% of overall economic growth, is currently locked into an unsustainable, extractive, poverty based environment. As a consequence, potentially high-value agricultural landscapes and forest resources are being rapidly degraded by low-yield agriculture and unsustainable systems, which are projected to be exacerbated by the increasing effects of climate change.

PAM Objective

181. The objective of PAM 4 is to improve agricultural efficiency and increase productivity through climate-smart agriculture. This will contribute to the transformation of agricultural systems in order to address food security, sustain livelihoods and encourage prosperity, adapt and build resilience to climate change risks, while reducing pressure on forests and other ecosystems and to reduce greenhouse gases emissions. Climate-Smart Agriculture promotes farming systems that improve per unit productivity and increase diversification to secure alternative incomes through activities such as crop diversification, agroforestry, intercropping, advanced irrigation systems, and organic farming. It will be important to clearly identify the costs of investment and maintenance, in addition to the benefits, so that stakeholders can see the ratio of costs and benefits of new agricultural practices.

PAM Target Actions

PAM 4 Target Actions	Responsible Agencies
Capacity building to improve agriculture productivity through agroforestry system to improve water utilization and reduce forest encroachment (shelterbelts, alley cropping, wind breaks, riparian forest buffers).	Ministry of Agriculture and other related ministries, FNC, Communities, Private Sector, Business Unions, Gum and Livestock Producers
Improve agricultural productivity through crop diversification and agro-pastoral systems.	Ministry of Agriculture and other related ministries, Ministry of Agriculture and other related ministries, FNC, Communities, Private Sector, Business Unions, Gum and Livestock Producers
Rehabilitating irrigation services to make water use more efficient, including the introduction of appropriate technologies to optimize water use and raise water awareness.	Ministry of Irrigation and Water Resources
Build capacity and conduct knowledge transfer for conservation agriculture with water harvesting, zero tillage, and improved seeds.	Ministry of Agriculture and other related ministries

182. ***Environmental Benefits:*** Agroforestry is a dynamic, ecologically based natural resource management system, which through the integration of trees in farmlands and rangelands, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels. It offers a wide range of benefits to farmers, including the positive effect on their livelihoods through increasing crop yield and increased food security and income, as well as improves farmers' ability adapt to climate

change. Agroforestry also provides benefits to the environment by providing various ecosystem services, including carbon sequestration. Agroforestry, therefore, is a win-win solution to the seemingly difficult choice between reforestation and agricultural land use, because it increases the storage of carbon on one hand and also enhances agricultural productivity and resilience on the other.

183. ***Social Benefits:*** Use of multi-purpose tree species can provide multiple benefits such as firewood, non-wood products and shade. There may be an improvement in employment and income generation opportunities, due to increased productivity, improved market access, a wider range of crops, and the higher prices that high-value products can attain. Farmers will gain increased knowledge through capacity development.

184. ***Risks:*** Traditional farming systems may be lost, and conventional farmers may be excluded due to lack of technical expertise. There may be some forest degradation as the result of infrastructure development, such as irrigation channels. There may be still issues with some farmers not being able to access finance (particularly women who find it hard to gain access to credit facilities), and challenges with complying with standards.

PAM 5. Promoting sustainable livestock and rangeland management

Rationale

185. Livestock helps to provide local resilience and rural incomes and the sector constitutes a key share of Sudan's agricultural exports. Sudan has the second largest and most diversified animal population in Africa. Estimates for 2018 showed that Sudan's livestock population is 108.6 million, made up of 4.9 million camels, 31.8 million goats, 40.8 million sheep and 31.2 million cattle (FAO 2018). Livestock accounts for half of agricultural GDP and 25 per cent of total GDP (IGAD Center for Pastoral Areas &Livestock Development 2013). The population is increasing at a rate of approximately 0.6 million animals every year.

186. Animal productivity is severely constrained by poor husbandry practices, low technology and limited infrastructure, declining grazing lands, insufficient utilization of feed resources such as crop residues and processed feeds, and weak integration of livestock in the prevalent agricultural and silvo-agro-pastoral systems. Crop residues are not easily affordable/accessible, because farmers nowadays sell them for increasing prices. There has been a history of conflict between farmers and pastoralists, as a result of the expansion in farming and narrowing/blocking of the stocking routes. Internally displaced people and refugees also add to the competition over natural resources and farmland.

187. Natural fodder is increasingly deteriorating in quantity and quality due to a short growing season for vegetation, desert encroachment, droughts, and overstocking. Rangelands have played a major role in animal feeding, but they are under pressure from other activities, policies and practices, such as agricultural expansion and urban sprawl, and lack of water. As a result, the current available grazing resources are not sufficient to feed the animals available in the region. As such, there is urgent need to reverse the deterioration of the natural rangelands through improving protection, management, and controlling of overgrazing.

188. These limitations result in insufficient feed production, nutritional deficiencies, and a prevalence of infectious diseases. The seasonal variability in water and feed means that Sudan has a fodder budget deficit of over five million tons of dry matter. The lack of feed often results in the requirement to supplement livestock diets through tree branching/ lopping, particularly in sedentary village-based livestock systems. Consequently, grazing is a key driver in forest degradation.

PAM Objective

189. Reduced emissions associated with animal overgrazing of the forests and support adaptation of local communities through enhancing forest ecosystem productivity of animal feed and good practice grazing management inside the forests

190. The objective of PAM 5 is to build strong rangeland and livestock management systems, strengthen adaptive capacity of communities to respond to climate change and reduce emissions from rangeland overgrazing. Actions under this PAM will enable provision of higher quality, sustainable feed for livestock, increasing availability without compromising forests and other critical ecosystems. This will include assessment of alternative sources of feed, including the cultivation of fodder crops, utilizing crop residues,

as well as improving the existing rangelands. This later component will require developing a good understanding of local conditions, including soil type, to avoid negative impacts such as compaction and soil degradation.

191. Achieving this strategy option will require building and transferring capacity, to ensure that all communities are aware of and can take full advantage of best practices. This PAM will also help develop the understanding and demarcation of traditional livestock migration routes and watering points, to reduce conflict between nomadic herders and settled agricultural producers.

PAM Target Actions

PAM 5 Target Actions	**Responsible Agencies**
Strengthening regulatory and non-regulatory measures for livestock movement corridor management including monitoring systems.	Federal and State departments of Range/Pasture, Ministries of Agriculture and Animal Resources
Rangeland restoration/rehabilitation, protection, and provision of adequate seasonal feedstock (fodder production): creating business partnerships between livestock owners and farmers along livestock routes.	Relevant departments and research in the ministry of animal resources, department of range-pasture, village base and agro-pastoral communities, CSOs and NGOs
Improve access to finance and support services for farmers and livestock producers (such as animal health, extension and training, farmer field schools, marketing).	Animal Production Corporation (APC) and range-pasture dept. of MAR at federal and state level +dept. of Extension and Technology Transfer MAR, village-based communities
Promoting cooperation and coordination between public and private sector institutions in range infrastructure development and management.	Animal Production Corporation (APC) and range-pasture dept. of MAR at federal and state level +dept. of Extension and Technology Transfer MAR, village-based communities
Increasing adaptive capacity of farmers and livestock producers for preparedness to seasonal variability in feed and water supply through community-based water conservation and river protection and management schemes.	Federal and State departments of Range/Pasture, Ministries of Agriculture and Animal Resources

192. ***Environmental Benefits:*** These approaches will improve the productivity of land and resources, thereby reducing the need for grazing in forests, as well as providing some relief to rangelands and the ability to improve the health of soils and other natural resources.

193. ***Social Benefits:*** Herders will gain increased knowledge on animal husbandry, while increasing productivity and reducing mortality of animals. Livestock can be utilized to provide essential nutrients and organic matter to soils in agricultural areas. The PAM seeks to increase cooperation, thereby reducing conflict, particularly between farmers and pastoralists.

194. ***Risks:*** These approaches may lead to the development of monocultures in tree species as a result of less seed dispersal via free ranging livestock. There may also be restrictions on wildlife movements due to fencing. Frequent livestock passage on heavy Gardud soils (depleted marginal sandy soils) leads to compaction and soil degradation.

4.3 STRATEGY OPTION 3: INTEGRATED LAND USE PLANNING

195. Sudan is understandably focused on developing the economy, responding to past economic shocks such as the loss of oil revenue since the cessation of South Sudan and conflicts. Addressing economic growth involves agricultural development, urban development, infrastructure development, and the extraction of natural resources. However, uncontrolled development will have the potential to cause negative impacts across different sectors, as well as increasing impacts on natural resources, including forests.

196. The existing legislation has provisions to address the environmental impacts from various infrastructure projects. However, current planning processes do not effectively address the holistic impacts from different sectoral projects. There is a lack of standards, capacity, and inadequate inter-agency coordination and cooperation. This limits the ability for the country as a whole to respond to and adapt to climate change, resulting in negative impacts on forests and environmental services.

197. This strategy will help create the enabling environment for successful and effective implementation of REDD+. Work associated with this strategy will strengthen land use planning systems and processes, by achieving greater levels of harmonization across policies, improved collaboration among implementing departments, greater levels of capacity, improved land tenure, and a stricter monitoring and enforcement regime.

PAM 6. Harmonizing land use planning, investment policies, and legislation

Rationale

198. As the population grows and the country seeks to develop the economy, the development of urban areas, infrastructure, and the need to extract natural resources will continue. The petroleum industry and gold mining are responsible for the large-scale clearance of forests during exploration and for the construction of infrastructure such as pipelines, roads and settlement camps. Anecdotal data shows that the construction of pipelines has resulted in the clearance of more than 542,000hectares (more than 129,000 feddans) of forests in five states (Abdel Magid et al. 2015). Large-scale oil exploration and roadconstruction also have significant destructive impacts on forests.This loss of forest indicates poor implementation and enforcement of regulatory instruments, along with limited capacity for interpreting existing guidelines.

199. It isnecessary to develop and build institutional capacity for policy and regulatory enforcement.At the center of national resource use is the complex issue of land management and planning, which seeks to ensure that negative environmental and social impacts from development are minimized and that a balance is achieved across different sectoral interests. Integrating climate risks into all national development planning processes is key in reducing vulnerability to the impacts of climate change, by building adaptive capacity and resilience. The Environment Protection Act 2001 (or the revised EPA Act when enacted) is the principal legal instrument for protection of the environment, however, very few regulations and guidelines to standardize procedures and implement the Act have been developed. Further challenges in planning result from inadequate institutional capacity, low awareness, limited coordination among different sectors.

200. A lack of a clear institutional framework for stakeholder engagement and community participation is a significant gap. Existing legislation, including the Environment Protection Act (2001), provides for participatory planning and the development of environmental and social safeguards, but such legislation does not currently provide adequate social and environmental safeguards. As such, broader environmental impacts affecting forest services and social impacts affecting forest dependent communities are not included or adequately addressed prior to the development of infrastructure or urban expansion.

PAM Objective

201. This PAM will help address some of the underlying drivers of deforestation and forest degradation. The objective of PAM 7 is to harmonize and integrate existing land use planning legislation and policies, so that the holistic impacts from various development projects are taken into account in order to reduce sectoral policy and planning conflicts.

202. Developing robust Environmental Impact Assessment (EIA) and social assessment processes and guidelines are important measures for Sudan´s infrastructure sector and economic development. These

assessments will allow for the holistic assessment of the impacts of major development, detecting future risks and impacts prior to implementation. The implementation of remediation measures would require a stricter monitoring and enforcement regime, as well as continuous revision of budget allocation practices and procurement processes. This will help achieve greater forest protection, including habitat restoration where impacts are unavoidable. This PAM will also assess options for providing offsetting or compensation from large infrastructure projects. Participatory approaches to planning and management are to be utilized, including the involvement of women and marginalized groups in capacity building, planning and implementation.

203.

PAM Target Actions

PAM 6 Target Actions	Responsible Agencies
Strengthen institutional capacity of environmental and social impacts assessments in agriculture, forestry, and mining sectors to prevent land degradation(institutional capacity needs and gap assessment and preparation of capacity development plans).	Line Ministries of Minerals, Petroleum and Gas Environment, Natural Resources and Physical Planning, National Legislatures
Rationalize, organize and harmonize above and below ground resource exploitation and related economic developmental activities and policies, in order to encompass environmental and climate change concerns.	Line Ministries of Agriculture and Forests, Animal Resources, Mining, Petroleum and Gas, Environment, Natural Resources and Physical Planning, Justice, National Legislatures
Improve standards for the establishment and development of mining infrastructure (updating of existing guidelines/policies and development of new guidelines and policies).	Ministries of Minerals, Petroleum and Gas Environment

204. ***Environmental Benefits:*** Harmonized land use planning should lead to more efficient and effective utilization of natural resources, enhancing biodiversity and ecosystem services.

205. ***Social and Economic Benefits:*** Land use planning will improve law enforcement and will help alleviate land disputes. It will provide a guide to future infrastructure establishment and potentially lower development costs.

206. ***Risks:*** If environmental, social, and economic goals are not adequately balanced there is a risk that environmental considerations will lose out when trade-off decisions are made. In addition, land use planning policy at the national level may result in a reduced ability of local communities to influence forest planning.

PAM 7. Sustainable land management stewardship through land tenure security

Rationale

207. Environmental degradation not only has a negative impact on livelihoods, but it can also threaten stability and development. The peaceful co-existence of tribes or other social groups depends on the sustainable use of shared natural resources. However, rural communities consider access to land and its resources as a right and privilege, and so land issues in Sudan are never properly addressed. As the United Nations Development Program's 2013 paper "Land Issues and Peace in Sudan" points out, the "elimination of conflicts and sustainability of social peace in Sudan requires land tenure reform, sustainability of natural resources, elimination of poverty, good governance and respects of human rights".

208. The lack of clear and comprehensive arrangements for land administration and management is contributing to land degradation and unsustainable land use practices. Rigorous scientific studies demonstrate that land registration can reduce deforestation by 10% in Brazilian Amazon(Alix-Garcia 2018) and by 20% in Benin(Wren-Lewis 2020) on-site, while it is also shown to stimulate small-holder tree planting(Arvola 2020). As the scientific evidence is accumulating, international panels, such as

IPCC(IPCC 2019)have started to stress the importance of recognition of Indigenous Peoples' (IPs), communal and customary land rights to reduce deforestation and greenhouse gas emissions.

209. In Sudan, there are still many barriers that restrict recognition of land rights in forests and forestlands. The problem is not just inadequate policies, but also the lack of adequate capacity to implement and enforce existing regulations to ensure sustainable land management. For instance, although mechanized farming takes place on farms that were legally acquired from the government through leasehold arrangements, there are a significant number of mechanized farms that have no form of official approval (they are known as squatter schemes).In Sennar state, 70 per cent of mechanized farmland, amounting to some 5.4 million feddans (2.2 million hectares), is classified as belonging to squatter schemes (IFAD 2014).

210. Re-demarcation of land has been slow and has resulted in conflict between mechanized farmers and nomadic pastoralists whose animal migration routes, and water points have been closed or obstructed. There is growing evidence that mechanized farming is becoming an unsustainable way of managing the land, due to depletion of soil nutrients. Yields in mechanized rain-fed areas have been decreasing by 0.6 kg/ha annually (FAO 2015c). The low productivity under mechanized and rain-fed systems has pulled Sudan's average yield closer to the yields for dry land productivity. There is also a tendency for expansion into marginal lands which often involves the wholesale clearance of trees, despite the legal obligation for the owners to have 10 per cent of land under tree cover. These challenges require strong and effective regulatory measures, supported by non-regulatory instruments that encourage natural resource management stewardship.

211. The complex two systems legal framework in Sudan creates uncertainty and confusion over which takes precedence. There is a customary tribal system and government ownership and control of all unregistered land through the Unregistered Land Act, 1970. Subsequent sectoral laws and policies have provided further recognition of customary rights. However, the Land Commissions, which are key in implementing the process of integrating and harmonizing customary laws with statutory laws, have not been established (except in Darfur). The customary land tenure system is used in much of the forest lands where the REDD+ programme is likely to be focused, but these laws vary in each locality. This situation has created wide range of disputes and conflicts over rights of use between the states and communities.

212. Registration of forests and rangelands is key in providing better management of these vital resources for settled and nomadic people, eliminating historic conflicts over resources such as water. Registration of community assets and active management will subsequently prevent expropriation of community land and natural resources by national and foreign investors or individuals. Registered community forest and rangeland in Sudan covers an extremely small area compared to the available forest and rangeland resources in the country and is also extremely small compared to the land registered by FNC, as a FNC forest reserve.

PAM Objective

213. The objective of PAM 7is to contribute to national dialogue on land tenure security, by developing mechanisms that will allow for stable and equitable land tenure. Land tenure insecurity is a significant underlying cause of deforestation and forest degradation, and it further affects the productive capacity of local farmers, as well as the necessary traditional seasonal movement of livestock.

214. This PAM recognizes that resource tenure, water use, and sustainable natural resource management are closely related. Managing water so that is accessible to both farmers and pastoralists is key in reducing conflict, as well as helping to restore rangelands.

215. Achieving clarity on tenure of land and resources is key in determining resource rights and in designing REDD+ benefit sharing mechanisms. This includes the eligibility of stakeholders to benefit from carbon credits and funding generated through REDD+ activities, while reducing vulnerability to climate change, and poverty.

216. This PAM promotes registration of land in order to enable effective resource management, including recognition, rules, sanctions and investment and prevent land grabbing. Collective action is needed to push the registration process forward and improve the results of community forest and rangeland reservation and management. This PAM acknowledges that land tenure is important in rural development interventions and emphasis needs to be placed on building people's endowments of assets so they can enjoy sustainable livelihoods. A livelihood is sustainable when it can cope with, and recover from stresses and shocks, and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

PAM Target Actions

PAM 7 Target Actions	Responsible Agencies
Regulatory and non-regulatory measures to improve land tenure security for local communities: Assessment and identification of opportunities for strengthening land tenure security for communities in deforestation hotspots (prioritization of deforestation hotspots).	Ministry of Environment and Physical Planning
Land use capability assessment and digitization to support the National Investment Map: optimizing land use through spatial planning and reliable spatial and non-spatial information.	

217. **Environmental Benefits:** Strengthening tenure security can improve rural communities' willingness to invest time and effort in actions and interventions that protect their immediate natural resources, including protection against destructive land use practices that lead to deforestation and landscape degradation. Coupled with support and knowledge for implementing climate smart agro-pastoral systems, there are significant benefits such as increases in agricultural productivity, incomes, and resilience to unpredictable and adverse weather patterns, including drought. Building social inclusion and cohesion around land tenure is also key to reducing conflict and contributes to farmers' sustainable management of natural resources.

218. **Social and Economic Benefits:** Property rights to land is one of the most powerful resources available to people to increase and extend their collection of assets beyond land and labor to the full portfolio necessary for sustainable livelihoods, i.e., natural resources, social, human, and financial capital as well as physical assets. Securing rural people's rights of land access is a critical factor in their ability to respond to the changing climate. People with secure tenure are more motivated to invest in farming practices that help mitigate climate change. Implementation of REDD+ through emission reduction programs at state level is an option where the magnitude of such large rural development programs offers different types of interventions, including policy engagement, investments in infrastructure and enhanced access to financial services. Efforts to establish or improve land tenure security can complement and build on these activities, helping advance gains in SDGs 1 and 2 (among others) leading to poverty eradicating and supporting sustainable rural transformation.

219. **Risks:** Achieving land tenure reform is by no means an easy or quick process and it can often lead to conflict, particularly where there is failure to recognize and expand rights for women to use and transfer property, effectively manage potentially conflicting claims of property user. The cost of land tenure reform can be prohibitively costly and often suffers from a lack of commitment, along with inadequate capacity and resources within administration authorities. However, the benefits over the long term can lead to substantial gains for smallholder farmers' competitiveness and increased countrywide stability.

4.4 STRATEGY OPTION 4: SUSTAINABLE ENERGY SUPPLY AND USE

220. Biomass provides the dominant primary energy supply, representing 54 percent of total supply, although thus has decreased in recent years the overall volume has gone up due to higher demand for energy. The RoS energy master plan seeks to boost access to energy from 35 percent to about 60 percent by 2030. Biomass is predominantly used by the household sector for cooking, either directly using firewood (predominantly in rural areas) or charcoal in urban homes. Cooking stoves are generally highly inefficient and can result in serious indoor pollution and health repercussion particularly for women and children. The current use of woody biomass is unsustainable in many parts of the country, resulting in forest degradation.

221. This Strategy Option seeks to address Sudan's energy requirements by increasing householder's access to efficient and sustainable energy from a sustainable biomass-based value chain. It seeks to achieve this by assessing and implementing options to use alternative sources of energy, such as LPG, while

promoting efficient cookstoves. Furthermore, sustainable business opportunities will be created in the biomass energy sector through regulatory and non-regulatory measures.

PAM 8. Increasing access to efficient and sustainable household energy

Rationale

222. The RoS government´s energy master plan seeks to boost access to energy from 35 percent to about 60 percent by 2030,by encouraging and supporting foreign direct investment for emerging industries. In addition, the government is well positioned to support competitive industries through an enhanced infrastructure program in line with the energy master plan. This ambition will result in reduced pressure on non-renewable energy sources. REDD+ is one of several options that can contribute to these government objectives, by implementing practical interventions within communities.

223. The use of inefficient energy sources such as open fires can cause a lot of smoke, soot and moisture, and air pollution. The major concern is the indoor pollution caused by inefficient stoves, which can have serious health repercussions, especially for women and children. A significant amount of air pollution in urban areas is also caused by indoor cooking stoves run on charcoal, wood and other biomass fuels. It is, therefore, necessary to reduce these negative impacts through the use of more effective energy sources such as improved and efficient stoves, solar, and liquefied petroleum gas (LPG) to compliment long-term larger investment energy generation programs. LPG is cleaner and more efficient than biomass and is easily available on the local market as one of the country's petroleum biproducts. As of 2014, LPG makes up 58.8 per cent of the energy used by urban households, compared with 33.5 per cent for rural households (Central Bureau of Statistics 2016). REDD+ can support interventions that enable easier access to improved cookstoves, advocating for measures to incentivize uptake and increased use of LPG in rural areas.

PAM Objective

224. The objective of PAM 8 is to support national efforts to enhance access to modern and clean energy by scaling up low-cost and improved energy efficiency. It will improve the quality of energy services in a fiscally and environmentally sustainable way, which is also aligned with the Nocatee are barriers to increasing access to energy and these include very large financing needs to develop a market and supply chain for cookstoves and LPG in rural areas. To meet the government's economic and sector goals, access to finance would have to increase substantially, and private sector financing would need to be mobilized at a much higher level to develop off-grid energy access solutions to be trigger demand and investments by local manufacturers/suppliers and households.

225. There is currently a very limited role for the private sector in energy, which limits the ability to import and distribute small energy appliances such as cookstoves and other products. There are four principal reasons why there is a lack of enterprises and businesses successfully supplying renewable energy technologies to rural communities in Sudan. The first reason is that the urban market is more lucrative, with urban customers having higher incomes and higher ability to pay compared to the rural market. Second, the rural setting isolates many rural communities and there is additional time and cost (low economies of scale) involved in travelling to these rural areas. Economics does not make it attractive to establish shops or supply centres in remote rural communities

226. In addition, there is a lack of awareness among rural populations in Sudan of the possibilities for gaining access to energy, including renewable energy. Public awareness campaigns have typically been targeted at urban areas and have neglected important gender-sensitive messages that recognize the important roles of women and female household heads in making purchase decisions. Public awareness campaigns need to be carefully designed and targeted in order to overcome these barriers.

PAM Target Actions

PAM 8 Target Actions	Responsible Agencies
Assessment and implementation of options for sustainable charcoal/biomass production.	FNC, Energy Research Centre, mining companies, National Centre for Renewable Energy

Assessment and implementation of options and measures to incentivize and increase use of LPG gas and other alternative sources of energy such as solar in urban and rural communities.	Ministries of Petroleum and Gas; Environment, Natural Resources and Physical Planning; Agriculture and Forests; Finance and Economic Planning; Social Security and relevant subsidiaries; Ministry of Water Resources, Irrigation and Electricity, Private Sector

227. ***Environmental Benefits:*** Improving efficiencies in energy consumption will lead to decrease in pressure on forests and reduce deforestation and forest degradation as well as carbon emissions.

228. ***Social and Economic Benefits:*** Clean energy options will reduce the health risk due to the indoor pollution caused by inefficient stoves, which can have serious health repercussions especially for women and children. Likewise, this will lead reduction in air pollution in urban areas caused by indoor cooking stoves run on charcoal, wood and other biomass fuels. Promotion of efficient and clean energy solutions will also create a market for appliances and in turn contributes to the growth of new businesses.

229. ***Risks:*** There are risks for individuals and communities involved in charcoal and other related business as a shift to other forms of energy may result in loss of livelihoods. Measures will need to be taken to provide alternative income options. There may be challenges in some rural households being able to afford new energy options.

PAM 9. Promoting a sustainable biomass-based energy value chain

Rationale

230. Woody biomass continues to be the primary source of energy, particularly in households. Biomass provides the dominant primary energy supply, representing 56 percent of total supply, followed by petroleum (40 percent) and hydro power (6 percent). The proportion of biomass has decreased from 80 percent, although the total biomass input has increased due to increased demand for energy. Given that the main consumer of biomass is the household sector, which uses 62 percent of total biomass consumption, predominantly for cooking, it is necessary to adopt energy efficient and sustainable consumption measures in the short to medium term. But more importantly, it is important to address the biomass deficit through a value chain approach.The total annual consumption of wood is beyond the allowable cut in the ten States east of the Nile Basin (Northern, River Nile, Khartoum, Red Sea, Kassala, Gadaref, Gezira, Sennar, Blue Nile & White Nile States). The eight states to the west of the Nile Basin are within the allowable cut.

231. Although the percentage contribution to RoS' total energy has declined, the overall volume of biomass has increased, responding to changing demographic and social trends. The burning of wood or charcoal has health implications through indoor pollution, as well as leading to forest degradation through unsustainable tree cutting. Policies to control tree cutting will not come to effect unless affordable alternatives are made available. Efforts in this regard have faced disincentives, due to removal of subsidies and liberalization of LPG markets leading to tremendous increases in prices. Energy policies, and the availability and cost of alternatives to wood for energy, such as LPG, will have an impact on energy demand and supply, and in turn deforestation and forest degradation.

232. The majority of energy demand is for wood biomass, with firewood being predominantly used in rural areas and charcoal in cities. The general inefficiencies in cookstoves, and wood conversion to charcoal results in significant energy loss. The service sector and industry, primarily brickmaking, are also big users of biomass with high inefficiencies. Intervention measures are necessary to build efficiencies in the value chain through technological innovation, knowledge transfer and access to finance to invest in modern appliances and production processes.

233. Forest biomass supply chains cover a wide range of biomass sources, logistic systems, conversion technologies, end-products and stakeholders as noted above. Future bioenergy-related policies should be designed in a way that enhances technological and economic efficiency and environmental sustainability. Objectives and policies for bioenergy and for renewable energy in general are often formulated and agreed upon at higher decision-making levels (federal level). However, the design of objectives and policies can be better informed by knowledge and experience at the lower levels of decision making (state level), where the implementation takes place, in order to integrate effectively renewable energy into the existing energy systems. Local planning can facilitate the identification of the most favorable sites and technologies, improve the understanding of the local environment and its actors

and facilitate the integration of policies throughout various sectors to cater for regional ecological complexity.

PAM Objective

234. The objective of PAM 9 is to reduce over-exploitation of biomass resources by creating business opportunities for the private sector through regulatory and non-regulatory measures. This may include regulatory measures such as setting standards for high biomass consumption in sectors such as brick molding and charcoal production, in order to reduce energy loss. Considerations could be made for control of charcoal production through innovative technologies, licensing and controlling movement of charcoal, through working with transport companies and charcoal producers. Charcoal production may also be linked to the national forest program and considerations could be made for promoting biomass crops.

235. Due to a lack of awareness, the additional costs involved, and the limited ability of local communities to pay, the application of more efficient appliances is severely limited. The numbers of renewable energy technologies currently in use, such as solar lamps, solar hot water systems, solar cookers or improved cook-stoves based on ethanol/biogas, are very small. However, their potential, given that over 70 million people in Sudan lack access to modern energy services, is significant.

236. This PAM seeks to encourage the adoption of environmentally friendly policies and interventions in the energy sector, in order to reduce pressure on forest resources and optimize fuelwood consumption. This includes promoting renewable and more sustainable sources of energy, such as liquid petroleum gas (LPG), ethanol, solar, hydro and wind energy. Actions will also seek to optimize wood consumption and develop sustainable managed plantations for firewood and the sustainable production of charcoal.

PAM Target Actions

PAM 9 Target Actions	Responsible Agencies
Creating business opportunities in the biomass energy sector for the private sector through regulatory and non-regulatory measures.	Ministries of Petroleum and Gas; Environment, Natural Resources and Physical Planning; Agriculture and Forests; Finance and Economic Planning; Social Security and relevant subsidiaries; Ministry of Water Resources, Irrigation and Electricity, Private Sector
Assessment of opportunities, incentives, and promotion of adoption of efficient cookstoves – linking biomass producers and consumers.	FNC, Energy Research Centre, development partners

237. ***Environmental Benefits:*** Reducing the general inefficiencies in cookstoves, and wood conversion to charcoal, biomass use in brick making will have significant benefits by reducing demand and hence deforestation and forest degradation.

238. ***Social and Economic Benefits:*** Intervention measures that build efficiencies in the value chain through technological innovation, knowledge transfer and access to finance to invest in modern appliances and production processes will increase the economic returns of businesses. The substitution to other fuel sources away from burning wood will help reduce adverse health effects from indoor air pollution.

239. **Risks:** There are risks that regulations or policy could be too restrictive, depriving communities' access to energy for basic needs, while private sector businesses may suffer from inability to access finance to invest in new technologies due to poor credit worthiness. Lack of awareness about the risks and benefits of other energy sources, including LPG, may lead low adoption rate and misuse. Affordability of other energy sources may limit access to some households.

4.5 STRATEGY OPTION 5: PROMOTING PARTICIPATION IN CLIMATE CHANGE RESPONSES

240. Broad stakeholder engagement is essential to ensuring that local REDD+ initiatives are anchored in local communities, who can actively engage and fully participate in both project development and

implementation. As such, participation is key from a wide range of stakeholders including women and men, forest dependent communities, agricultural communities, pastoralists, NGOs, private-sector entities, research and academia, as well as government institutions at national and state levels. This will allow all parts of society to play significant roles in the management of forests and natural resources.

PAM 10. Advance the participation of youth and women

Rationale

241. It is widely seen that people who are already most vulnerable and marginalized in societies will also experience the greatest impacts from climate change. Climate change is not an isolated phenomenon and will affect marginalized groups in all aspects of their lives. Climate change will perpetuate food insecurity, malnutrition, ill health, and migration, rendering marginalized groups particularly vulnerable, impacting the ability to secure sustainable rural livelihoods, and driving people away from farming communities.

242. Women are increasingly being more vulnerable than men to the impacts of climate change due to a range of cultural, economic and social reasons. Typically, women have less access than men to resources such as land, credit, agricultural inputs, decision-making structures, technology, training and extension services that would enhance their capacity to adapt to climate change.

243. It is not common to categorize young people as a marginal group. However, they can be marginalized in village programs, particularly when they are not involved in relevant decision-making, educational or capacity building processes. Young people are not only victims of climate change, but they are also valuable contributors to climate action. Within the next 50 years, some of today's youth will become the community leaders, policy makers and decision makers. Consequently, capacitating and involving young people in the response to climate change is crucial.

PAM Objective

244. The Sudan NRS will ensure gender equality and women's empowerment principles inform and are fully integrated into the formulation, prioritization, and implementation of all Strategic Options and PAMs. This approach will help ensure that all stakeholders can equitably and meaningfully engage, participate and benefit from national REDD+ processes and actions.

245. The NRS recognizes the gender equality provisions contained in international agreements on REDD+, including on safeguards; and promotes the mainstreaming of gender in REDD+ planning, implementation, monitoring and knowledge management activities, to achieve gender-responsive REDD+ action and contribute to Sustainable Development Goal 5 on gender equality.

246. This NRS recognizes that creating opportunities for broader youth participation in climate change responses has catalytic benefits, ensuring that the next generations are in a stronger position to be active and effective agents and promoters of adaptation and mitigation.

247. Education, training, capacity building, investments in technology and creating employment opportunities for women and youth are key components in establishing an enabling environment in which everyone can contribute to building a sustainable future.

PAM Target Actions

PAM 10 Target Actions	Responsible Agencies
Encourage access of women and youth to decision making forums and bodies at national and local levels regarding climate response measures.	Sudanese Environment Conservation Society Sudanese Environmental Community Organization, Youth Green Creep Organization, and the Sudanese Youth Parliament for Water Sudan MAB Youth Forum

At national levels, gender and youth perspectives should be mainstreamed into national policies and strategies on climate change.	TBA
Develop education and awareness programmes to help youth develop deeper understanding of the impacts of climate change and develop skills and knowledge in responding to these impacts.	Federal Ministry of Youth and Sports Ministry of Higher Education and Scientific Research
In implementing all PAMS in this NRS, specific consideration should be made in addressing gender inequalities in relation to access to resources, including credit, extension and training services, information and technology.	TBA
All communications undertaken in relation to the PAMS in this NRS should involve a well-defined, gender and youth sensitive and culturally appropriate communication strategy.	TBA Sudan MAB Youth Forum
Design and implement mechanisms that involve communities (including women, youth and elders) in monitoring social and environmental improvements in local areas.	State and Community Level Organizations

248. ***Environmental Benefits:*** Involving women and youth will help create a sense of shared ownership in protecting the environment. Women have historically developed knowledge and skills, which if fully utilized can contribute to enhancing local adaptive capacity and sustainable management of natural resources.

249. ***Social and Economic Benefits:*** Youth and women have a major role to play in building and sustaining peace in areas of conflict. Increasing their participation through REDD+ will contribute and lead to more effective macroeconomic policies based on fairness and equality. Taking note that it can be hard for women to obtain assets and credit, climate finance can support and increase the opportunities for women and youth while reducing vulnerability of these groups. With unemployment and poverty on the increase, it is important to increase opportunities for women to obtain technology and learn new skills.

250. ***Risks:*** Poverty, discrimination and gender dynamics are all dynamics that will influence how women and young people respond to climate change. Unless they are equipped with tools and presented with increased opportunities then their empowerment, involvement and contributions will not be successful.

5 FEASIBILITY ASSESSMENT OF STRATEGY OPTIONS

251. The feasibility analysis conveys how REDD+ and the Strategy Options fit into the context of the national social, environmental and economic development framework. The aim is to understand the implications on existing policies and institutional establishments, including how the NRS addresses deforestation and forest degradation, as well as builds on the existing policies, regulatory measures and institutional settings.

252. The NRS must have a positive net effect in its contribution to RoS' climate change response and adaptive capacity. The feasibility and the cost-benefit analysis build on the prior analysis undertaken for strategy preparation, specifically from the situational assessment of existing shortcomings affecting drivers of deforestation and forest degradation.

253. The cost-benefit analysis offers an overview of the implementation costs of Strategy Options based on an indicative approach. The results of the feasibility assessment support and guide the prioritization of the Strategy Options and PAMs as well as articulating the following:

a. **Regulatory and Policy Framework**: Assessment of the interaction and coherence of the Strategy Options and relevant policies, legislation and regulations.

b. **Costs of implementation**: Calculation of the net present value of the implementation of the PAMs with baseline funding and reference benefits or impacts.

c. **Institutional Analysis**: An analysis and identification of the institutions that would be involved in the implementation of REDD+ to ensure roles and responsibilities are well aligned, as well as having the necessary capacity.

5.1 Responses to Drivers

254. The PAMs address the required responses to drivers, through a range of complementary actions. **Error! Reference source not found.** summarizes how each of the proposed PAMs addresses the drivers of deforestation and forest degradation. The response to individual drivers requires a range of different and complimentary responses, as outlined in the table below.

Table 5-1 PAM response to drivers and expected outcomes

PAM	Key Drivers Addressed	Expected Outcomes
PAM 1. Strengthen sectoral policies, financing, and institutional capacity	Legal and institutional gaps and capacity	Coherent policies, with improved coordination and state level implementation, proposal for a sustainable financing instrument or fund
PAM 2. Strategic landscape management, restoration and emission reductions	Crosscutting issues; Destructive agents; Wood extraction; Legal and institutional gaps	Multi-functional managed forests, with improved species and investment
PAM 3. Support for Forestry Research and Development	Crosscutting issues	Enhanced research and development, including the development of a research innovation hub
PAM 4. Improving the adaptive and climate mitigation capacity of the agriculture sector	Agriculture expansion; Destructive agents; Subsistence agriculture; Crosscutting issues	Increased productivity through enhanced capacity
PAM 5. Promoting Sustainable Livestock and Rangeland Management	Livestock overgrazing; Refugees & internally displaced people; Crosscutting issues	Improved stock, habitat and feed, with reduced conflict between pastoralists and agriculture

PAM 6. Harmonizing land use planning, investment policies, and legislation	Legal and institutional gaps; Infrastructure development; Petroleum exploration; Mining	Holistic impacts from development are taken into account, reducing sectoral policy and planning conflicts
PAM 7. Sustainable Land management stewardship through land tenure security	Legal and institutional gaps	Clear demarcation of land activities, protecting individual and community rights
PAM 8. Increasing access to efficient and sustainable household energy	Urban sprawl; Wood extraction for energy; Population growth; Crosscutting issues	Sustainable charcoal production and alternatives to energy from forest-sourced biomass
PAM 9. Promoting a sustainable biomass-based energy value chain	Urban sprawl; Wood extraction for energy; Population growth; Crosscutting issues	Efficient and sustainable production and consumption
PAM 10. Advance the participation of youth and women	Legal and institutional gaps	Enhanced participation and improved access to opportunities for women and youth

5.2 Relevant Regulatory and Policy Framework

255. Sudan's natural resources policies aim to reduce the impact of development on forests, wildlife, biodiversity, soil and water resources, and to increase the resilience of natural ecosystems to climate change. The modified forestry policies that came into force in 1986 were designed to protect, rehabilitate, conserve and develop the forest sector (Elsiddig 2013). One of the objectives was to expand the area under forest reserve to 20 per cent of the country's total area.

256. The Sudan National Forestry Policy Statement of 2006 broadened the scope of the country's forest policy, covering poverty reduction, food security, desertification, reforestation, conserving biodiversity, land use planning, industrialization and the economic valuation of forest products and services (FAO 2006). However, the policy statement is silent on important issues such as drinking water for animals, grazing for livestock and wildlife, and the effects of climate change(Magid and Kerkhof 2020).

257. The analysis in the first Sudan State of the Environment and Outlook Report (UNEP and HCENR 2020) paints an important and accurate picture. National institutions are significantly under-resourced and lack skills and resources, particularly in relation to designing, implementing, and monitoring development programs. There is also a pervasive lack of and access to information, while roles and responsibilities of national and state level institutions are ambiguous and often overlapping, resulting in poor communication and coordination.

258. This NRS comes at a time when the RoS is at a crossroads and in political transition, with a broad anticipation for substantive economic and social reforms. Historically, planning processes tended to take atop-down approach, rather than encouraging participationat all levels. REDD+ encourages broad stakeholder engagement and it is a critical success factor. This NRS not only seeks to support the current and future efforts to combat deforestation and forest degradation but represents a convergence of climate change mitigation and adaption efforts and green growth. While most of Sudan's economic policies have sought to deal with systemic issues affecting society, such as poverty and food security, it is becoming increasingly essential to create the necessary enabling environment for green growth and economic recovery.

259. Opportunities exist for mainstreaming climate change by engaging with the private sector. The creation of the Investment and Private Sector Development Agency (IPSDA) in December 2019, as a one-stop-governmentinstitution to cater for the challenges and needs of private sector, is an important step as it can provide measures and policies that promote green investment and recovery.

260. Policies in key primary production sectors, such as livestock, aim to grow both the meat industry, and to improve the quality of rangelands and protect livestock drinking water facilities. However, the implementation of these policies has been ineffective as some economic policies, such as those related

to oil and gold mining, have resulted in the contamination of water bodies in West Kordofan state and the destruction of pastures in eastern Sudan.

261. Sudan's progress in implementing the Interim Poverty Reduction Strategy Paper was assessed in 2016 by the World Bank and the Ministry of Finance and Economic Planning (World Bank and Ministry of Finance and Economic Planning, 2016). The evaluation concluded that although the interim strategy correctly highlighted the important role of the agricultural sector in reducing poverty, it falls short in adequately addressing the environmental consequences of agriculture and the effects of this sector on natural resources. (UNEP and HCENR 2020).

262. The strategy options and policies and measures in this strategy recognize the complex convergence and of economic development and environmental sustainability and the government´s efforts to mainstream climate change response through national economic development strategies. The integration of REDD+ into existing and future policy will require deliberate mainstreaming. However, it may not necessarily require full reference to REDD+ as long as principles of sustainable natural resource management are recognized and reducing emissions from deforestation and forest degradation is recognized as a necessary measure to safeguard Sudan´s natural capital.

263. Existing policies and regulations may be adequate to address environmental degradation, but the implementation and enforcement of the policies and regulations is the most significant challenge. Table 5-2 summarizes a selection of federal and state policies, laws, and regulations relevant to REDD+, including international conventions that the RoS has signed up to.

Table 5-2 Policies, Laws and Regulations Relevant to REDD+

#	Title	Date
National strategies and legislations		
1	Environment Protection Act	2001
2	Sudan Interim National Constitution	2005
3	RoS Forest Policy Statement	2006
4	25-Year National Development Strategy	2007-2031
5	Investment Act	2013
6	Sudan National Agricultural Investment Programme (NAIP)	2015-2020
7	Range and Pasture Act	2015
8	National Bio-safety Law No (15)	2015
9	Interim Poverty Reduction Strategy	2016
10	Utilization of Minerals Regulation	2016
11	Development of Mineral Resources Law	2017
12	Manual of Terms and Conditions for Environment Safety and Occupational Health in Minerals Sector	2017
13	Manual of Terms and Conditions for Safety and Occupational Health in Traditional Mining Sector	2017
14	Social Corporate Responsibility in Minerals Sector	2017
15	RoS' National Permanent Constitution under formulation	2018
16	Land tenure laws and policies	
Sub-national Legislations		

1	Gadaref State Law for Protection and Promotion of the Environment	2007
2	Khartoum State Law for Protection and Promotion of the Environment	2008-2010
3	North Darfur State Environmental Protection Act	2009
4	North Darfur State Land Use Act	2009
5	North Darfur State Desertification Control Act	2012
6	North Darfur State Tree-belts and Wind Breakers Act	2013
7	North Kordofan State Law of Protection and Promotion of the Urban Environment No. (17)	2016
8	Blue Nile State Law requiring farmers to plant trees on 10% of rainfed agricultural land and 5% of irrigated land in line with the provisions of the Federal law	2018
Regional and international conventions and treaties ratified by the RoS		
1	The Statement of Forest Principles of Agenda 21	1992
2	Criteria and Indicators for SFM	2001
3	New Partnership for Africa's Development (NEPAD)	2001
4	Comprehensive African Agricultural Development Programme (CAADP)	2003
5	United Nations Convention to Combat Desertification (UNCCD)	1992
6	United Nations Framework Convention on Climate Change (UNFCCC)	1993
7	New UNCCD	2018-2030
8	UN Convention on Biological Diversity (CBD)	1992
9	Kyoto Protocol	1997
10	2015 Paris Agreement	2017

5.3 Potential Barriers to REDD+

264. As a post conflict country, Sudan is faced with multiple risk factors, which will have both direct and indirect implications on the successful implementation of REDD+ (World Bank 2015). These relate to political stability, economic growth, capacity, governance, corruption and social issues.

265. The situation in the country is considered fragile given the challenges of political, administrative and economic transition post conflict. The economic situation, together with limited revenue mobilization, heavy debt burden, long-term effects of international sanctions, and rampant inflation are constraining growth prospects and poverty reduction efforts. Achieving strong governance and addressing corruption will be critical in seeking investment and achieving equitable growth.

266. Technical and implementation capacity is uneven across sectors and there are inherent capacity gaps in some government departments, with a lack of integration at institutional levels(World Bank 2015). At the institutional level, there is a lack of awareness across institutions about the boundaries associated with the implementation of potential adaptation strategies, as well as training and public awareness raising activities. The capacity gaps refer to both the availability of proper technology and suitable staff. The FNC is the key national institution overseeing forest management, establishing policies and regulations for development and protection. However, since its establishment the FNC has faced many institutional challenges including policy conflicts across ministries, limited budgets and resources, and challenges with staff in respect of numbers, skill levels and gender quality (Kerkhof 2017). As such, capacity is vested in a limited number of staff and there are weak linkages between regional REDD+ coordination staff and other FNC staff and the staff of related stakeholder institutions.

267. Climate change is not fully integrated into national and state policy and planning systems. This is partly due to the changes within institutions experienced in recent years, as well as a general lack of information and awareness. As such, national development plans and strategies do not effectively incorporate multi-lateral environmental agreements such as UNFCCC. Mainstreaming climate change will require continuous revision of policies, legislation, and activities across a range of sectoral areas. Furthermore, there is poor enforcement of laws and regulations, which limits the effectiveness of existing strategies to reduce GHG emissions and enhance resilience to climate change impacts.

268. There are a range of critical social issues that are associated with the implementation of REDD+ in the RoS. These include social conflict between farmers and pastoralists over land use, issue of migration, refuges and internal displacement, issues of land tenure as it relates to customary ownership and use of land. Many of these issues will become more challenge, due to the country's vulnerability to climate change. Addressing these issues will require strong environmental, economic, and social safeguards.

269. Forest management is entrusted to various institutions, agencies and community sectors, who gain benefit from forest products and services. This does lead to some levels of sustainable forestry and environmental protection. However, the lack of integrated land use plans and coordination across institutions are major limitations.

Table 5-3 Alignment of NRS Objectives to national economic development strategies

Goals and Objectives		
Strategy/legislation		**National REDD+ Strategy**
Environmental Protection Act 2001	Stipulating environmental impact assessment (EIA) prior to implementation of any development project	Reduce deforestation and forest degradation, while promoting sustainable forest management (SFM) and enhancing forest carbon stocks through afforestation and reforestation. Reducing deforestation, forest degradation and enhancing forest carbon stock by promoting climate smart agriculture, best mining practices, conservation and restoration of forest
RoS Forest Policy 2006	Governance of forestry sector, population welfare, a greener RoS, maintaining competitiveness, people's participation, land use and tenure conflict resolution, development of jobs and income generation programs and conservation of biodiversity	
25-Year National Development Strategy 2007-2031	Conservation of biological balance and sustainability of natural resources	
	Enhancement of institutional and legislative relationships and policies	
	Incorporation of the environmental factor in policies and institutional and legal relationships	
	Adoption by The State for the design and implementation of a national plan for land use that caters for protection and implementation of forest and other natural resources policies, genetic resources and attain the required balance between them and other land uses	
	Rationalization of use of biomass energy	
	Mobilization of financial resources	

Interim Poverty Reduction Strategy (IPRS) 2010 revised 2016	Recovery and growth of agriculture, adopting institutional reform and enforcing land use regulations, ensuring formal security for farmers and pastoralists tenancy rights, halting and reversing desertification, preparing land use maps, enhancing community environment awareness, strict enforcement of environment protection legislations, promotion of good governance, increasing participation of locality governments and communities in land use decision making, devolving power and obligations, removal of fees duplications, and promoting networking coordinated linkages.	ecosystems, rationalization of biomass energy consumption, promoting renewable energy production and usage. Mobilizing resources (including non-results-based funding) and intensifying investments in forestry for increased emission reductions and reduced carbon removals.
Investment Act 2013	Preparation of investment plans and maps, determining and allocation of national land for investment in coordination with concerned ministries and states	
Range and Pasture Act 2015	Provide a holistic approach for developing and managing natural resources.	

5.4 Cost-Benefit Analysis

270. There are costs associated with implementing REDD+ interventions, and they can be defined as the costs and investments required to implement the NRS and avoid or minimize displacement of emissions to other regions or sectors (leakage) (World Bank 2016a). Therefore, it is necessary to determine the cost and benefits that are likely to accrue from implementing the NRS. Such an analysis enables an understanding of the level of resource mobilization, emission reduction potential, social and economic impact.

271. For this strategy, a cost benefit analysis (CBA) evaluates the costs and benefits generated over the period of implementation of 10 years. The effectiveness of each of the PAMs was determined by estimating the costs of implementation based on the target actions required to meet each PAM. These activities were further diffused into budget actions and costed using national and international reference factors as well as assumptions discussed with national experts.

272. The results of the CBA support and guide the prioritization of the Strategy Options and PAMs for implementation, from the point of view of the most effective use of funds. The proposed budget for each PAM is derived from various sources and assumed to have a certain level of emission reduction potential and socio-economic benefits.

273. The CBA is developed through an iterative manner, starting with a model that allows for comparability. The allocation of funds is then assumed to lead to impacts on reducing forest degradation or deforestation and to lead to increased incomes depending on the PAM. The funds can be interpreted as scalable budget figures and the impacts as targets for the sub-projects. As such, the modelling provides a basis for the overall budget allocation presented for each PAM. Hence, the CBA should be treated as part of the broader suite of guidance, including expert knowledge, used to determine the overall budget estimate for implementing the NRS as presented in the Action Plan.(Annex 1).

274. The CBA provides a net present value (NPV), which is often used as an indicator for financial viability. However, it should be noted that in the case of some policy measures, financial viability analysis does not accurately reflect the long-term benefit and impacts on the economy, and this is one weakness of a CBA. The internal rate of return (IRR), which is the expected compound annual rate of return that will be earned on an investment, was also calculated as an indicator of financial viability of the PAMs. The CBA uses baseline ecosystems services factors derived from country-specific and some global literature, plus expert advice to calculate the social and economic net present value, as well as the carbon emission reduction potential of each PAM.

275. The targets, costs and other values were set from reference ambitions for Sudan such as the published INDC, the Sudan's First and Second National Communications under the UNFCCC, Sudan's REDD+ Readiness Assessment, 2019 FAO crop and food supply assessment mission (CFSAM) to Sudan, Sudan First State of Environment and Outlook Report, Sudan's forest reference emission levels/forest reference levels (FRELs/RELs), published research papers and other reports. Where data was not available,

subjective estimates were utilized, based on comparable countries in addition to expert judgement. A list of key factors and assumptions is present in (Annex 2a and 2b in progress).

276. The impacts of the PAMs over time are assumed to take place during a 20-year period, following a linear function between the current state to the assumed future state at year 20. In addition to a normal time preference discount rate used by private companies and individuals (assumed here at 15%), the analysis uses a social discount rate (SDR) calculated according to (Valentim 2008). The equation for calculating the SDR is adjusted to Sudan in line with the 2.4%[4] population growth and 3.2%%[5] annual per capita GDP growth, respectively. The SDR is set to 8.36%.

277. The five Strategy Options and the ten PAMs are highly relevant and respond to the identified drivers and underlying causes of deforestation. Quantitative and qualitative analysis shows that a combination of regulatory and institutional strengthening would have a greater impact on reducing deforestation and forest degradation. As noted, Sudan has a wide range of suitable policies and opportunities, but enforcement and financial capacity are significant barriers.

278. The combined results of the CBA, economic valuation and climate change mitigation potential show that the five Strategy Options should enable the RoS to address the direct and indirect drivers of deforestation and forest degradation, while contributing to national economic development agenda. With regards to the ten PAMs, the range of net present values and climate change mitigation potential Table 5-5should determine the necessary investment approach to draw maximum returns and benefits (social, environmental, and economic). Table 5-4 and Table 5-5 outline the social and economic NPVs, internal rate of return (IRR) and emission reduction potential for each PAM.

279. The highest investments are required for PAM 2 (Strategic Landscape Management, Restoration and Emission Reductions) which will cost ~US$13 million. The cost drivers in PAM 2 are smallholder forestry programs, state-wide forestry nursery systems to support afforestation, reforestation, and restoration of degraded lands, strengthening the gum sector and managing forest fires. This is followed by PAM1 (Strengthen sectoral policies, financing, and institutional capacity for sustainable natural resource management), with these 2 PAMs accounting for 56.3% of the overall costs of the REDD+ program in Sudan. The least cost is for PAM 6 costing ~US$1 million.

Table 5-4 Net Present Values and IRR for proposed PAMs

PAM	Net non-Monetary(Social) Benefit (US$)	Net Monetary (Economic) Benefit ($)	Net Carbon benefits (US$)	Net Benefits (US$)	IRR (%)
1	59,033,219	-8,578,478	297,470,927	365,082,624	33%
2	283,157,314	256,064,144	1,035,180,152	1,591,966,890	145%
3	13,566,660	-513,636	63,066,222	77,146,518	83%
4	27,045,020	1,312,115,397	122,540,950	1,472,180,834	-
5	13,561,937	-2,798,680	65,919,463	82,280,079	30%
6	6,205,348	-834,800	30,821,746	37,861,895	35%
7	9,300,607	-1,259,615	46,358,587	56,918,809	36%
8	12,817,150	-1,263,146	62,316,712	76,397,008	45%
9	9,642,713	-917,509	46,700,694	57,260,916	43%
10	6,019,671	55,192,389	30,636,070	93,889,084	-

[4]https://data.worldbank.org/indicator/SP.POP.GROW?locations=SD

[5]https://data.worldbank.org/indicator/SP.POP.GROW?locations=SD

280. Approximately USD40.1 million will be required to implement the NRS. A detailed Action Plan is provided in Annex 1.

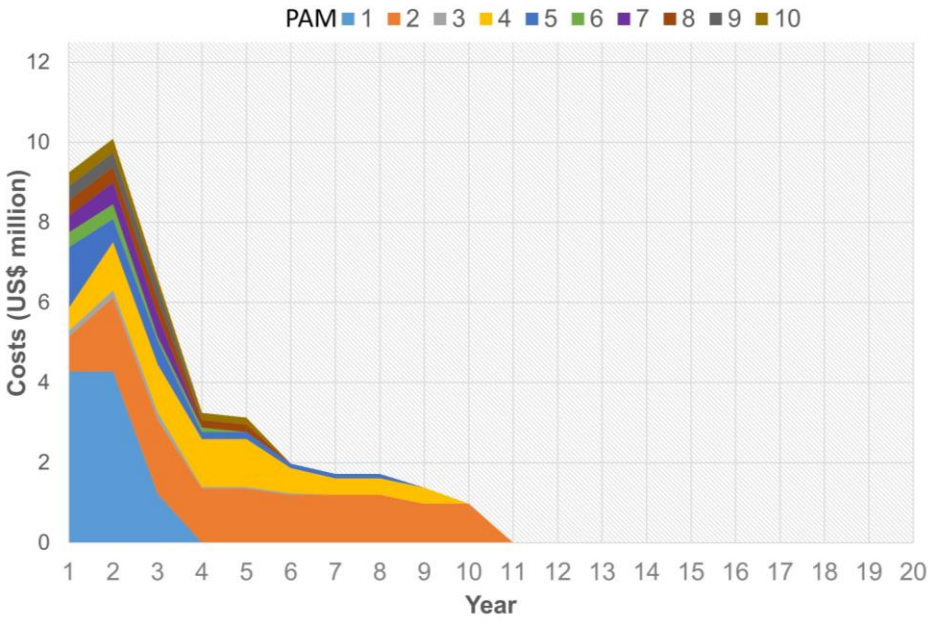
281. The potential impact of each PAM in terms of GHG emission reductions and net income from carbon are shown in Table 5-5. As expected, PAM 2, because of the forest area expansion, has the largest emission reductions potential over 20 years, with a yearly average emission reduction of 53,399 tons of CO2e. This already represents a sequestration potential of 69% of the 77,650tCO2e 2010 baseline total emissions from Sudan. Expansion of agroforestry, shelterbelts and silvicultural practices on farms is a distant second in terms of potential CO2 impact.

Table 5-5 Climate Change Mitigation Potential of each PAM

PAM	Potential Total CO2e impact (Gg)	Average CO2e impact per year (Gg)	Potential Net Income from Carbon (USD5.1/ton)	Cost estimate (US$)
1	161,728	8,086	41,240,556	9,770,000
2	1,067,987	53,399	272,336,664	12,825,000
3	33,680	1,684	8,588,444	670,000
4	201,350	10,067	51,344,244	7,210,000
5	45,798	2,290	11,678,432	3,360,000
6	16,840	842	4,294,222	970,000
7	25,260	1,263	6,441,333	1,480,000
8	33,680	1,684	8,588,444	1,540,000
9	25,260	1,263	6,441,333	1,070,000
10	16,840	842	4,294,222	1,240,000
Total	**1,628,423**	**8,142**	**415,247,891**	**40,093,333**

282. The cost evolution of the PAMS over the 20-year period are shown in Figure 5-1. The cost modelling shows that the peak costs are in the in the first and second years of REDD+ implementation and will need to be reviewed or end after 10 years. PAM2 has the most cost spread to year 11 particularly from the 10 year high value timber tree nurseries and planting activities and running costs in capacity development and institutional strengthening for fire management.

Figure 5-1 Cost evolution for the implementation of the PAMs over 20 year period



5.5 NRS Financing

283. The NRS is an important instrument that will contribute to the RoS´s climate response strategies. Several options will be considered to develop a financial vehicle to drive the implementation of the NRS, through which the required international funding will be raised, and financial allocations will be coordinated.

284. Financing of REDD+ interventions will require consideration of various modalities. This NRS proposes setting up a REDD+ Financing Facility (RFF).

5.5.1 Proposal for a REDD+ Financing Facility

285. Sudan will benefit from establishing a financing facility that harmonizes and rationalize climate change funding, both from domestic and external sources, for implementation of national climate change response priorities under REDD+ and other strategies including NAMA, NAPA and NDC. The purpose of the Facility will be elaborated during Phase I of the NRS implementation.

286. The purpose of the Facility will need to be represented through an eligibility criterion, which act as a gateway to determine the types of projects/ initiatives that can be funded. The eligibility criteria may depend on the source of funds. These criteria will help rank different potential projects, which will be important in situations when the value of project applications is higher than what is within available funds. This assessment will ensure transparency in decision making, avoiding the question of bias when certain projects are selected over others.

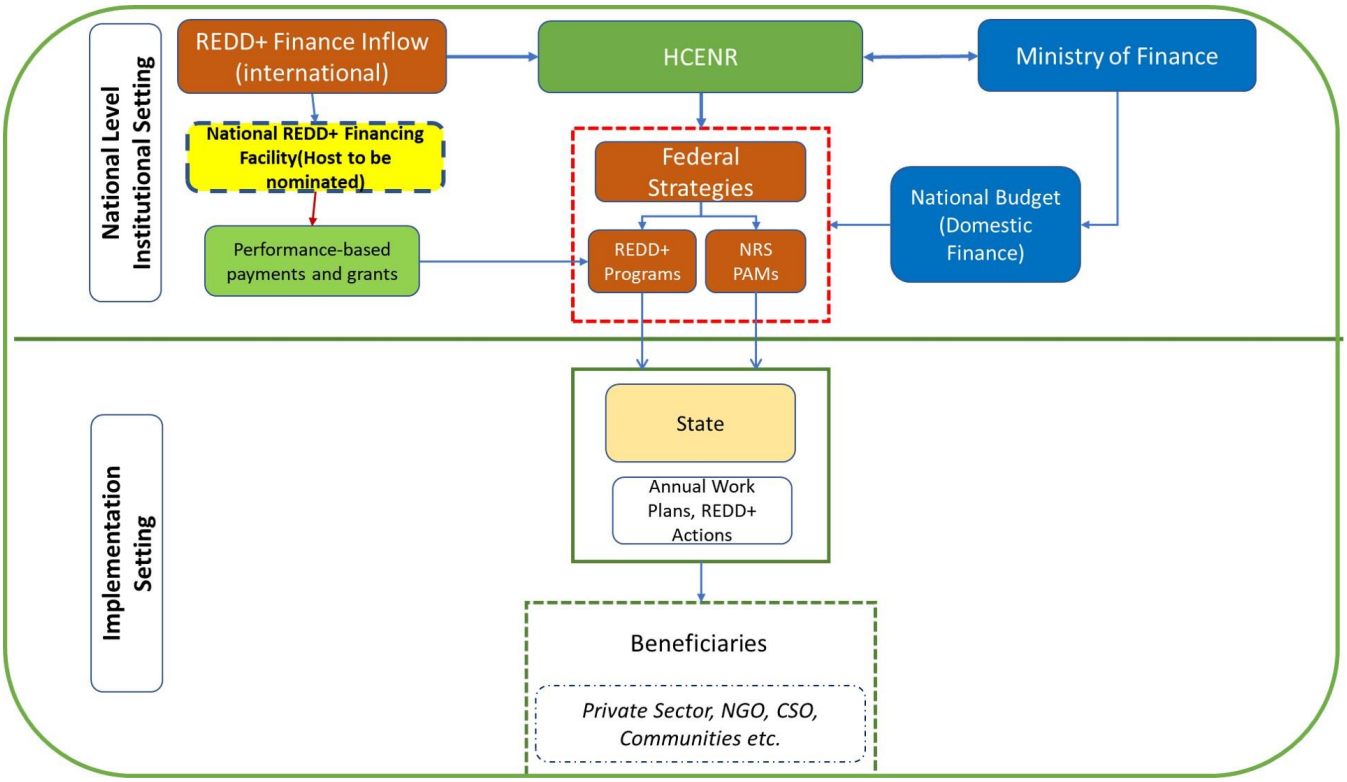
287. The eligibility criteria will need to reflect the key national priority areas including;

- Adaptation
- Mitigation
- Climate change research, technology development and transfer; and
- Capacity building.

288. The Facility will have multiple windows, each of which will have different disbursement modalities. The types of projects that will be funded will also need to be fully identified and articulated. For example: funds may be required for administration and planning (e.g., establishing integrated land use management plans, rangeland management); technology development and adoption (e.g., promoting climate change adaptive agricultural technologies); development of services (e.g., improved waste management and sanitization); capital development (e.g., climate proofed infrastructure for energy, telecommunication,

transport and water sectors); capacity building (e.g., increasing knowledge and skills of various organizations in climate change management); and, education and awareness (e.g., promoting energy efficient technologies).Figure 5-2 illustrates the proposed fund and options for funds flow to beneficiaries.

Figure 5-2 REDD+ Financing Facility and funds flow arrangements (proposal)



5.5.2 Resource Mobilization

289. Options for funding REDD+ include development grants with national co-financing, loans and RBP, private national and international sources. The mechanism to deliver these funds also may vary, including grants, loans, market-based mechanisms and innovative mechanisms such as payments for ecosystem services. An optimal scenario that fits the domestic fiscal setting is to seek international grants (direct programme or project-based funding for REDD+) that can be complemented with domestic financing, or co-financing and leveraging on other international projects.

Table 5-6 Options and sources for financing REDD+ actions

Source	Description
Domestic finance	***Public budgets:*** Many countries are already delivering large-scale domestic finance for climate action from their public budgets. This will be assessed in discussions with national institutions. In some cases, finance has been directly targeted toward climate response activities, whereas in others finance is directed toward sector specific actions. For instance, Brazil has several domestically financed forest conservation programs. The best known of these is the Ecological Value Added Tax which is a federal tax implemented by the Brazilian Treasury. Under the tax, the size and management of protected areas was included in the calculation of the allocation of national VAT to states. This gave states an incentive to gazette and properly manage protected areas. A variety of options for domestic climate financing are recognized, depending on country-specific economic conditions, such as carbon markets and green bonds and mining royalties ***Payments for ecosystem services (PES):*** Many countries have implemented PES programs that pay for environmental mitigation efforts to deliver ecosystem services. Payments can be raised from direct users (e.g. industry, households, tourists) or through governments' taxation (e.g. a water fee, fuel tax).

	Nationally Appropriate Mitigation Actions (NAMAs): Many developing countries have pledged to undertake voluntary, domestically supported mitigation targets that may also become a source of climate finance.
Bilateral finance	After domestic sources, bilateral finance is the second largest source of climate finance, accounting for two-thirds of all internationally supported initiatives.
Multilateral finance	Currently there are more than 30 multilateral climate change funds and a growing number of regional funds (Table 1), although not all are accessible for Sudan. Among the multilateral climate funds solely dedicated to thematic climate funding, the largest by funding capitalization are the Green Climate Fund, the Forest Investment Program (FIP) and UN-REDD+. Other funds include the Global Environment Facility (GEF) Sustainable Forest Management.
Private sector partnerships and innovative products	There is growing interest in blended finance. Blended finance is defined "as the strategic use of development finance and philanthropic funds to mobilize private capital flows to emerging and frontier markets", resulting in positive results for both investors and communities. The private sector has an increasingly important role to play in climate funding. The UNFCCC and various international funding donor organizations are heavily supporting the broader participation of the private sector. Private sector actors are crucial for climate change response success, given the dominant role that market forces often play in driving land use change. Companies themselves are increasingly interested in the climate debate, because they recognize that their long-term operational sustainability is at risk due to climate change.

290. A fund mobilization strategy will be put in place to support the implementation of this NRS. The strategy will provide an overview of both domestic and international funding opportunities. In line with the proposal to set up a financing facility and encourage states to prepare REDD+ action Plans, it will be necessary to prepare a REDD+ financing facility investment and implementation plan along with a fund mobilization strategy.

6 BENEFIT SHARING FRAMEWORK

6.1 Purpose of the Benefit Sharing Mechanism

291. The Sudan REDD+ Benefit Sharing Mechanism (BSM) willplay a key role in REDD+ implementation by providing guidance on the distribution and sharing of benefits that create incentives and measures for REDD+ actions. The objective is to motivate behavior change that leads to reduction in deforestation, forest degrading, and landscape degrading activities. The way that benefits are shared among stakeholders will determine how stakeholders perceive, engage with, and contribute to REDD+ incentives.

292. The main objectives of the BSM are linked to the guidance and overall goals and objectives of the REDD+ Program in Sudan are as follows:

a. **Pursue low-carbon development:** The overarching guiding principles are those set by the RoS. In its NDC, the RoS views the planning process to reduce GHG emissions, or rather pursue low-carbon development, as an opportunity to strengthen national capacity, promote sustainable resource management, facilitate technology transfer, and identify synergies between national economic objectives and sustainable development. The BSM should improve the effectiveness of the implementation of REDD+ in achieving emission reduction objectives, by encouraging the participation and collaboration of stakeholders and improving livelihoods for forest-dependent communities.

b. **Reducing vulnerability to climate change:** The NRS outlines the vulnerability of the RoS to climate change, which has been exacerbated due to the recent historical socio-political and economic situation. About 80% of the Sudanese population is dependent upon crop production and animal husbandry for livelihoods. The agricultural sector faces significant risk from desertification of arable areas with humid agro-climatic zones shifting southward, rendering vast arable lands increasingly unsuitable for agriculture production. It is therefore necessary to increase the efficiency of REDD+ by minimizing transaction and implementation costs and integrating resources. It is also necessary to maximize the equity in the distribution of benefits among the actors responsible for the reduction of deforestation and forest degradation.

6.2 Benefit Sharing Context

293. For Sudan, the transition from REDD+ readiness phase to implementation and results-based payments implies the need to identify benefits to determine which approaches can be used for the BSM. Benefits will include monetary benefits (direct cash) and non-monetary benefits for goods and services.

294. The implementation of this NRS will lead to several non-carbon benefits. Non-carbon benefits (NCB) encompass a wide range of positive outcomes, resulting from REDD+ activities beyond those associated with avoided emissions and/or carbon sequestration. There are three types of NCBs: social, environmental, and governance benefits. Social NCBs of REDD+ activities include providing opportunities for livelihood improvement and facilitating the empowerment of individuals and all communities (farmers, livestock owners, gum Arabic producers etc.). From the consultations, options such as Participatory Forest Management (PFM) community forest management (CFM), joint forest management (JFM), and payment for ecosystem services PES can be considered. There are also significant opportunities for enhancing community livelihoods through civil society, women and youth groups, support and or establishment of Gum Arabic Producers Associations (GAPAs) who facilitate credit services, training, and extension services.

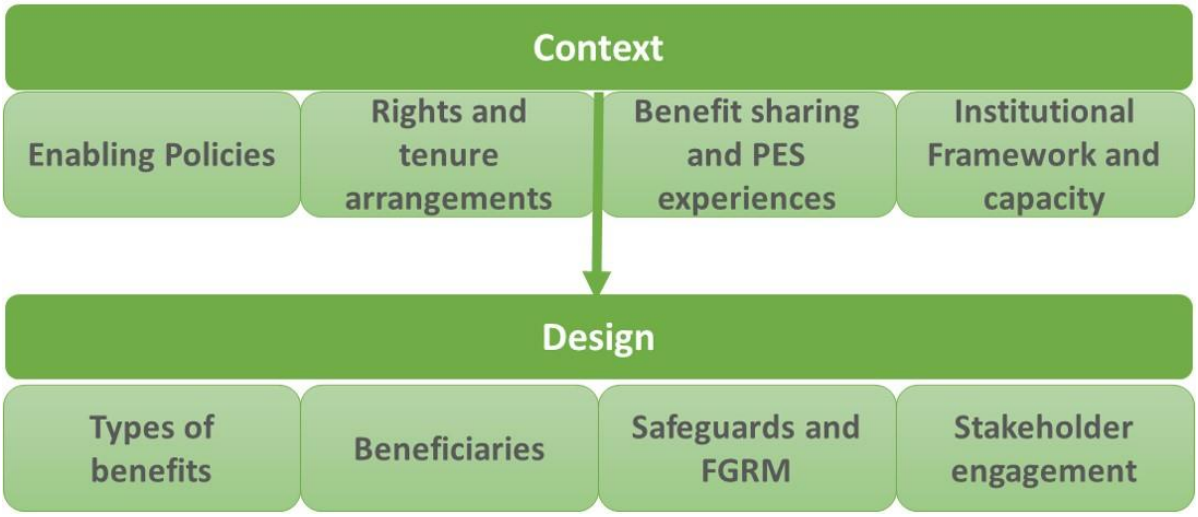
295. Environmental benefits range from biodiversity conservation to increased resiliency of ecosystems and improved ecosystem services, such as water regulation and erosion control, halting desertification and landscape degradation.

296. Governance benefits include secure land tenure, improved law enforcement, improved management of livestock corridors, increased levels of transparency and broader stakeholder participation in policies and systems that affect the management of forest resources. In most cases, these NCBs are also national priority policy issues., In the case of Sudan, governance, issues are identified as underlying drivers in the analysis of deforestation and forest degradation drivers.

297. As of necessity, priority non-carbon benefits need to be looked at from a national level to enable broader integration into socio-economic priorities, as well as national level monitoring and reporting.

298. Figure 6-1 illustrates the context of the Sudan BSM. Important aspects of the BSM context include enabling policies proposed across each of the 10 PAMs to be operationalized through the Action Plan, addressing rights and tenure, reviewing existing systems and experience and institutional arrangements and capacity for implementation. This context flows into the design of subsequent benefit sharing plans at program and project level where types of benefits and beneficiaries are identified along with designing relevant safeguards and grievance redress measures through broad stakeholder engagement.

Figure 6-1 Benefit Sharing Context



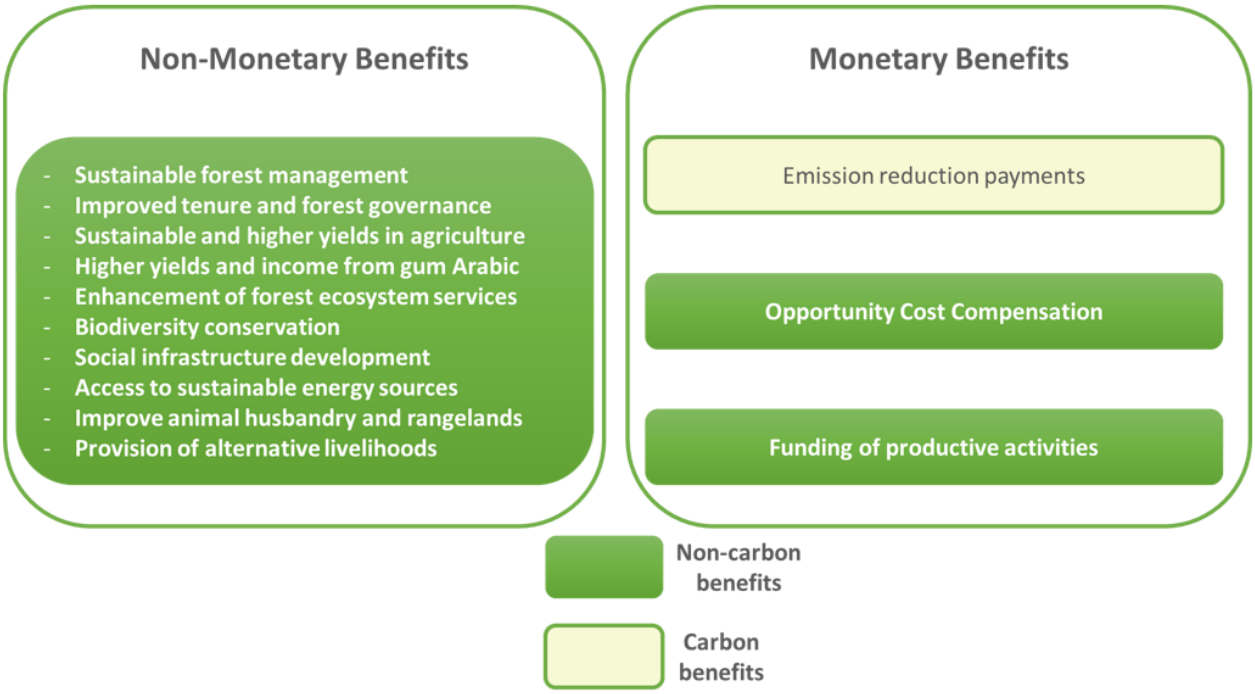
Source: readapted from CIFOR 2014

299. With the context in Figure 6-1, the cost of achieving benefits will vary. Higher levels of investment are justified for achieving benefits that clearly align with Sudan´s top economic development priorities combined with high emission reduction potential (PAMs 1, 2, 4 and 5).

300. At the implementation level, benefit sharing plans, such as for Emission Reductions Programs, contain important parameters that will include benefit sharing effectiveness, efficiency, equity and whether the focus should be on monetary (carbon) benefits or other non-monetary non-carbon benefits.

301. The complex socio-economic challenges faced by governance systems for ecosystem services are a major source of conflict tension in Sudan and are at the core of the debates about the governance of access to and use of ecosystem services. Under the NRS, considerations will be made on how to transfer international payments for carbon conservation by way of financial or non-financial benefits to the local stakeholders, who directly reduce deforestation and forest degradation, and provide the emissions reduction service. Figure 6-2 summarizes some of the benefits that will accrue from the implementation of REDD+ in Sudan.

Figure 6-2 Types of benefits



6.3 Modalities for Delivering REDD+ Benefits

302. There are three main basic modalities for delivering international REDD+ finance to countries. The modalities are loosely linked to the phases of REDD+ implementation articulated in the Cancun Agreements of 2010.They involve a transition from preparation and planning to implementation of policies and measures to reduce deforestation and forest degradation, and finally to results-based payments for verified emission reductions. The basic modalities that will need to be assessed in the context of Sudan are listed and described in Table 6-1.

Table 6-1 Modalities for delivering REDD+ Benefits

Modality	Description
Up-front investments	Finance delivered upfront to build capacity or to support the implementation of policies and measures that have been agreed upon in advance by the donor and recipient (This might include the World Bank, IFAD, GCF, and a host of other bilateral support.
Performance-based payments for actions	Finance is delivered in return for demonstrating successful implementation of "REDD+ actions" that are necessary for the success of REDD+, such as demonstrated improvements in forest governance or establishment of a national reference emission level through say the Green Climate Fund and others. These can be non-monetary
Results-based payments	Finance is delivered upon demonstration of verified emissions reductions generated by REDD+ activities, which may or may not result in the issuance of carbon credits that can be sold on a voluntary or compliance carbon market.

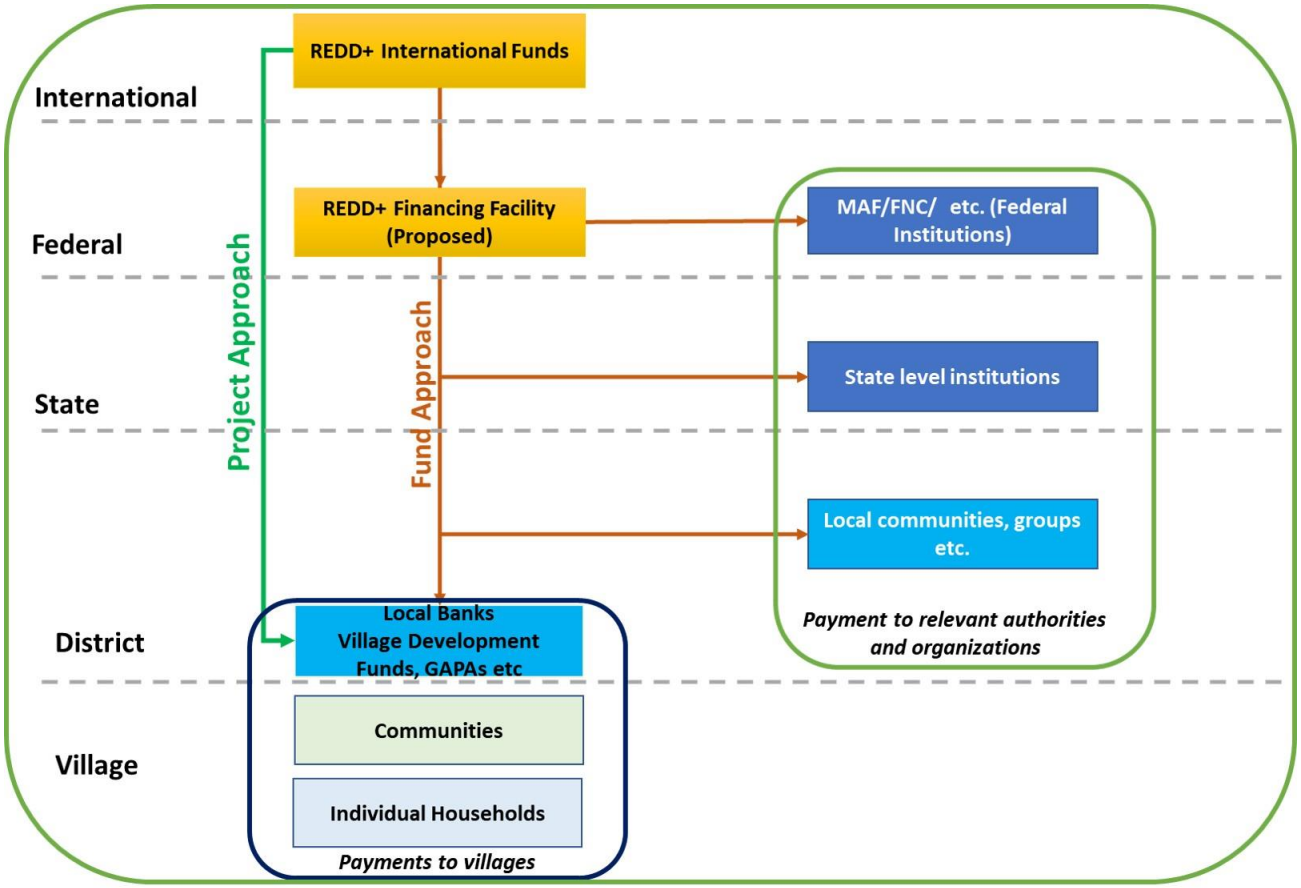
303. These three modalities can operate at any scale – federal level, state level and at community or household level. However, there are challenges that arise in striking a balance in equity. Many questions remain unanswered with regards to costs and benefits, participation in decision-making and roles and responsibilities of different stakeholders.

6.4 Benefit Flow

304. There are two scenarios that could be adopted in Sudan – a fund approach and project approach. In each approach, there will be specific types of beneficiaries and benefit rationale. Benefits under this framework will include both monetary and non-monetary benefits and include benefits that are achieved after some period of implementation (ex-post); as well as upfront benefits (ex-ante) to enable the REDD+ interventions. This framework is based on the tenet that the greater proportion of REDD+ financing in Sudan will come from international sources, with some domestic finance and potentially significant revenue from RBP based on the CBA.

305. The BSM will need to operate effectively for various actors at multiple levels in Sudan and ensure that participating communities receive benefits. Legal arrangements and regulation rules should be put in place to ensure a fair benefit sharing system. However, these regulations and rules should be flexible enough to accommodate local-specific circumstances and allow local actors to appropriately adapt the mechanisms to their needs.

Figure 6-3 Project and fund approach benefit sharing



306. The proposed establishment of REDD+ financing facility in Sudan would need to be preceded by the creation of clear carbon rights and ownership related to land tenure rights. Development of regulatory and non-regulatory instruments could build on existing systems and enhance benefits for local communities. For instance, the FNC collects royalties and license fees for cutting of forests or collection of NWFPs. The use of these royalties is mainly for funding FNC operating costs. Reviewing and improving the royalty system could be considered to improve planning and allocation of the royalties. For instance, increased funding mobilization and capacity would improve sustainable management of forests and increase revenues that could be invested back into community programs and rangeland management.

7 STRATEGY IMPLEMENTATION

7.1 Institutional Setting

307. The design of this NRS requires that a lead agency is nominated for each PAM, in line with its institutional responsibility. Associated activities will be led by the specified department in close collaboration with other relevant government departments or institutions. The implementation of this NRS does not necessarily require separate institutional structures. Activities or projects will be implemented within relevant departments, following normal project or program implementation framework and best practice.

308. **Table 7-1** lists but not exhaustive, the institutions with significant relevance to REDD+ expected to lead the implementation of this NRS. The implementation of REDD+ will require institutional, sectoral, and sub-sector cooperation and coordination as well as effective resource mobilization. As in many countries, roles and responsibilities in Sudan will evolve over time. It is necessary that changes in roles and responsibilities do not lead to policy conflicts.

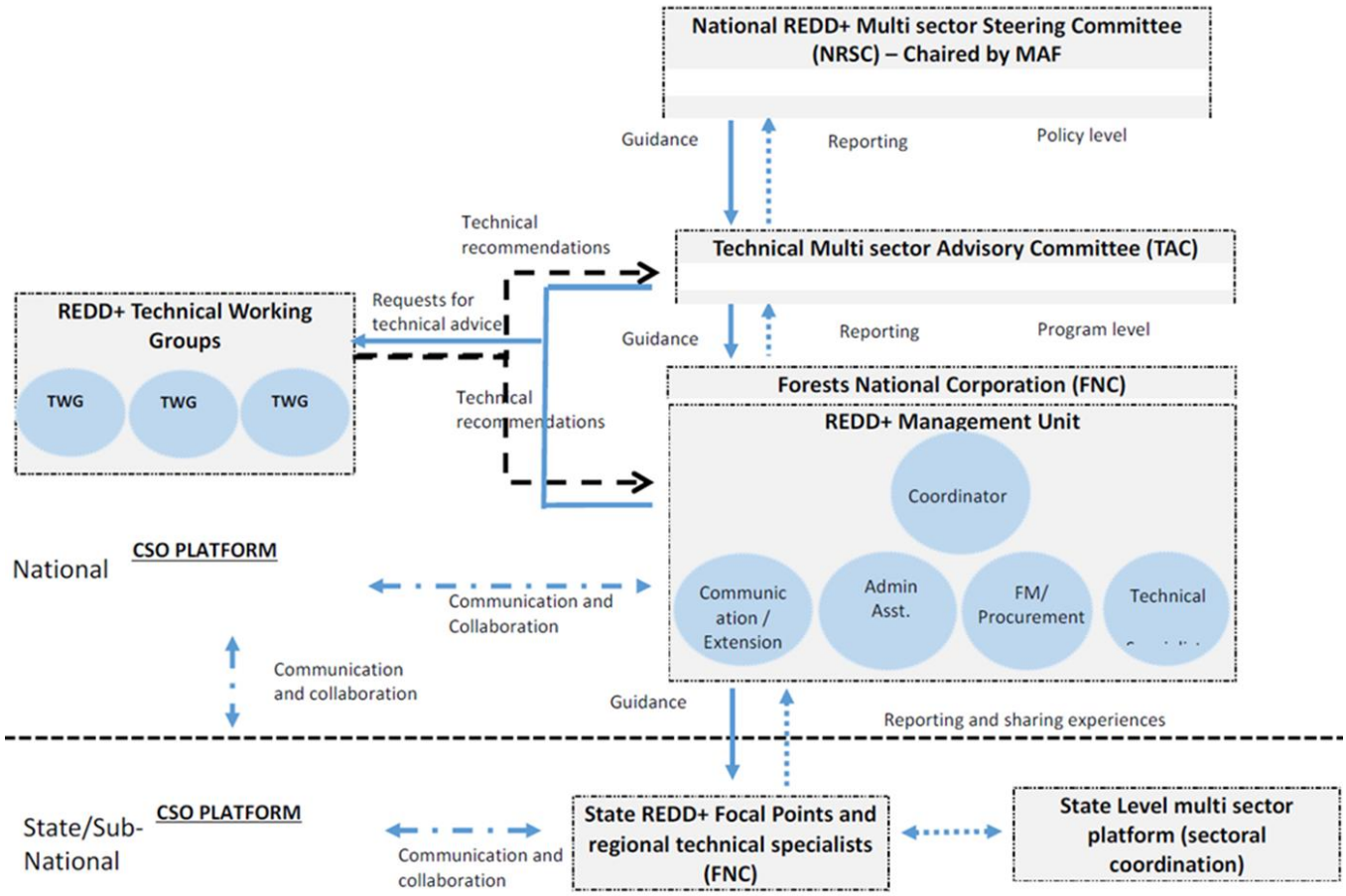
Table 7-1 Institutions relevant to REDD+

Institution	Mandate
The Ministry of Agriculture and Natural Resources	Responsible for developing and implementing policies and programs related to mechanical and irrigated agriculture, as well as forest land. Developing and improving agricultural production carrying out scientific and research in agriculture and natural resources , and supervising and investing in natural resources and follow up the implementation of laws that promote and protect forests.
Ministry of Finance and Economic Planning	Coordinates all funding that is to ultimately be provided of the Ministries. All of government fiscal allocation and national policy setting
Ministry of Animal Resources, Fisheries and Rangelands	The is responsible for national livestock production and improvement Developing policies and plans for the livestock Developing veterinary extension programs and methods for animal health Developing animal production and raising the competitiveness of livestock
Ministry of High Education & Science Research	Main role is to improve the quality of education, improve its outputs and build capacity in the education system Developing applied scientific research and publishing Responding to the needs of the labor market and community service and providing the necessary expertise in the fields of economic, social and cultural development Develop universities relevant curriculum for creating centers of excellence in research and development and the establishment of special units and centers
High Council for Environment and Natural Resources (HCENR).	Responsible for policies and protection of the environment and natural resources. Consists of ministers and heads of institutions of direct relevance and representatives of research institutions and academic and representatives of civil society organizations and experts in the field of the environment. The HCENR Secretariat acts as focal point for international conventions, including the UNFCCC. Responsible for submitting all reports to the UNFCCC, including the Biannual Update Reports (BURs), the National Communications, and the Technical description of the Forest Reference Emission Level (FREL) for review.
National Council for Physical Development and Land Disposition	General policies for urban planning Drafting of laws and regulations concerning physical planning Training of staff

Forests National Corporation	Reservation, protection, conservation, and replacement of forests State-owned corporate institution, under the governance of MAF. Develop and implement forestry policies, rules, program and methods for sustainable use and development to ensure full protection of the environment. Planning, research, technical supervision and raising awareness about forestry. Responsible for afforestation and reforestation projects including developing gum Arabic and other non-wood forest products. Responsible for the development and implementation of the REDD+ Program
Remote Sensing and Seismology Authority (RSSA):	Autonomous multidisciplinary institution specializing in geoinformatics and application in agriculture, forestry, environment, geology, disasters and hydrology. Implementation and application of remote sensing technology for natural resource management, climate change and disaster risk reduction. Cost recovery business model. Role in REDD+ includes supporting NFMS and MRV requirements and is custodian and disseminator of multiple datasets including satellite imagery and other derivative products. Identifying strategies for increasing application and use of geoinformatics, capacity-building and knowledge transfer and engagement with international remote sensing organizations.
Mechanized Farming Administration	Allocation of land and management of the mechanized sector
National Investment Council	Identification of land for agricultural, industrial and other purposes
Physical Planning and Land Disposition committees	Approval of locations and purposes of land use Designation of governmental land
Nomads Commission	Policy making for the development of pastoralists Mapping and demarcation of pastoral routes Advocacy for and defending of pastoral rights
Nomads Development Council	Opening of livestock routes and provision of services
Land Disposition Committees	Allocation of agricultural land Policy making on agricultural land uses
Physical Planning Administration	Establishment of branch committees Preparation of physical plans for approval Carrying out socio-economic studies for planning and establishment of land rights, on behalf of the state
Land Administration	Support to land registration at the judiciary after approval
Ministers of Physical Planning	Approval of housing plans Approval of changes in village boundaries Looking into appeals pertaining to
Department of Surveying	Surveying and mapping of lands Preparation of land maps Information center for land issues The onsite handing over of land to those entitled
Range and Pastures Department	Mapping and demarcation of livestock routes Protection and management of range lands

309. An institutional setting for REDD+ implementation (**Figure 7-1**) was proposed in 2018 and was agreed through wide stakeholder consultation. This arrangement may evolve over time.

Figure 7-1 Proposed Institutional setting



310. In each of the thematic areas of the Sudan REDD+, implementation structures are proposed. The REDD+ readiness process established project level implementation structure within existing institutional structures. Table 7-2 summarizes key actions completed and documents that outline the thematic implementation arrangements, guidelines on technical approaches and where required, stipulation of methodological parameters.

Table 7-2 REDD+ Thematic Documents

KEY DOCUMENTS
National Forest Monitoring System
Strategic Environmental and Social Assessment (SESA)
Environmental and Social Management Framework (ESMF)

Safeguards Information System
Feedback and Grievance Redress Mechanism (FGRM)
Developing Benefit Sharing Mechanism (BSM) for Sudan´s REDD+ Program
National Forest Monitoring System (NFMS) and Action Plan
National Monitoring, Reporting and Verification (MRV) Framework
National Forest Inventory
Forest Reference Emission Level
In-depth Analysis of Drivers of Deforestation and Forest/Rangeland Degradation

7.2 National Forest Monitoring System

311. To meet international reporting obligations, countries are expected to establish national forest monitoring systems (NFMS). The NFMS allows compliance with the REDD+ requirements and can serve simultaneous functions: a 'monitoring' function; and a 'Measurement, Reporting and Verification (MRV)' function. The RoS will implement an MRV system for REDD+ in line with international best practice and guidance. The evolution of the Sudan National Forest Monitoring System (SNFMS) is based on an action plan developed in 2019, with technical support from the Food and Agriculture Organization (FAO).

312. The scope of the SNFMS is national and will provide the necessary MRV functions. The monitoring function of the SNFMS is primarily a domestic tool to allow assessment of a broad range of forest information, including REDD+ activities. The monitoring function will be implemented through a variety of methods and will serve a number of different purposes, including supporting evidence-based policy for key sectors of the economy including forestry and agriculture, where drivers of deforestation and forest degradation originate. The monitoring function focuses on the impacts and outcomes of the PAMs in NRS and may also include the impact of adaptation measures that directly or indirectly support emission reductions.

Table 7-3 Objectives of the Sudan National Forest Monitoring System

Objective 1	To adopt and implement a sustainable and participatory network of institutions with necessary range of expertise and clearly documented roles and responsibilities to establish SNFMS.
Objective 2	To develop a transparent and integrated NFMS with complete and coordinated functions of National Forest Inventory, the Land Monitoring System and Green House Gas Inventory in order to estimate GHG emissions and removals from forestry sector through creation of consistent time series of forest cover and periodically assess the on-ground conditions of all forest resources in Sudan (MRV Function)
Objective 3	To implement COP's decisions related to establishment of robust and transparent NFMS for REDD+ and IPCC's guidelines for GHG Inventory of LULUCF sector.
Objective 4	To establish a central REDD+ Project Registry (RPR) as database and archiving system including the provision of information on REDD+ Safeguards
Objective 5:	To develop a national forest and land use web portal for ensuring transparency, accessibility and quality of information related to Sudan's LULUCF sector

313. For REDD+, the MRV functions will focus on the estimation and international reporting of national-scale forest emissions and removals based on three main components, or 'pillars':

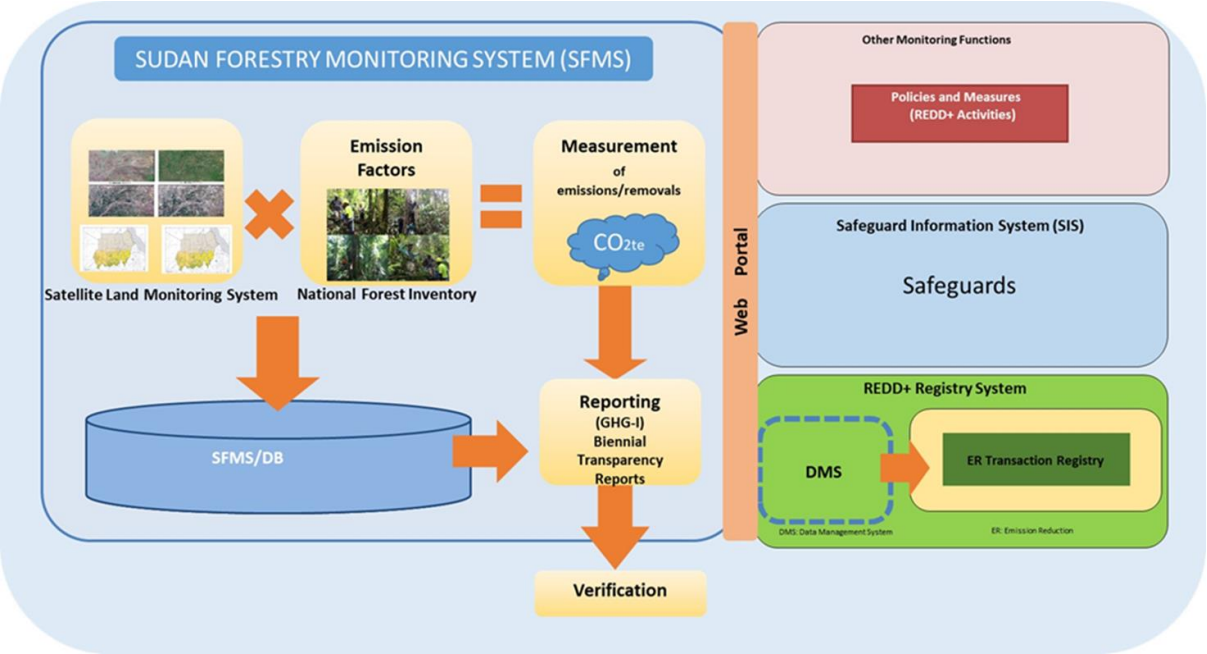
- the satellite land monitoring system (SLMS);

- the national forest inventory (NFI); and
- the national GHG inventory (GHG-I).

314. The SLMS and the NFI pillars will provide inputs into the GHG-I – the forest sector component of the national GHG inventory. In accordance with the SNFMS Action Plan, Sudan will progressively develop and operationalize these three pillars to align with the monitoring function in order to achieve a fully functional NFMS.

315. Figure 7-2 illustrates the SNFMS. Full details of the can be found in separate documents related to these thematic areas.

Figure 7-2 Sudan National Forest Monitoring System

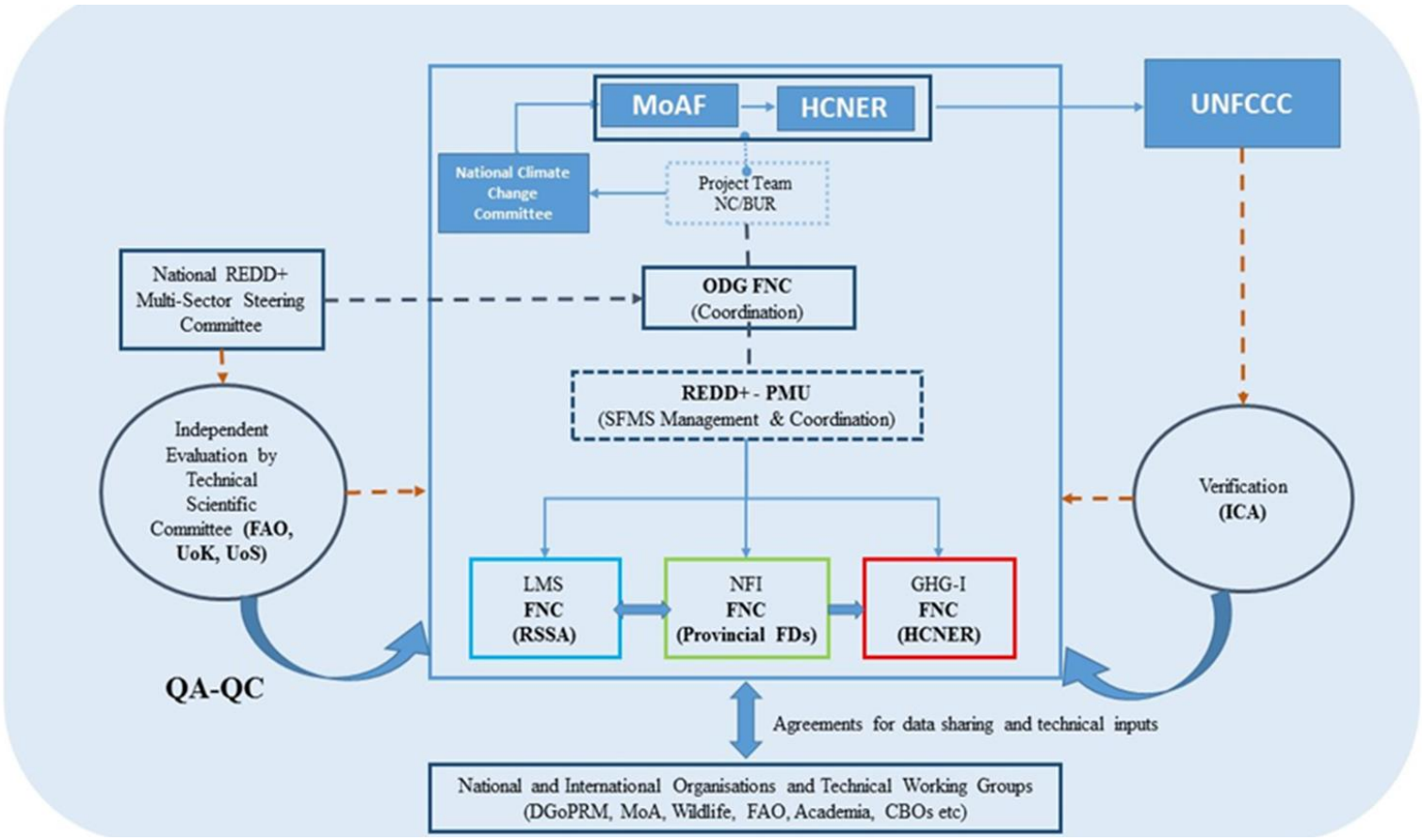


7.2.1 NFMS Institutional Arrangements

316. Effective implementation of REDD+ activities requires sound institutional arrangements to support requirements for (i) implementation of the National REDD+ Strategy or Action Plan; (ii) preparation and continuous improvement of the national FREL/FRL; (iii) maintaining a robust and transparent NFMS to meet MRV requirements for REDD+; and (iv) a system for providing information on safeguards. The first step is the development of a long-term vision and a strategic plan, with clear institutional mandates and specification of roles and effective coordination mechanisms. Thorough processes will be established for collecting, processing, reporting and verifying data, based on methodologies and tools which recognize the need for adequate and sustainable human resource arrangements.

317. Sudan will build upon existing arrangements, such as those developed for greenhouse gas inventories (GHG-I) that underpin National Communications. Building on and strengthening existing institutional arrangements in establishing a NFMS for REDD+ will reduce duplication of effort and costs, facilitate use of official data sources, avoid policy conflicts and help maximize co-benefits and consistency in reporting. It is also expected that REDD+ will be coordinated and implemented by a wide range of ministries directly and indirectly using existing legal settings. Figure 7-3 illustrates proposed institutional NFMS institutional arrangements.

Figure 7-3 NFMS Institutional arrangements (PROPOSED)



318. For the NFI, a single national-level entity (FNC)has the overall responsibility and provides data to government agencies and other entities involved in the preparation of emission and removal estimates from AFOLU. In doing so, there is a need to ensure enough capacity and technical competence of the staff involved in the inventory development process for:

- The timely collection of data needed to estimate anthropogenic GHG emissions by sources and removals by sinks; and
- The preparation of GHG inventories in accordance with the relevant UNFCCC reporting guidelines.

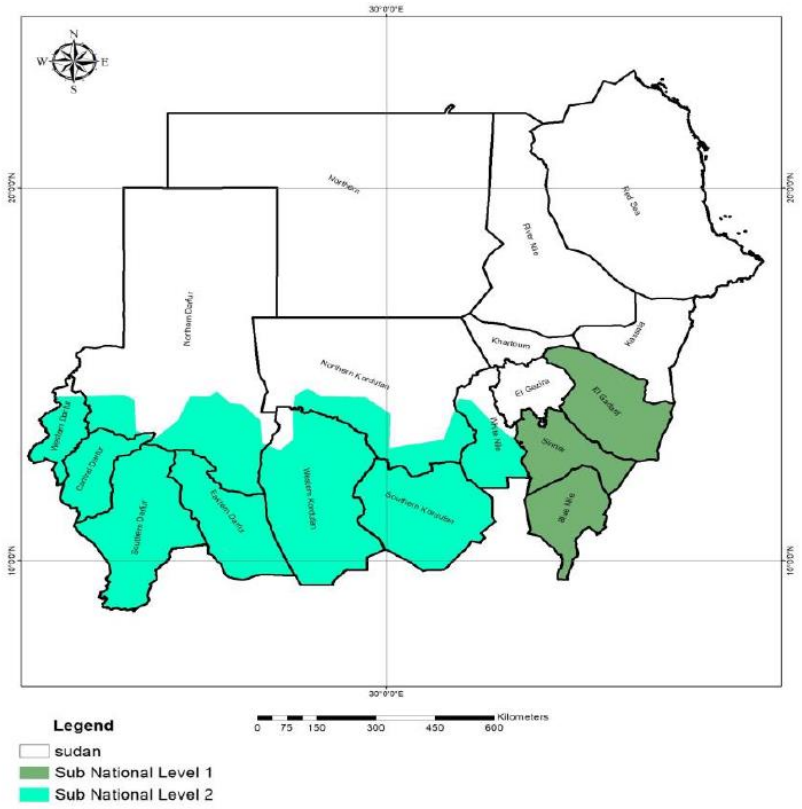
319. Specific functions of national inventory arrangements include collecting activity data (AD), selecting appropriate methods and emission factors (EFs), estimating anthropogenic GHG emissions by sources and removals by sinks, implementing uncertainty assessments and quality assurance/quality control (QA/QC) activities, and carrying out data verification procedures.

7.2.2 Forest Reference Emission Level

320. To define the scale and the boundaries of the Sudan Forest Reference Level, recall paragraph 71(b) of Decision 1/CP.16 and paragraph 11 of Decision 12/CP.17 which states that Parties may elaborate a sub-national Forest Reference Emission Level and/or Forest Reference Level (FREL/FREL), as an interim measure, while transitioning to a national FREL/FREL andalso recalling paragraph 10 of Decision 12/CP.17 in which the Conference of the Parties (CP) agreed that a step-wise approach to national FREL/FRL development may be useful, enabling Parties to improve their FREL/FRL by incorporating better data, improved methodologies and, where appropriate, additional pools, noting the importance of adequate and predictable support as referenced to by Decision 1/CP.16, paragraph 71.

321. Therefore, Sudan follows a stepwise approach in the construction of its first national FRL, with the main objective of developing knowledge, resources and expertise within the responsible national institutions. Accordingly, the areas encompassing the forest lands of Sudan have been defined for potential two subnational FRELs/FRLs to be constructed in sequential manner, building on experiences, capacities, resources and lesson learned, Figure 7-4. These two FREL/FRLs would cover all forests in the country as no forests are expected to grow under the ecological conditions in the Northern part of Sudan. A full description of the FREL methodology can be found in the FREL submitted to the UNFCCC[6].

Figure 7-4 Progressive Forest Reference Emission Level Development



322. Sudan´s first subnational FRL consists of three States (subnational administrative units) namely, Blue Nile, Sinnar and Gadaref States which covers an area of 134,918 km² (Blue Nile: 38,149 km², Sennar: 39, 241 km², Gadaref: 57, 527 km²), see Figure 3. The area of this first FRL represents about 7.2% of the country total area. As estimated by AfriCover (2012) forest area in this region represents 11% of the total forest land in Sudan. The forests in the three states can be stratified into two main strata low rainfall savannah in the northern part, which is the largest one and the high rainfall savannah in the southern part, in addition to a small area of riverain forest ecosystem (*Acacia nilotica*) along the banks on the Blue Nile and Rahad Rivers.

7.3 Nesting Approach

323. Sudan will implement REDD+ through emission reduction programs at state level but the modalities will be clarified in Phase I. The objective is to make emission reductions the basis for results-based climate finance. Benefit-sharing mechanisms will ensure that financial and other benefits are shared in a transparent, equitable and effective manner.

324. In Sudan, national-level action, subnational approaches and projects can all contribute to achieve emission reductions. As such, a nesting approach will be considered and the necessary modalities and regulations and guidelines will be assessed and developed.

[6]https://redd.unfccc.int/files/sudan_frl_submission_to_unfccc_january_2020.pdf

7.4 National Emissions Registry

325. The RoS will consider options for a REDD+ database of emissions trading registry. An emissions trading registry is an online database that issues, records, and tracks carbon units that are exchanged within market mechanisms or financed through Results-Based Climate Finance (RBCF) programs. Given the length of time and capacity needed for the development of a registry, it is essential for countries that are in the process of designing market mechanisms to factor in specific regulatory, administrative, functional, and technical aspects of registry development. Bearing in mind these factors, three guiding questions can facilitate the process of reconciling multiple policy objectives and choosing between various design options.

326. During 2021 to 22, the GoS will assess different registry options in the context of a wide range of national needs by answering the following questions based on three key questions(World Bank 2016):

- ***What type of registry system would be the most suitable?***
- ***What legal and administrative arrangements need tobe put in place?***
- ***What resources are required for implementation?***

327. Sudan will choose options on the basis that emissions trading registries are likely to become more important in the frameworkof the Paris Agreement.To comply with the Paris Agreement, Sudan, like other countries, will have to account for anthropogenic emissions and removals corresponding to the NDC, which will require the development of a GHG inventory. In addition, Sudan intends to access results-based climate finance through bilateral and multilateral channels therefore developing or having access to a register to track compensated results, and a data management system for the tracking of detailed project-level information is required.

Figure 7-5 Emissions registry country needs assessment

7.5 Social and Environmental Impacts

328. Sudan REDD+ demonstrates potential to deliver significant social and environmental benefits as well as emission reductions, but its implementation may also have negative social and environmental effects. This NRS is supported by a Social and Environmental Strategic Assessment (SESA) and an Environmental and Social Management Framework (ESMF)and both documents are publicly disclosed on the Sudan REDD+ and FCPF websites. The SESA identifies all potential environmental and social impacts of the proposed REDD+ strategy options and PAMs while the ESMF will be used as a practical tool during projects formulation, design, implementation and monitoring. It describes the steps involved in identifying and mitigating the potential environmental and social impacts of future investment activities.

329. The main outputs of the SESA are twofold: (i) a REDD+ strategy that is environmentally and socially sustainable; and (ii) a framework that will enable projects implemented under the strategy to be environmentally and socially sustainable. The outputs have been, as much as possible, generated in an integrated manner with other REDD+ processes and in tandem with the formulation of the strategic options for REDD+. The process has been informed by studies and analyses that had already been completed and were about to be completed.

330. The SESA was developed through extensive stakeholder consultations in the locations that potentially would be impacted by the implementation of the various REDD+ actions. The SESA further assesses the suitability of the current regulatory framework for the implementation of the REDD+ programme activities; and suggest an impact management framework to deal with potential environmental and social impacts in line with the World Bank safeguards.

331. The overall objective of the SESA has been to ensure that the World Bank and the UNFCCC E&S safeguards have been and will be applied to integrate E&S considerations into RoS's REDD+ readiness process in a manner consistent with RoS's environmental laws and regulations and the World Bank's safeguard policies.

332. Assessment of past and existing policies and laws relevant to REDD+ were analyzed against ten environmental and social standards (ESS) (Figure 7-6).

Figure 7-6 Environmental and Social Standards[7]

333. The analysis found that the RoS has legal instruments for environmental and social risks and impacts (ESS 1), but that processes are not standardized, and implementation is inconsistent and weak. Sudan's current legislation provides for good protection of biodiversity conservation and sustainable management of living natural resources (ESS 6) and provide for all of the related requirements, but weaknesses are in implementation, partly due to jurisdictional issues related to decentralized control of states.

[7]https://www.worldbank.org/en/projects-operations/environmental-and-social-framework

334. The current laws provide the framework for pest management (related to ESS 3, resource efficiency and pollution prevention and management) but regulations are required under the current Environmental Protection Act to put into practice the provisions of the law.

335. However, some requirements of this World Bank policy are not covered. Current laws provide for some but not all of the requirements of the World Bank safeguard policy related to forests (ESS 1,3, 4 and 6). Sudan's current constitution and the Wildlife Conservation and National Parks Act (1986) and proposed revised Act 2015 cover the requirement for conservation and protection of habitats (ESS 6, Biodiversity Conservation and Sustainable Management of Living Natural Resources). However, the issue of invasive species is not adequately covered.

336. In relation to indigenous peoples/Sub-Saharan African historically under-served traditional local communities (ESS 7), the Sudan Transitional Constitution (2019) provides for the recognition of equal rights and protection of all Sudanese people including indigenous peoples and for respect of customary laws and practices and local heritage, however these are not well enforced. The requirements of ESS 2 (Labor and Working Conditions) are covered in the Sudan policies, laws and regulations but institutions and implementation are weak. Awareness, inspection and compliance levels are low, especially in the informal sector. Safeguards related to land acquisition, restrictions on land use and involuntary resettlement (ESS 5) were not covered in the current legislation. The requirements of the ESS 8 (Cultural Heritage) are in the current legislation but not implemented in practice as regulations, guidelines and standards have not been developed. Finally, the existing legislation does not meet the requirements of ESS 10 (Stakeholder Engagement and Information Disclosure) but the revised forests Act 2015 and the draft revised EPA do include these safeguards. With regards to ESS 9 (Financial Intermediaries), financial intermediaries are subject to the same safeguard standards as funding and development agencies.

7.5.1 Safeguards Information System

337. A system for providing information on how the safeguards will be addressed and respected is one of the elements required in the RoS for implementing REDD+ activities in line with UNFCCC (paragraph 71 of decision 1/CP.16). A safeguards information system (SIS) will provide transparent and consistent information that will be accessible by all relevant stakeholders and updated on a regular basis. The systems builds upon existing systems, and will be implemented at the national level.

338. The RoS will periodically provide a summary of information on how the safeguards will be addressed and respected understanding that this is a condition for eligibility for results-based payments in accordance with decision 9/CP.19.

7.6 Feedback and Grievance Redress Mechanism

339. FGRMs are organizational systems and resources that will be established by federal and state institutions to receive and address concerns about the impact of REDD+ policies, programs and operations on stakeholders. FGRMs act as recourse for situations in which, despite proactive stakeholder engagement, some stakeholders are concerned about a project or program's potential impacts on them. This is in line with FCPF and UN-REDD guidance. FGRMs are intended to complement, not replace, formal judiciary or other forms of legal recourse, for managing grievances. It should also be recognized that not all complaints can be handled through FGRM. For instance, grievances that allege corruption, and/or major and systematic violation of human rights are normally referred to administrative or judicial bodies for formal investigation, rather than to FGRMs for collaborative problem solving.

340. The FGRM will be designed to receive and respond to the concerns, complaints and grievances that REDD+ stakeholders and other parties may have during implementation. FGRM should be:

- ***Legitimate*** – have clear, transparent, and sufficiently independent governance structures to ensure that no party to a particular grievance process can interfere with the fair conduct of that process.
- ***Accessible*** - must be publicized or disclosed to those who may wish to access it and provide adequate assistance for aggrieved parties who may face barriers of access, including language, literacy, awareness, finance, distance, or fear ofreprisal. It should be accessible to the diverse members of the community, including more vulnerable groups such as the elderly, women, youth, and the disabled.

- ***Predictable***- must provide a clear and known procedure, with time frames for each stage; clarity on the types of process and outcome it can, or cannot, offer; and means of monitoring the implementation of the outcome.
- ***Equitable***- must ensure that aggrieved parties have reasonable access to sources of information, advice, and expertise necessary to engage in a grievance redress process on fair and equitable terms.
- ***Rights-compatible***- must ensure that its outcomes and remedies accord with internationally recognized human rights standards.
- ***Transparent***-must provide sufficient transparency of process and outcome to meet concerns of public interest at stake wherever possible.

341. For the implementation of this NRS, the objective of the FGRM is to contribute to the timely resolution of grievances and conflicts related to REDD+ in an effective manner. The FGRM will contribute to improvement and restoration of relations between individuals and communities affected by conflict as a result of REDD + activities by helping to detect and prevent conflicts before they occur, mitigate their consequences, and prevent them from escalating. This will enable voiceless and vulnerable people (e.g. the poor, elderly people, marginalized communities and neighboring forests), to file complaints and receive timely feedback. It will further improve stakeholder participation and decision-making through dialogues, grievance redress and dispute settlement. A separate document outlining the full description of the FGRM accompanies this NRS document and should be referenced for procedures.

7.6.1 Potential sources of grievances

342. Potential issues that the FGRM may have to deal with include:

- Allegations of non-compliance with safeguards and standards
- Financial, fiduciary and benefit sharing disputes
- Land tenure and customary rights
- Rights to carbon
- Participation and free, prior and informed consent
- Access to information; and
- Adequacy and the independence of reporting from project implementers and local, provincial and national governments including on information provided to the SIS.

343. Conflicts may result from project activities. They will be resolved following a grievance mechanism that is based on the following key fundamentals:

- Rights and interests of impacted people, communities', workers and others associated with or impacted by the project are protected.
- Concerns of project participants arising from the project implementation process are adequately addressed and in a prompt and timely manner.
- Entitlements or livelihood support for project participants are provided on time and in accordance with the Government and World Bank safeguard policies.
- Project participants are aware of their rights to access grievance procedures free of charge.
- The grievance mechanism should be in line with existing policies, strategies, and regulations on grievances as defined by RGoB, which require project owners/developers to set up grievance mechanisms starting from the village level.

7.7 Monitoring and Evaluation

344. REDD+ monitoring will be integrated into existing national frameworks to enable monitoring of the implementation of the REDD+ Action Plan at the national level. The NRS Action Plan will form the basis for a logframe which serve as reference for operational planning, monitoring of progress of the R-PP Process towards its objectives as well as for evaluation of its overall performance and impacts. The Logframe demonstrates how the inputs and activities, which are delivered by different actors involved, interact logically, thus producing outputs, outcomes and finally the desired impact.

345. As part of the M&E function, it is suggested to report on progress towards impacts where the REDD+ process can directly contribute. The NRS Action Plan contains specific, measurable, attainable, relevant and time bound, (SMART) indicators, wherever possible qualified by targets and values to be achieved in each of the Phases.

8 CAPACITY BUILDING

346. Capacity building is an inherent part of the NRS. Across all PAMs, the proposed actions will build institutional functional and operation capacity. Some thematic components have specific action plans.

Table 8-1 Thematic Capacity Building

Thematic Area	Capacity Building Strategy
Institutional Arrangements (Federal and State)	Institutional-level Capacity Needs Assessment and preparation of tailored Capacity Building Plans
Safeguards and Safeguards Information System	Environmental and Social Management Framework
National Forest Monitoring System	NFMS Action Plan and MRV Framework (validated December 2020)
PAMs Implementation (NRS Action Plan)	NRS Action Plan including targeted capacity building based on needs assessment of lead agencies

347. In order to implement the NRS effectively, capacity needs, and gap assessments will be carried when designing programs at both federal and state level following a set of principles to address core issues. There are four capacity issues that are most encountered across sectors and levels. These interdependent core issues are:

a. **Institutional arrangements:** the policies, procedures and processes that are in place to legislate, plan and manage the rule of law, development and other functions of state. This relates to coordination structures, roles and responsibilities, and institutional incentives across public sector agencies. As noted, this NRS and the associated Action Plan assigns specific agencies to lead the implementation of each PAM. Hence strong institutional arrangements are necessary.

b. **Leadership:** the ability to inspire, influence and motivate individuals, organizations and societies is key in achieving REDD+ objectives. Key determinants include the ability to create a vision, rally people around the goals of REDD+, instill a need for change, and infer a sense of shared ownership.

c. **Accountability:** allows organizations to monitor, learn, self-regulate and change behavior. Accountability is essential in the management of REDD+, by providing legitimacy to decision-making, transparency and reducing the influence of vested interests.

d. **Knowledge and awareness:** the creation, absorption and diffusion of information and expertise towards effective solutions. At the program level, knowledge may be influenced by communication frameworks and the ability of stakeholders to adequately participate in REDD+ dialogue.

8.1 Functional and Technical Capacities

348. Functional capacities are required to create, manage and review policies, legislation, strategies and programs across all levels of capacity (enabling environment, organizational, individual) and core issues (institutional arrangements, leadership, knowledge, accountability). They are key to 'getting things done' and are not associated with any one particular sector or theme. The following five functional capacities are those that are generic to most projects and programs and will need to be strengthened:

- Capacity to assess a situation and define a vision and mandate.
- Capacity to formulate policies and strategies.
- Capacity to budget, manage and implement.
- Capacity to evaluate.
- Capacity to engage stakeholders.

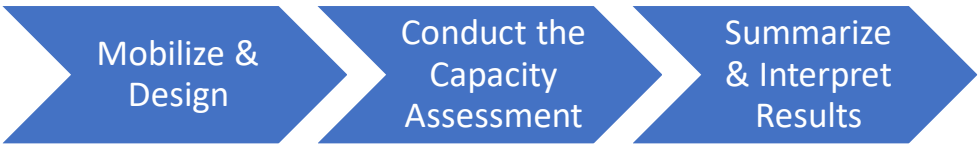
349. Functional and technical Capacities are required to create, manage and review policies, legislation, strategies and programs across all levels of capacity (enabling environment, organizational, individual) and core issues (institutional arrangements, leadership, knowledge, accountability). They are key to 'getting things done' and are not associated with any one particular sector or theme. Table 8-2 shows the five functional capacities that are generic to most projects and programs.

Table 8-2 ***Generic Functional Capacities***

Capacity Area	Description
Capacity to assess a situation and define a vision and mandate	This refers to the capacity to fully understand an operating environment, through: • Accessing, gathering and disaggregating data and information. • Analysing and synthesizing data and information. • Articulating capacity assets and needs. • Translating information into a vision, goals and objectives.
Capacity to budget, manage and implement	This refers to financial and management capacities, through: • Formulating, planning and managing projects and programmes, including the capacity to prepare a budget and to estimate capacity development costs. • Managing human and financial resources and procurement. • Setting indicators for monitoring and monitor progress.
Capacity to formulate policies and strategies	This relates to development of policies and strategies, through: • Exploring different perspectives. • Setting objectives. • Elaborating cross-sectoral policies. • Managing priority-setting mechanisms.
Capacity to evaluate	This relates to the evaluation of progress to ensure performance, learning and accountability, through: • Measuring results and collecting feedback to adjust policies. • Codifying lessons and promoting learning. • Ensuring accountability to all relevant stakeholders.
Capacity to engage stakeholders	This relates to the capacity to engage and build consensus among all stakeholders, through: • Identifying, motivating and mobilizing stakeholders. • Creating partnerships and networks. • Promoting engagement of civil society and the private sector. • Managing large group processes and open dialogue. • Mediating divergent interests. • Establishing collaborative mechanisms.

8.2 Capacity development Approach

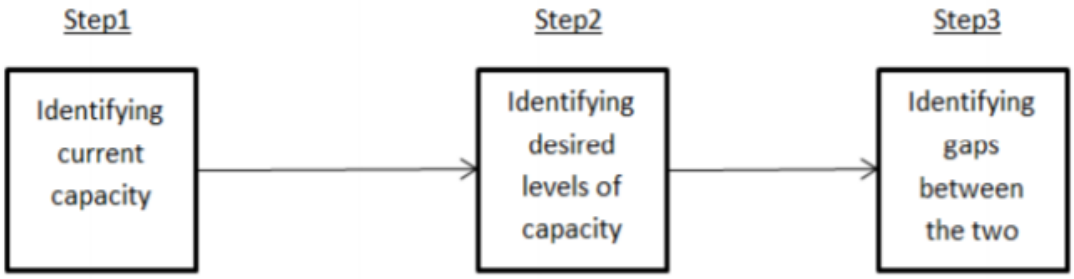
350. The Capacity Needs and Gap Assessment for REDD+ implementation will be tailored to the Sudanese context and adapted from UNDP's Capacity Assessment Methodology (2008) approach, as well as taking into account other development partner specific guidance. This assessment framework takes a multi-dimensional systems approach, which looks at both functional and technical capacities. The assessment will follow a three-stage approach, summarized as follows with specific details in a later section:



351. ***Step 1:***In the implementation PAMs and actions, capacity assessments will be designed to understand the 'capacity for why'; 'capacity for whom'; and 'capacity for what'.

352. ***Step 2:*** Data and information will need to be collected on the existing and desired capacity, relating to best-practice examples relevant for program implementation and resource mobilization.

353. ***Step 3:*** The existing capacities will be compared against desired capacities, in order to formulate a capacity development response and determine interventions that are required to bridge the gap.



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10 Annexes

10.1 Annex 1: REDD+ Action Plan

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term (1-5 Years) 2022-2026	Mid Term (6-10 years) 2027-2031	Long Term (11 years plus) 2032-beyond
PAM 1: Strengthen sectoral policies and institutional capacity for sustainable natural resource management							
Improve forest sector regulations, laws, and policies to mainstream REDD+ actions: sector review and assessment of priority actions	Enhanced forest sector governance	Number of revised legislative and regulatory documents taking REDD+ into account	Updated National Policies on REDD, Review reports, Policy documents	1,800,000			
Support Revision and strengthening of the Sudan National Forest Policy Statement (2006; updated from Sudan's Forest Policy 1986)	Well-coordinated forest sector management and vision	Draft policies, review meetings., policy briefs and policy dialogues	Revised Forest Policy adopted	4,500,000			
Support and improve policies to reduce deforestation and land degradation from refugee settlements	Decreased deforestation and degradation in refugee settlements	Sector plans, actions and budgets targeting refugee settlements.	Participatory review of forest sector policies and its adoption	1,250,000			
Development of National Forest Information Systems to support forestry and landscape management in Sudan (NFMS, MRV, Safeguards, Carbon Registry)	Informed forest and land management decisions	Institutional framework for NFIS, procurement, staffing & training, web-interface, data centre	Operational National Forest Information Systems	620,000			

State Level REDD+ implementation framework and financing options: Setting up a REDD+ Financing Facility and development of State REDD+ Action Plans (S-RAPs).	Reduced deforestation and degradation	Number of state level plans, budgets and investment in REDD+ related activities	State Level REDD+ Implementation plans	3,100,000																										
Lead agency:			**TOTAL PAM BUDGET**	**11,270,000**																										

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 2: Strategic Landscape Management, Restoration and Emission Reductions							
Smallholder Forestry Program in Selected States for high value timber, fuelwood/biomass, and pole production and non-wood forest products (Initial target – Blue Nile and Sinnar States)	Forest areas are managed sustainably, and plantations areas increased	Area and number of seedlings planted, area of forest concessions, logging damage factor evolution in forest concessions, wood product material yield reports, quantity of NTFPs commercialized on markets	% decreases in deforestation, degradation & emissions	6,500,000			
State-wide Forestry Nursery Systems to support community-based, afforestation, reforestation, and restoration of degraded lands	More area planted with forest species in communities deforested areas and degraded lands	Number of nurseries and number of seedlings raised and planted and hectares	New forest area established & rehabilitation of degraded forests	3,250,000			

Capacity building for sustainable gum production value chain through sustainable finance and private sector engagement	Enhanced capacity of stakeholders in sustainable gum value chains	area of gum trees managed sustainablele and productive, number of investments, private sector players, improved production and values, training reports	improved area and production of gum produced sustainably	1,500,000	
Support sustainable forest management through development of capacity for and use of forest management plans (including selected coastal zones	Reduced deforestationn and forestry degradation	Training reports, number of forest management plans, changes in forest management systems	More state forest management plans developed and implemented	750,000	
Capacity development and institutional strengthening for fire management	Reduced area burnt annually	Fire area reports, fire emission reports, loss reports, NWFP value and quantities	More area not burnt and forests more productive.	1,800,000	
Lead Agency:			**TOTAL PAM BUDGET**		**13,800,000**

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 3: Support for forestry research and development							
Revise and redesign of forest and rangeland research programs and curricula	Well-funded forest and rangeland research programs and improved knowledge-based rangeland management	Establishment of forest research programs in different states Improvements in Rangeland productivity		420,000			
Establishment of Centres of Excellence through Tertiary institutions – (Consideration for setting a Forestry Research Development Institution)				250,000			
Lead Agency:			**TOTAL PAM BUDGET**	**670,000**			

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 4: Improving the adaptive and climate mitigation capacity of the agriculture sector							
Capacity building to improve agriculture productivity through agroforestry system to improve water utilization and reduce forest encroachment (shelterbelts, alley cropping, wind breaks riparian forest buffers)	Increased trees on farms and farming areas	Number and areas of agroforestry trees on farmlands, agricultural production numbers, area under different forest types, number of farmers participation, water use records	Agroforestry policy, established shelterbelts, alley cropping, wind breaks riparian forest buffers, training and dialogue,	1,650,000			
Improve agricultural productivity through crop diversification and agro-pastoral systems	Reduced degradation from livestock and cropping related activities	Agricultural GDP %, area with shelterbelts, alley cropping, wind breaks riparian forest buffers, diversification metrics,	Diversified agricultural productivity is improved, Agricultural strategy with focus on diversification and agro-	1,210,000			

		livestock units, yield, agriculture-related deforestation	pastoral systems,		
Rehabilitating irrigation services to make water use more efficient, including the introduction of appropriate technologies to optimize water use and raise water awareness	Improved water use in irrigated agricultural areas	Number of farmers trained on improved agriculture, water use per area/harvest, river flows and yield values		3,250,000	
Build capacity and conduct knowledge transfer for conservation agriculture with water harvesting, zero tillage, and improved seeds	Increased area under zero tillage and water harvesting systems	Area under zero tillage		1,100,000	
Lead Agency:			**TOTAL PAM BUDGET**	**7,210,000**	

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 5: Promoting sustainable livestock and rangeland management							
Strengthening regulatory and non-regulatory measures for livestock movement corridor management including monitoring systems	Improved governance in livestock movement and foraging to prevent degradation	Number of revised legislative and regulatory documents on livestock. Corrido management plans, state-level livestock movement policies,	Reduced degradation of pastures and rangelands	620,000			
Rangeland restoration/rehabilitation, protection, and provision of adequate seasonal feedstock (fodder production): Creating business partnerships between livestock owners and farmers along livestock routes	Improved rangeland conditions through management and reduced pressure through substitution.	NDVI trends in rangelands, rangeland condition assessments, fodder produced, biomass in grazing areas, number of private players, value of fodder available in lean period and number of livestock	Better quality rangelands for livestock sector development	1,200,000			
Improve access to finance and support services for farmers and livestock producers (such as animal health, extension and training, farmer field schools, marketing)	Improved livestock sector management through investment	Number of farmers with access to finance, farmer loans value, animal mortality and morbidity, number of FFS and number of farmers participating, value of livestock	Heathier and better-quality livestock units	900,000			

		marketed, livestock numbers			
Promoting cooperation and coordination between public and private sector institutions in range infrastructure development and management	A coordinated livestock sector in Sudan	Number of partnerships, meetings between private and public sector players, investment from private sector and new infrastructure developed or rehabilitated.	Linkages and synergies in PPPs in livestock and rangeland management	240,000	
Increasing adaptive capacity of farmers and livestock producers for preparedness to seasonal variability in feed and water supply through community-based water conservation and river protection and management schemes	A more resilient livestock sector	Number of farmers with feed & water in dry season, animal mortality and morbidity, values of livestock marketed, livestock numbers	More and healthier livestock feed and water available for farmers without degradation	400,000	
Lead Agency:			**TOTAL PAM BUDGET**	**3,360,000**	

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term (1-5 Years) 2022-2026	Mid Term (6-10 years) 2027-2031	Long Term (11 years plus) 2032-beyond
PAM 6: Harmonizing cross-sectoral land use planning and investment policies and legislation							
Strengthen institutional capacity of environmental and social impacts assessments in agriculture, forestry, and mining sectors to prevent land degradation: (Institutional Capacity Needs and Gap Assessment and preparation of Capacity Development Plans)	Enhanced capacity of local and national level institutions for impact assessments	Training reports, land degradation and deforestation assessments, GHG emission data	Improved capacity for social and environmental impacts assessments	450,000			
Rationalize, organize and harmonize above and below ground resource exploitation and related economic developmental activities and policies, in order to encompass environmental and climate change concerns	Mainstreamed REDD+ aspects for the extractive industries, and their introduction within the national regulatory framework	Number of extracted policies integrated with REDD+, meeting reports, training reports, review documents, policy revisions	Awareness and adoption of deforestation and degradation neutral extractive industries.	280,000			
Improve standards for the establishment and development of mining infrastructure (Updating of existing guidelines/policies and development of new guidelines and policies	Updated policies/guidelines for the better infrastructure for the mining sector	Number of new investments in mining infrastructure, mining contribution to deforestation and degradation reports, emissions from mining reports	Better standards and policies for less emissions from mining sector	240,000			
Lead Agency:			**TOTAL PAM BUDGET**	**970,000**			

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 7: Sustainable land management stewardship through land tenure security							
Regulatory and non-regulatory measures to improve land tenure security for local communities: Assessment and identification of opportunities for strengthening land tenure security for communities in deforestation hotspots (Prioritization of Deforestation Hotspots	An institutional and legal/ regulatory/non-regulatory framework for land rights management	Laws, regulations, guidelines and implementation practices for land tenure rights and land use systems, a national land use plan, trends in deforestation in hotspots	Securing of land tenure rights (mainly collective) supported by the national reform mainly in deforestation hotspots	280,000			
Land use capability assessment and digitization to support the National Investment Map: optimizing land use through spatial planning and reliable spatial and non-spatial information	Coordinated and informed land management and planning	A landuse map useful for spatial planning, stakeholder meetings reports, spatial database, auxiliary and attribute data collected, interface and hosting	A functional digital land capability assessment and investment map	1,200,000			
Lead Agency:			**TOTAL PAM BUDGET**		**1,480,000**		

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 8: Increasing access to efficient and sustainable household energy through innovative measures							
Assessment and implementation of options for sustainable charcoal production	Reduced emission from charcoal production	Quantity of charcoal produced, number of people involved in charcoal value chains, deforestation values linked with charcoal	Less quantities of unsustainable charcoal production	940,000			
Assessment and implementation of options and measures to incentivize and increase use of LPG gas and other alternative sources of energy in urban and rural communities	Reduced demand for forestry-based biomass for domestic energy supply	Number of people using LPG, number of stations and service providers, quantity of LPG used in country, deforestation statistics from energy use	Increased adoption and use of LPG energy use.	600,000			
Lead Agency:			**TOTAL PAM BUDGET**	**1,540,000**			

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 9: Promoting a sustainable biomass-based energy value chain							
Creating business opportunities in the biomass energy sector for the private sector through regulatory and non-regulatory measures	Increased availability of opportunities for biomass investments by private sector	laws and regulations to support biomass players, number of players, quantities involved and population reach of the sector	Regulatory and non-regulatory instruments for biomass energy sector	620,000			
Assessment of opportunities, incentives, and promotion of adoption of efficient cookstoves – linking biomass producers and consumers	Reduced demand for forestry-based biomass for domestic energy supply	Number of people with efficient cook stoves, deforestation values related to domestic biomass use, number of players in the cook stove production and marketing,	Review of entry points for improved use of cook stoves	450,000			
Lead Agency:			**TOTAL PAM BUDGET**	**1,070,000**			

Policy & Measures	Expected Outcome	KPIs	Key Outputs	Budget, USD	Short Term	Mid Term	Long Term
					(1-5 Years)	(6-10 years) 2027-2031	(11 years plus)
					2022-2026		2032-beyond
PAM 10: Promoting Youth participation in climate change response and environmental sustainability							
Young in climate change – youth-led agriculture and forestry initiatives	Broader youth participation and	Measurable		600,000			
Capacity building for broader women participation in REDD+	More opportunities for women			940,000			
Lead Agency:			**TOTAL PAM BUDGET**	**1,540,000**			

10.2 Annex 2a: Cost Benefit Analysis Factors and Assumptions

Data/assumption	Value	Unit	Source
Land area (km2)	1,765,048	km2	
Area of forest cover	19.2 million	ha	FRA (2015), Global Forest Resources Assessment.
% of forest cover	10.66%	%	FRA (2015), Global Forest Resources Assessment
Annual rate of forest loss	542,000	ha	FRA (2015), Global Forest Resources Assessment
Desertification	200	Km	
Livestock population	130 million	herd	
Forest fires	1,000,000	ha/year	RoS (2020) SudanFirst State of Environmentand Outlook Report
Forest degradation	1,018,296.92	ha/year	RoS (2020) SudanFirst State of Environmentand Outlook Report
Forest planting targets	7,907,95	Ha/year	Sudan INDC
Current value of Gum arabic exports	82169000	US$	FAO. 2019. FAO Crop and Food Supply Assessment Mission to the Sudan – Special Report. Rome. 38 pp.
Agricultural GDP (2020)	6,174,600,000	US$	IMF World Economic Outlook Database
Average Carbon Density (t C/ha)	45	t C/ha	Tropical Rainforests: Deforestation rates tables and charts https://rainforests.mongabay.com/deforestation/2000/Sudan.htm
Carbon price	5.10		WorldBank rate

Annex 2b Effect of deforestation, degradation and fire on forest ecosystem values

Service Benefit	Current	Degraded	Deforested	Burnt	Unit	Source
NWFPs	2.40	0.72	0.00	0.24	USD/ha/year	Value of top NWFPs divided by forested area.
Sediment removal	2.86	0.86	0.00	0.29	USD/ha/year	Based on sediment removal (opportunity) costs
Fuelwood	2.05	0.62	0.00	0.21	USD/ha/year	Fuelwood demand divided by forested area.
Water	0.66	0.20	0.00	0.07	USD/ha/year	Implied based on market values
CO2	45.00	13.50	0.00	4.50	tonnes CO2 eq/ha	Tropical Rainforests: Deforestation rates tables and charts

10.3 Annex 3: Detailed Links to Drivers

PAM	Driver Link	Driver Area	Expected Outcome
PAM 1. Strengthen sectoral policies, financing, and institutional capacity for sustainable natural resource management			
Creating the necessary enabling environment to address underlying causes through assessing, reviewing and improving policy and regulatory measures. this would supported by institutional capacity building, investment in information systems to support evidence-based policy. The proposed actions will form the broad framework for the implementation of the NRS supporting Sudan NDC implementation.			
mprove forest sector regulations, laws, and policies to mainstream REDD+ actions: sector review and assessment of priority actions	Legal and Institutional Gaps	Underlying Driver	Coherent and complimentary policies, with REDD+ mainstreamed; improved coordination across government.
Support Revision and strengthening of the Sudan National Forest Policy Statement (2006; updated from Sudan's Forest Policy 1986)	Legal and Institutional Gaps	Underlying Driver	Redefinition of designated functions and reformulation of management plans on sustainable forest management for the forest estate
Support and improve policies to reduce deforestation and land degradation from refugee settlements.	Legal and Institutional Gaps; Refugees & Internally Displaced People	Underlying Driver	Policies to help assimilate and integrate refugees and IDPs in a manner that does not degrade the environment
Development of National Forest Information Systems to support forestry and landscape management in Sudan (NFMS, MRV, FREL Development, Safeguards, Carbon Registry)	Legal and Institutional Gaps	Underlying Driver	Provide key enabling processes to support REDD+ in Sudan.
State Level REDD+ Implementation Framework and Financing Options: Development of State REDD+ Action Plans (S-RAPs)	Legal and Institutional Gaps	Underlying Driver	Provide state level plans for REDD+.
PAM 2. Strategic landscape management, restoration and emission reductions			
Smallholder Forestry Program in selected states for high value timber, fuelwood/biomass, and pole production and non-wood forest products (Initial target – Blue Nile and Sinnar States)	Wood extraction for energy; Crosscutting Issues: Natural environmental factors, such as climate change and desertification/ poverty	Deforestation and Degradation	Development of multi-functional forest systems
Statewide Forestry Nursery Systems to support community-based, afforestation, reforestation, and restoration of degraded lands	Crosscutting Issues: Natural environmental factors, such as climate change and desertification	Deforestation and Degradation	Drought-resistant commercial tree species, using good-quality seeds and the investment in agroforestry systems; nursery development upscaled and mass planting conducted.
Capacity building for sustainable gum production value chain through sustainable finance and private sector engagement	Crosscutting Issues: Socio-economic factors, specifically poverty	All	Improved capacity and resilience; increased investment opportunities
Support sustainable forest management through development of capacity for and use of forest management plans (including selected coastal zones, protection of mangrove forest, and riparian)	Legal and Institutional Gaps; Lack of stakeholder participation	All	Improved quality and implementation of management plans
Capacity development and institutional strengthening for fire management	Crosscutting Issues: Natural environmental factors, such as climate change and desertification	All	Reduce the risk of forest fires, thereby avoiding degradation of forests and GHG emissions, as well as limiting risks and threats to life and property.
PAM 3. Support for Forestry Research and Development			
Revise and redesign of forest and rangeland research programs and curricula	Crosscutting Issues: Natural environmental factors, such as climate change and desertification	Underlying Driver	Enhanced research and development
Establishment of Centres of Excellence through Tertiary institutions – (Consideration for setting a Forestry Research Development Institution)	Destructuve agents; Crosscutting Issues: Natural environmental factors, such as climate change and desertification	Underlying Driver	Develop a forestry innovation bub that will help enterprises improve approaches to growing, harvesting, and processing
PAM 4. Improving the adaptive and climate mitigation capacity of the agriculture sector			

Capacity building to improve agriculture productivity through agroforestry system to improve water utilization and reduce forest encroachment (shelterbelts, alley cropping, wind breaks riparian forest buffers)	Agriculture Expansion; Destructive Agents; Subsistence Agriculture; Crosscutting issues	All	Capacity building and knowledge transfer; reduced crop failure
Improve agricultural productivity through crop diversification, improved seeds, and agro-pastoral systems	Agriculture Expansion; Destructive Agents; Subsistence Agriculture; Crosscutting issues	Deforestation	Increased productivity per hectare and reduction in need to expand agroculture in forest areas
Rehabilitating irrigation services to make water use more efficient, including the introduction of water harvesting and appropriate technologies to optimize water use and raise water awareness	Agriculture Expansion; Refugees & Internally Displaced People; Subsistence Agriculture; Crosscutting Issues: Natural environmental factors, such as climate change and desertification	All	Efficient and equitable distribution of water
Build capacity and conduct knowledge transfer for conservation agriculture with ~~water harvesting,~~ zero tillage, maintenance of soil covers, crop diversity and rotations ~~and improved seeds~~.	Agriculture Expansion; Destructive Agents; Subsistence Agriculture; Crosscutting issues	All	Practices adapted to the requirements of local conditions, using techniques that protect the soil from erosion, improve biodiversity, and preserve natural resources, while optimizing yields.
PAM 5. Promoting Sustainable Livestock and Rangeland Management			
Strengthening regulatory and non-regulatory measures for livestock movement corridor management including monitoring systems [and mapping?].	Livestock Overgrazing; Refugees & Internally Displaced People	Deforestation and Degradation	Reduce conflict between pastoralists and agriculture.
Rangeland restoration/rehabilitation, protection, and provision of adequate seasonal feedstock (fodder production): Creating business partnerships between livestock owners and farmers along livestock routes [this feels like two separate PAMS - does the second one relate to agro-pastoral systems?]	Livestock Overgrazing; Refugees & Internally Displaced People	Deforestation and Degradation	Improvement of habitat; reduce conflict between pastoralists and agriculture; improve nutritional health of animals
Improve access to finance and support services for farmers and livestock producers (such as animal health, extension and training, farmer field schools, marketing)	Cross cutting issues	Deforestation and Degradation	Improved access to finance to develop agricultural and livestock systems
Promoting cooperation and coordination between public and private sector institutions in range infrastructure development and management.	Cross cutting issues; lack of stakeholder participation	Deforestation and Degradation	Reduce conflict between pastoralists and agriculture; improve nutritional health of animals
Increasing adaptive capacity of farmers and livestock producers for preparedness to seasonal variability in feed and water supply through community-based water conservation and river protection and management schemes	Cross cutting issues	Deforestation and Degradation	Enhanced resilience to climate change; reduce conflict between pastoralists and agriculture; improve nutritional health of animals
Improve the health and welfare of livestock [this is very broad - is this where the vet services comes in?]	Livestock overgrazing; cross cutting issues	Deforestation and Degradation	Improve health, well being and productivity of animals
PAM 6. Harmonizing land use planning, investment policies, and legislation			
Strengthen institutional capacity of environmental and social impacts assessments in agriculture, forestry, and mining sectors to prevent land degradation	Legal and Institutional Gaps; Infrastructure development; Petroleum exploration; Mining	All	Institutional Capacity Needs and Gap Assessment; preparation and implimentation of Capacity Development Plans
Rationalize, organize and harmonize above and below ground resource exploitation and related economic developmental activities and policies, in order to encompass environmental and climate change concerns	Legal and Institutional Gaps; Infrastructure development; Petroleum exploration; Mining	Deforestation	Holistic impacts from various development projects are taken into account in order to reduce sectoral policy and planning conflicts
Improve standards for the establishment and development of mining infrastructure [should this be wider than mining?]	Legal and Institutional Gaps; Infrastructure development; Petroleum exploration; Mining	Deforestation	Updating of existing guidelines/policies and development of new guidelines and policies

PAM 7. Sustainable Land management stewardship through land tenure security			
Regulatory and non-regulatory measures to improve land tenure security for local communities: Assessment and identification of opportunities for strengthening land tenure security for communities in deforestation hotspots (Prioritization of Deforestation Hotspots)	Legal and Institutional Gaps	All	Protection of individual and community rights
Land use capability assessment and digitization to support the National Investment Map: optimizing land use through spatial planning and reliable spatial and non-spatial information	Legal and Institutional Gaps	All	Clear demarcation of land activities
PAM 8. Increasing access to efficient and sustainable household energy			
Assessment and implementation of options for sustainable charcoal production	Urband sprawl; Wood extraction for energy; Population growth; Cross cutting issues	All	Charcoal production from sustainable sources
Assessment and implementation of options and measures to incentivize and increase use of LPG gas and other alternative sources of energy in urban and rural communities	Urband sprawl; Wood extraction for energy; Population growth; Cross cutting issues	All	Provide alternatives to woody biomass
PAM 9. Promoting a sustainable biomass-based energy value chain			
Creating business opportunities in the biomass energy sector for the private sector through regulatory and non-regulatory measures.	Urband sprawl; Wood extraction for energy; Population growth; Cross cutting issues	All	More efficient and sustainable production and consumption
Assessment of opportunities, incentives, and promotion of adoption of efficient cookstoves – linking biomass producers and consumers	Urband sprawl; Wood extraction for energy; Population growth; Cross cutting issues	All	Improve efficiency of wood biomass and other organic fuels
PAM 10. Advance the participation of youth and women			
Awareness raising and capacity building on gender: Encouraging broader access for women and youth to national and local level decision-making platforms on climate response.	Legal and Institutional Gaps	All	
Funding for youth-led climate initiatives and formation of youth climate change dialogue forums	Legal and Institutional Gaps	All	Enhanced and meaningful participation by youth in climate change debates
Funding for women-led community climate initiatives (consider lessons learnt from the CBR+ - a partnership between the UN-REDD Programme and the GEF Small Grants Programme (SGP) and implemented by UNDP)	Legal and Institutional Gaps	All	Accessible finance to women
Mainstream gender and youth perspectives in national policies and strategies on climate change through partnerships within and between government agencies CSO, NGOs and development organizations (Consider an Inter-Ministerial Gender Group on Climate Change)	Legal and Institutional Gaps	All	All perspectives are incorporated into the formulation, prioritization, and implementation of policies
Address gender inequalities through improving business and employment opportunities, access to resources, microfinance, targeted extension and training services, and information technology in the forestry and agriculture sector	Legal and Institutional Gaps	All	Accessible finance, business opportunities, and information
National Guidelines for gender consideration for project fund allocation under REDD+	Legal and Institutional Gaps	All	Accessible funding to all
Design and implementation of gender-responsive social and environmental monitoring systems	Legal and Institutional Gaps	All	Reliable data on the involvement of women and youth

Table 10-1Overview of existing Climate Funds

Fund	Type	Administered by	Area of focus	Operational Date
Green Climate Fund	Multi	UNFCCC	Mitigation and Adaptation General	2010
Adaptation Fund	Multi	Adaptation Fund Board	Adaptation	2009
Adaptation for Smallholder Agriculture Program	Multi	The International Fund for Agricultural Development (IFAD)	Adaptation	2012
Clean Technology Fund	Multi	The World Bank	Mitigation - general	2008
Congo Basin Forest Fund	Multi-Donor Regional	African Development Bank	Mitigation - REDD	2008
Forest Carbon Partnership Facility	Multi	The World Bank	Mitigation - REDD	2008
Forest Investment Program	Multi	The World Bank	Mitigation - REDD	2009
GEF Trust Fund - Climate Change focal area	Multi	The Global Environment Facility (GEF)	Adaptation, Mitigation - general	1991 (tracked since 2010)
Global Climate Change Alliance	Multi	The European Commission	Adaptation, Mitigation - general, Mitigation - REDD	2008
Global Energy Efficiency and Renewable Energy Fund	Multi	The European Commission	Mitigation - general	2008
Green Climate Fund	Multi	GCF	Adaptation, Mitigation - general, Mitigation - REDD	2015
UK's International Climate Fund	Bi	Government of the United Kingdom	Adaptation, Mitigation - general, Mitigation - REDD	2011
Germany's International Climate Initiative	Bi	Government of Germany	Adaptation, Mitigation - general, Mitigation - REDD	2008
Australia's International Forest Carbon Initiative	Bi	Government of Australia	Mitigation - REDD	2007
Japan's Fast Start Finance - private sources	Bi	Government of Japan	Adaptation, Mitigation - general, Mitigation - REDD	2008
Least Developed Countries Fund	Multi	The Global Environment Facility (GEF)	Adaptation	2002
MDG Achievement Fund – Environment and Climate Change thematic window	Multi	UNDP	Adaptation, Mitigation - general	2007
Norway's International Climate and Forest Initiative	Bi	Government of Norway	Mitigation - REDD	2008
Pilot Program for Climate Resilience	Multi	The World Bank	Adaptation	2008
Scaling-Up Renewable Energy Program for Low Income Countries	Multi	The World Bank	Mitigation - general	2009
Special Climate Change Fund	Multi	The Global Environment Facility (GEF)	Adaptation	2002
Strategic Climate Fund	Multi	The World Bank	Adaptation, Mitigation - general, Mitigation - REDD	2008
Strategic Priority on Adaptation	Multi	The Global Environment Facility (GEF)	Adaptation	2004

UN-REDD Programme	Multi	UNDP	Mitigation - REDD	2008

Source: Climate Funds Update - http://www.climatefundsupdate.org