Readiness Preparation Proposal (R-PP)

for Country: SUDAN

Date of revision: October 2014

Component 1: Version 6 Working Draft April 20, 2012

Forest Carbon Partnership Facility **(FCPF)**

The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries **(UN-REDD)**

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Note: This version is for use by:

1) FCPF REDD-plus Country Participants submitting revised or new R-PPs to the FCPF FMT for PC 12 meeting in Colombia, June 27 – 29, 2012 or afterwards.

2) UN-REDD countries submitting National Programmes, as agreed.

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Resume R-PP Information

Dates of R-PP preparation (beginning to submission):	February 2012 – June 2014
Expected duration of R-PP implementation (month/year to month/year):	Two Years from Date of grant signature
Total budget estimate:	**7820 USD**
Anticipated sources of funding:	from FCPF:3500.**$US** from UN-REDD: 4000.**$US** National Government contribution: 320 **$US** Other source: Sudan Government shall endeavour to seek funding from development partners to support the implementation of REDD+ Programme
Expected government signer of R-PP grant request (name, title, affiliation):	Dr. Abdel Azim Mirghani Ibrahim (Lead Official), General Manager, Forests National Corporation
Expected key results from the R-PP implementation process:	Outcome 1) National Governance Framework & Institutional Capacity for REDD+ enhanced, Outcome 2) Management Arrangements contributing to National REDD+ process in place, Outcome 3) Measurable improved stakeholder & custodian awareness & effective engagement, Outcome 4) National REDD+ Strategy & Implementation Framework in place, Outcome 5) Monitoring & MRV results for REDD+ activities realized

Executive Summary

The Readiness Preparation Proposal (R-PP) of the Republic of Sudan follows the structure provided in the latest version 6 of the FCPF/UN-REDD R-PP formats with six distinct components (chapters) which are reflected in this summary. A separate **Annex document** complements the R-PP.

Component 1: Organize and Consult

1a. National Readiness Management Arrangements

On receipt of go ahead and directives from his peers, the Director General, Forests National Corporation of Sudan went about to instil and institutionalize the REDD+ Process in the country. He appointed a Coordinator, established a Coordination Office and summoned a REDD National Steering Committee followed by two Task Forces. The latter formulated a REDD Strategy and a Readiness Preparation Proposal.

Once accepted by Forest Carbon Partnership Facility, Sudan R-PP shall then be handled by Sudan National REDD+ Programme Implementation Body. Based on the country's experience in conflict resolution from the forest reservation process, a comprehensive Grievance Management & Conflict Resolution Plan is presented. For these activities a budget of US$250 k is scheduled over the next 4 years.

1b. Information Sharing and Early Dialogue with Key Stakeholder Groups

A consultation process was carried out since August 2009 through meetings, workshops, group discussion, seminars, so as to capture the views and opinions of all stakeholders in order to ensure that these views and comments reflect the priorities of people involved in the REDD+ process. Communication briefings were circulated by the PMU via media, internet and direct contact. Links were established to have a continuous feedback from local level through FNC offices, key persons and local NGOs and CBOs. Generic feedback received was analysed and considered centrally. To further improve and enrich information gathered through the national consultation, target groups at local level were also asked to provide views on issues that they would wish to highlight as being potentially challenging on the basis of discussions being held with local stakeholders. Feedback from different stakeholders was received directly during workshops, meeting, seminars and group discussion. Outcome reports were sent to all relevant stakeholders for comments and further revision of reports was made and final versions developed where all views were reflected. A total of more than 500 responses were received from target groups, local people, environmental organisations, NGOs, CBOs of related sectors, etc. Following the initial launch of the consultation, access to the consultation information was fully considered. This work culminated in the development of **Sudan's First Draft REDD+ Preparedness Strategy**. The entire consultation process, including persons met and aspects touched upon is documented in the Annex. Further work is already underway to ensure that all relevant institutions and people have an opportunity to be heard and their views considered through work with the PMU. For these activities a budget of US$115 k is scheduled over the next 4 years.

1c. Consultation and Participation Process

Subsequent consultation process will include visits to Blue Nile, River Nile, Northern, N. Kordofan, W. Kordofan, N. Darfur, East Darfur and South Darfur States; where relevant agriculture, forests & range custodians and stakeholders are to be met together with a wide array of NGOs & CBOs, particularly Farmers Union and Pastoralists Union, Women Groups, Owners of Community Forests, Institutional & Private Forests. As a centrepiece of the Sudan REDD+ strategy a Consultation and Participation Plan has been formulated. For these activities a budget of US$180k is scheduled over the next 4 years.

Component 2: Prepare the REDD+ Strategy

2a. Assessment of Land Use, Land Use Change Drivers, Forest Law, Policy and Governance
Sudan is a mostly arid country, dominated by the agricultural sector which includes cropping, livestock, forestry and fishing, and related processing activities. In 2012 land cover was 13% crops, 14% herbaceous plants, 12% shrubs, 10% trees and 51% without vegetation. The forest and woodlands have decreased at a rate of 598,000 ha/year equivalent to 0.08% during 1990-2000 and 54,000 ha/year during the period 2000-2010. The biggest direct driver of land use change had been the **conversion of natural forests to cropland and pasture**. Some 17 million ha have been converted into mechanized & traditional rain fed and irrigated agriculture during the period 1940-2012, but in the last decade conversion rates were much lower. A major driver of forest degradation is **energy consumption**: Demand for wood fuel increased in the last two decades due to rapid population growth and shortage in supply of other forms of energy. Fuel wood has to cover about 70 - 81 % of the national energy supply. Other big drivers of forest degradation are **grazing of domestic animals** in woodlands, with devastating effects on tree seedlings and smaller trees, and **fire**, frequently used in rural land management.

Sudan's Forest Policy (1986) defines and recognizes several levels of forest ownership: Federal and State Forests (38.9%), Wildlife Reserves (60.8%), Institutional, Community and Private Forests (0,3%). The Forest Act of 1989 prescribes the allotment and upkeep of 10% and 5% of rain fed and irrigated agricultural land respectively to forests in the form of wood lots and shelter belts. The Comprehensive National Strategy 1992-2002 stipulates the allotment of 25% of the country's land area to forest, rangelands and wildlife reserves. To further address land use drivers and governance a budget of US$1,335 k is scheduled over the next 4 years.

2b. REDD+ Strategy Options
To address the drivers of deforestation and forest degradation, an integrated set of REDD+ strategy options is proposed, which will be screened and prioritized in an inclusive and participatory consultation process with key stakeholder groups. The options are:

Substitute unsustainable fuel wood and charcoal with Liquefied Petroleum Gas (LPG);
Increase the use of sustainable charcoal;
Increase firewood efficiency;
Subsidise renewable energy production and grid infrastructure;
Increase gum Arabic production;
Forest conservation and sustainable forest management;
Reforestation;
Crop intensification and balanced livestock production;

For these activities a budget of US$1,450 k is scheduled over the next 4 years.

2c. REDD+ Implementation Framework
Sudan National REDD+ Programme Implementation Body is envisaged to be broad-based, encompassing beside the Steering Committee representatives of:

- Relevant Federal Line Ministries & Institutions, such as MAI, MEFPP, MFNP, HCENR, and RPGD
- Representatives of relevant State entities, such as State Legislatures, State Ministries of Agriculture & Animal Resources
- Representatives of Federal and State Academia, Research, NGOS & CSOs such as SFS, SECS, FoF, GAPAs, FU, and PU.

The Steering Committee is envisaged to be composed of representatives of UN-REDD+ organizations and other expertise of which the collaborative initiative was built: FAO, UNDP, UNEP & WB together with the NPM. The main role of this working group is to coach and

facilitate REDD+ activities in Sudan, and to coordinate cooperation throughout the entire REDD+ Programme implementation. The actual REDD+ Implementation Framework may still undergo changes and revisions, once the readiness management arrangements will be better visible, along with the emerging REDD+ strategy. For these framework activities a budget of US$510 k is scheduled over the next 4 years.

2d Social and Environmental Impacts during Readiness Preparation and REDD+ Implementation

A number of possible social and environmental impacts emerged in the course of REDD+ Strategy & R-PP preparation. As stated in component 2b, many technical, legislative and institutional studies, consultations and measures are planned to address such impacts. In compliance with the Common Approach, it is planned to undergo a Strategic Environmental and Social Assessment (SESA) process with its key output, the Environmental and Social Management Framework (ESMF). The following two phased approach will be taken:

During Preparation of the REDD+ Strategy:

- Addressing legal, institutional, regulatory and capacity gaps to manage environmental and social priorities associated with the drivers of deforestation and forest degradation
- Proposing risk minimizing REDD+ Strategy Options

During Implementation of the REDD+ Strategy:

- Addressing remaining environmental and social risks and potential impacts of policies, regulations, investments, or projects during the implementation of the R-PP or R-Package (ESMF)

Steps, responsible entities, actions and documentation along the National SESA process have been specified together with an estimate which World Bank's Safeguard policies may apply. For the upcoming activities a budget of US$95 k is scheduled over the next 4 years.

Component 3: Develop a National Forest Reference Emission Level and/or Forest Reference Level

Sudan has not yet established a regular or permanent national forest inventory system. However, numerous surveys and studies have been undertaken to identify forest & range resources and changes in land use and vegetation cover. The state of forest cover can only be assessed from these incomplete and ad hoc surveys and studies, some global forest resources assessments (FRA 1995-97) and international literature. The GHGs emission scenario of the forest sector has been estimated twice, in 1995 and 2000 for the purpose of preparing the initial and second NCs of Sudan to the UNFCCC. Accordingly, in 2000 the LULUCF sector was a net emission source with 9.3 Tg CO_2e, mainly resulting from forest and grassland conversions.

A limited number of Government experts were trained in practical use of FAO's Land Cover Classification System (LCCS), satellite image interpretation, Google-Earth software and field verification. In 2010 experts developed an LCCS legend and database for Sudan which updated the Africover database of 1999-2000.

To develop RELs and RLs and future projections the following steps are envisaged:

- Establish expert groups to design REL/RL and define suitable methodologies for future projections that are appropriate for Sudan's situation;
- Define proper methodologies for REL/RL establishment at national and sub-national scales, taking into account historical emissions and removals, and modelling of future development paths;

- Develop and test RELs/RLs at sub-national level that can be scaled up to national level;
- Convene National stakeholder's consultation forums to discuss and endorse the developed RELs/RLs.

For these activities a budget of US$1,140k is scheduled over the next 4 years.

Component 4: Design Systems for National Forest Monitoring and Information on Safeguards

4a. National Forest Monitoring System

The Sudan Forest Monitoring System will be based on the existing remote sensing and forest inventory infrastructure. The objective is to develop a national forest monitoring system, for emission and removal of GHGs, including its methodologies for Measurement, Reporting and Verification (MRV) of activities under REDD+. The following outputs are envisaged:

1. Work plan including ToRs for a national forest monitoring system established, to include national and sub national successive forest inventories containing activity data and emission factors. Institutions include FNC, Remote Sensing Authority, Survey Department and a remote sensing company. In addition, stakeholders include NGOs, CSOs, and the FAO

Monitoring system initiated, including MRV process and REDD+ Project Registry, i.e. relevant institutions engaged and stakeholder groups evolved in MRV

Initial design of successive National forest inventories

The planned activities are outlined and a budget of US$2,410K is scheduled for four years.

4b. Designing an Information System for Multiple Benefits, other Impacts, Governance, and Safeguards

A participatory process will be followed to develop and set up a monitoring system for ecosystems multiple benefits, impacts and risks associated with REDD+ activities. The process will start with the coordination of different related institutions supported and facilitated by specialists from government sector, academia, NGOs and local stakeholders. It will be based on available information and present capacities of these groups and national institutions and scaled up with the increase in capacity building. The FNC has solid experience in inventories and remote sensing from planning and executing national inventories and management planning. Added to that is the experience of academic and research institutions of forestry and other related disciplines. The major tasks will incorporate:

1. Collection of information related to co-benefits of forest ecosystems, and social and environmental impacts and risks
2. Development of a set of indicators and verifiers
3. Evaluation of the parameters related to deforestation and forest degradation drivers
4. Capacity building, communication and training

A set of task related activities is outlined, for which a budget of US$190K is scheduled over the next 4 years.

Component 5: Schedule and Budget

The total budget for all planned activities over the next four years is resumed and a proposal is made how the amount could be divided between the Government of Sudan, FCPF and UN-REDD:

Overall Budget (in thousand US$) in:	2014	2015	2016	2017	Total
Grand Total	2090	3735	1685	310	7820
Government					320
FCPF					3,500
UN-REDD Programme					4,000

It is obvious that most of the total cost of US$8.76 million is needed over the first two years. As innovative activities may encounter difficulties and delays, the annual budgets should be made transferable up to 2017.

Component 6: Design a Program Monitoring and Evaluation Framework

The Republic of Sudan will account for the progress made towards REDD+ readiness and develop the necessary detailed Programme M&E Framework, allowing to immediately flag when planned activities are getting delayed. The Programme M&E Framework is a standard tool used in programmes or projects to monitor progress against the ToRs. A combination of process and product indicators shall be used, as it has been outlined in the draft M&E Framework of this component. Further details, including a risk assessment of each output, will be added during the starting phase of the readiness programme. A set of task related activities is outlined, for which a budget of US$145K is scheduled over the next 4 years

Abbreviations

AD	Activity Data
ARC	Agricultural Research Corporation
BRICKS	Building Resilience through Innovation, Communication and Knowledge Services (African regional project)
Common Approach	The Common Approach provides an overarching framework for the World Bank and development agencies to be Delivery Partners to provide R-PP Formulation and/or Preparation grants to FCPF REDD Country Participants
CB	Capacity Building
CBO	Community-based Organizations
CC	Climate Change
CF	Conversion Factor
CSO	Civil Society Organizations
CEMP	Community Environmental Management Plan
EF	Emission Factor
DG	Director General
ESMF	Environmental and Social Management Framework
FES	Fuel Efficient Stove
FFRS	Faculty of Forests & Range Sciences
FMS	Forest Monitoring System
FNC	The Forests National Corporation
FoF	Faculty of Forestry
FPGR	Forage Plants Genetic Resources
FPIC	Free Prior Informed Consent
FRA	FAO Global Forest Resources Assessment 2015
FRC	Forestry Research Centre of the Agricultural Research Corporation(ARC)
FU	Farmers Union
GAPA	Gum Arabic Producer Association
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GGWI	Great Green Wall Initiative (of Sahara and Sahel)
GMCRM	Grievance Management and Conflict Resolution Mechanisms
HCENR	Higher Council for Environment and Natural Resources
HRWS	High Rainfall Woodland Savannah
IDPs	Internally Displaced Populations
IES	Institute of Environmental Studies of University of Khartoum (UoK)
JFM	Joint Forest Management
LMS	Land Monitoring System
LRWS	Low Rainfall Woodland Savannah
MAI	Ministry of Agriculture and Irrigation
MB	Management Board
MEFPD	Ministry of Environment, Forestry & Physical Development
MFC	Mechanized Farming Corporation
MFNP	Ministry of Finance & National Planning
MoLFR	Ministry of Livestock, Fisheries & Range
MoM	Minutes of Meetings
MRV	Measurement, Reporting and Verification
NFI	National Forest Inventory
NFMS	National Forest Monitoring System
NFP	National Forestry Programme of Sudan
NPM	National Programme Manager
NRCO	National REDD+ Coordinator Office
NRP	National REDD+ Programme of Sudan
NRSA	National Remote Sensing Authority
NSB	National Statistics Bureau
NWFP	Non-Wood Forest Product
PMU	Programme Management Unit
PU	Pastoralists Union
QA	Quality Assurance
QC	Quality Control
REDD	Reducing Emissions from Avoided Deforestation and Forest Degradation
REDD+	Reducing Emissions from Deforestation and Forest Degradation, and the role of Conservation of Forest Carbon Stocks, Sustainable Management of Forests, and Enhancement of Forest Carbon Stocks in Developing Countries

RL/REL	Reference Level/ Reference Emission Level
RoS	Republic of Sudan
RPGD	Range & Pasture General Directorate
R-PP	REDD+ Readiness Preparation Proposal
RPR	REDD+ Project Registry
RS	Remote Sensing
RSA	Remote Sensing Authority
SAWAP	Sahel and West Africa Program
SCFS	Sudan Community Forestry Society
SDG	Sudanese pounds. 1 US$ = 5.57 SDG (July 2013)
SECS	Sudanese Environment Conservation Society
SESA	Strategic Environmental and Social Assessment
SFMS	Sudan Forest Monitoring System
SFS	Sudanese Forestry Society
SIEP	Sudan Integrated Environmental Programme
SNC	Survey National Corporation
SNRPIB	Sudan National REDD+ Programme Implementation Body
SOC	Soil Organic Carbon
SRNSC	Sudan REDD+ National Steering Committee
SSNRMP	Sudan Sustainable Natural Resources Management Project (GEF/WB)
SUST	Sudan University for Science & Technology
TF	Task Force
TOE	Ton Oil Equivalent
ToR	Terms of Reference
UN-REDD	UN-REDD Programme
UoK	University of Khartoum
WB	The World Bank
WCGA	Wildlife Conservation General Administration

Component 1: Organize and Consult

1A. National Readiness Management Arrangements

The Republic of Sudan (RoS) was among the first countries to sign UNFCCC in September 1992 and is party to it since 1993. Sudan ratified KP on 16 February 2005. The Higher Council for Environment and Natural Resources (HCENR), the key governmental body responsible for policy making on overall Federal environmental aspects but particularly with regard to the provisions of the Convention has been designated as the National Focal Point to the UNFCCC. A detailed introduction of the involvement of Sudan in the Post-Rio arrangements is provided in (Annex 1a.1.)

1A.1. Inception & Institutionalization of Process

The Forests National Corporation (FNC) Director General (DG) submitted a Concept Note on REDD+ to FNC's Management Board (MB).The Board directed the DG to proceed with the country's involvement in the initiative in the most consultative and participatory manner, involving all stakeholders & relevant entities and tapping support from all relevant sources. The genesis of Sudan REDD+ Programme is depicted in Annex 1a.2.

Throughout the Sudan National REDD+ Formulation Process, the DG of FNC:

I. Appointed a National REDD+ Coordinator (Coordinator);
II. Established:
    1. A National REDD+ Coordination Office (NRCO) composed of Coordinator & two assistants within FNC's General Administration of Planning. NRCO was assigned the tasks of:
        i. Inception of Sudan National REDD+ Programme in close collaboration with HCENR,
        ii. Provide secretariat & logistic support to National REDD Formulation & Implementation Bodies.
    2. An open-ended Sudan REDD+ National Steering Committee (SRNSC) is made of representatives of some line ministries , HCENR, NGOs, CSOs, private sector, co-opted members for various stages of project formulation & implementation together with representatives of UN-REDD+ organizations on convening role & expertise of which the collaborative initiative was built: FAO, UNDP, UNEP and the World Bank.
        i. The main role of SRNSC is to coach, facilitate REDD+ activities in Sudan and to coordinate cooperation between and solicit financial & technical support from these UN and other Development Partners throughout the entire REDD+ preparation and ultimate programme implementation.
        ii. NRCO is member of and provided secretariat support to SRNSC.
III. Task Force I. This was composed of International Consultants, National Consultant, National Support Group & SRNSC. Courteously supported by DIFD & UNEP, Task Force I was assigned Sudan REDD+ Strategy preparation. Composition & ToRs are depicted in Annex 1a.3. Task Force I was disbanded after it successfully submitted its report on Sudan REDD+ Strategy.
IV. Task Force II. This was composed of: SRNSC, Representatives of FNC, HCENR, Ministry of Agriculture & Irrigation (MAI), Range & Pasture Administration (RPA), Sudanese Forestry Society (SFS), Sudanese Environment Conservation Society (SECS), Sudan Community Forestry Society (SCFS), Faculty of Forestry (FoF) & Institute of

Environmental Studies (IES) of University of Khartoum (UoK), together with a broad spectrum of collaborating national consultants. Composition of Task Force II is depicted in General Information chapter (Table 2). Courteously supported by UNDP, UNEP and WB, Task Force II was assigned Sudan REDD+ Readiness Preparation Proposal (Sudan R-PP). Task Force II shall function up to the point when Sudan R-PP and subsequent revisions thereof are finally submitted to FTM and shall then be disbanded. Subsequent dealings with Sudan REDD+ shall be handled by Sudan National REDD+ Programme Implementation Body (SNRPIB).

Schematically depicted in **Figure IA-1**, SNRPIB is envisaged to encompass:

National REDD+ Steering Committee (NRSC):

1. Due to the importance of cross-sectoral collaboration for the REDD+ programme, the SNRPIB will need to have a balanced representation of all stakeholder groups, resource custodians, ministries and government institutions with responsibilities for forest & range conservation and management or have potential to mitigate impacts of REDD+ implementation.

   The decision-making authority for SNRPIB shall be the NRSC. The NRSC shall provide overall and arching guidance and direction to the National REDD+ Readiness Process, including the development of the Roadmap and on matters related to cross-sectoral and inter-agency coordination and collaboration. The NRSC, therefore, will ensure the overall coordination and collaboration between all REDD+ relevant initiatives, supported by various development partners and national institutions.

2. Composition:

   NRSC shall be summoned and Chaired by The President of the HCENR.

   > *"According to the Environmental Protection Act 2001, The Council (HCENR) shall be under the Supervision of the President of the Republic of The Sudan. HCENR was Constituted by Decision of the Council of Ministers, under the Chairmanship of the Minister responsible for the National Environment in Sudan (Minister of EFPD), and membership of the competent ministers (Agriculture & Irrigation, Water Resources & Electricity as Deputy of the chair, Industry , Animal Wealth , and a number of members of people endowed with sufficient know how ,experience and interest in the affairs of the environment and natural resources."*

   Genesis of HCENR is detailed in **(Annex 1a.4.1.)**

3 Membership:

   Full Membership NRSC comprises, Line Ministries such as Ministries in charge of Forests, Agriculture, Livestock, Mining and Local Government Bureau; DG – FNC, Secretary -general of HCENR and representatives of Academia, Forest Research, Wildlife, legal expert, Private Sector involved in forest activities, Media, NGOs, CSOs, Farmer Union, Pastoralists Union, Women Groups, GAPAs, Forest Dependent Communities and Forest Dependent Ethnic Groups.

   1. Observers:
      Representatives of Technical Advisory Group + UN Agencies of convening role & expertise of which the collaborative initiative was built: FAO, UNDP, UNEP and the World Bank.

Figure IA-1 Sudan National REDD+ Programme Implementation Body Structure

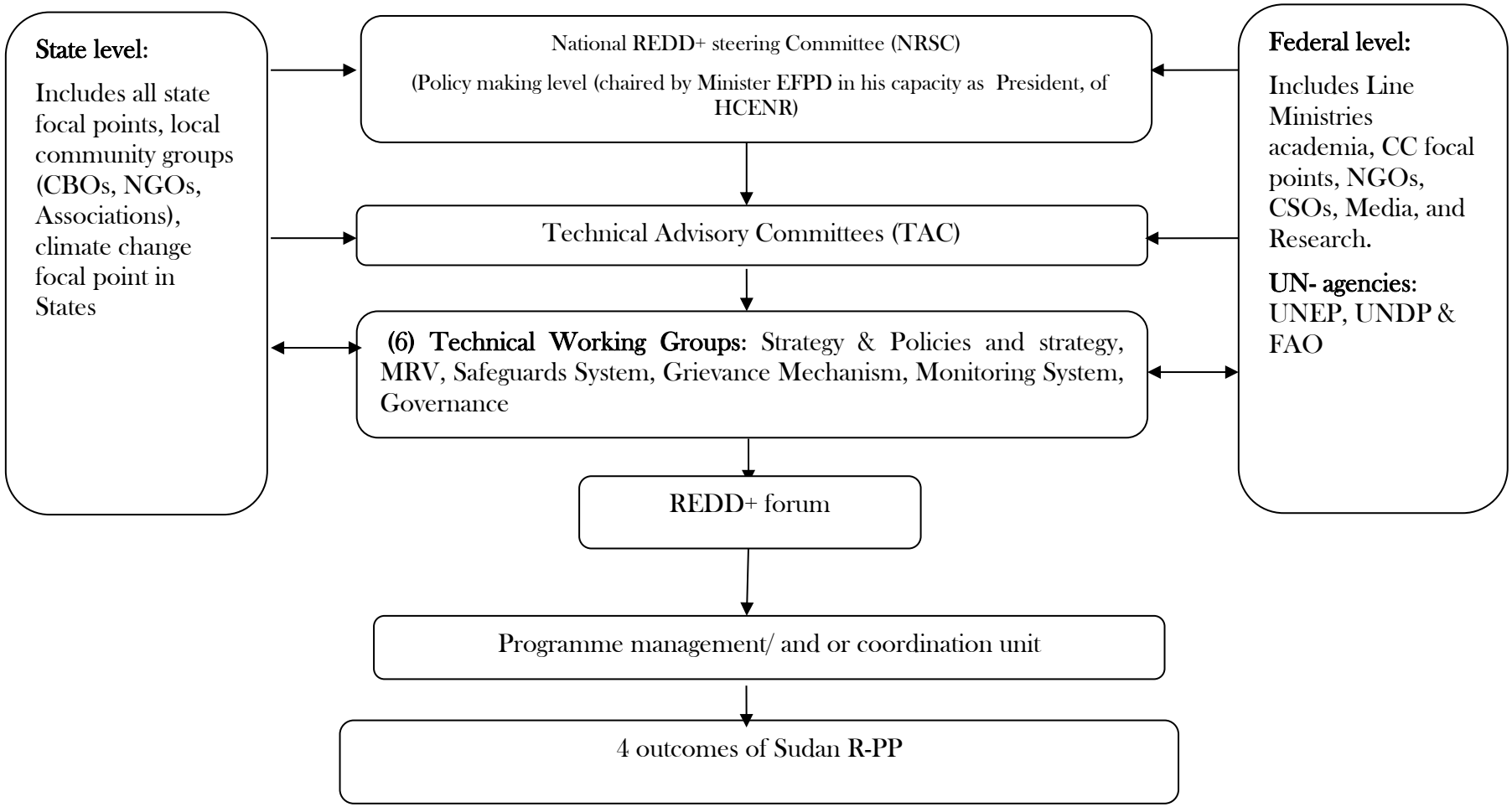


Figure IA-2: National REDD+ Steering Committee (NRSC)

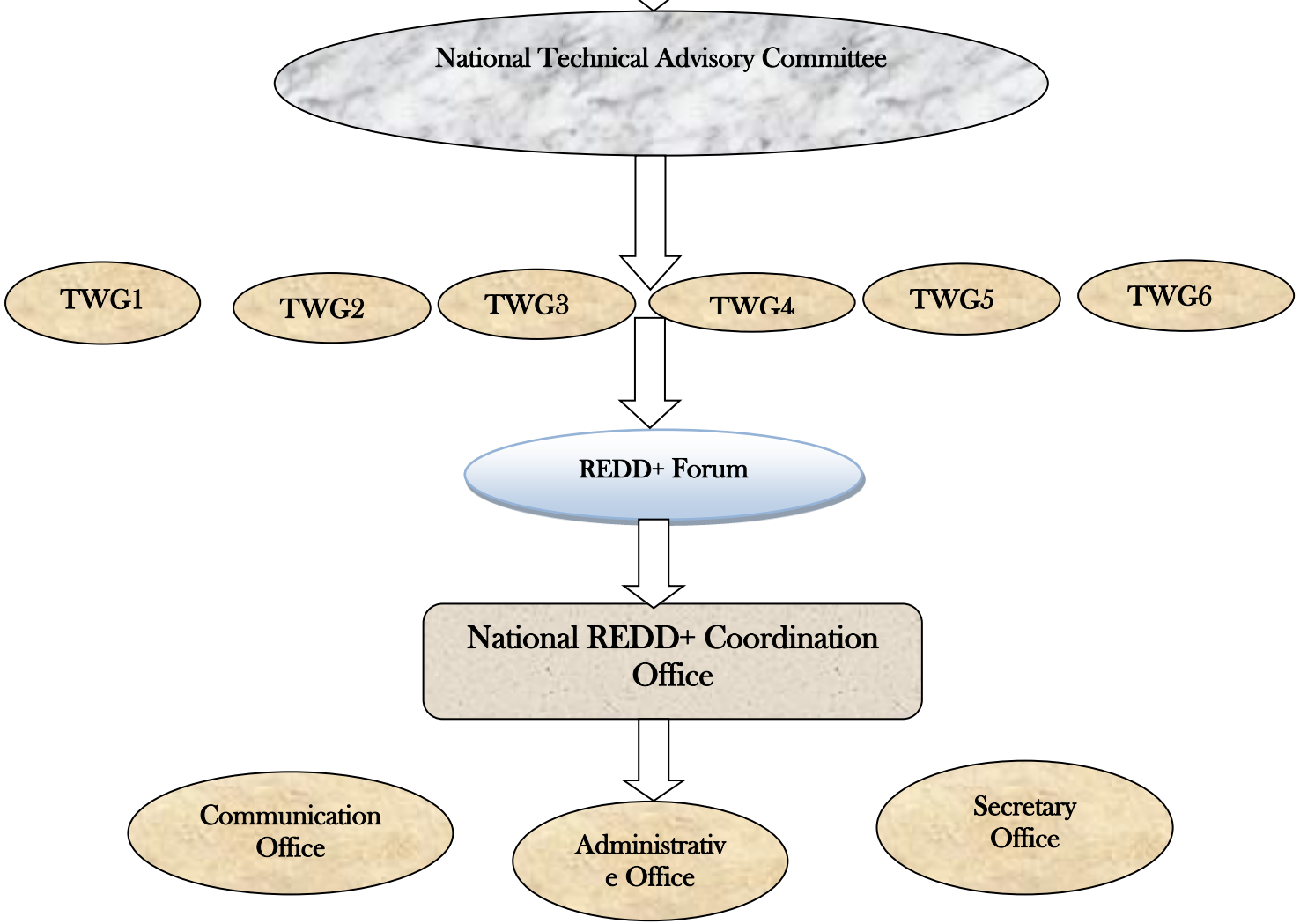
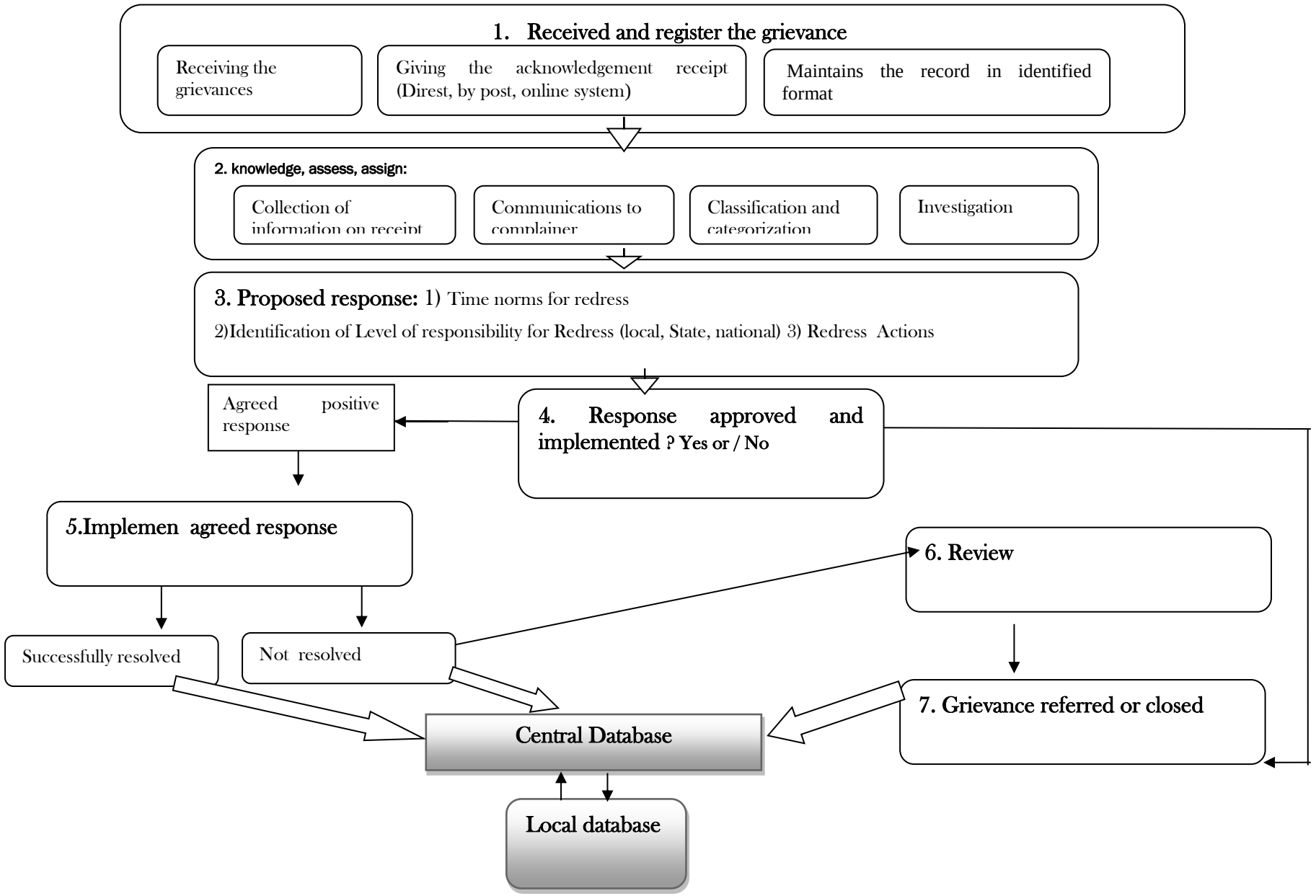


Figure IA-3: GMCRM in Sudan



1A.2. Sudan National REDD+ Programme

Rationale

Sudan, a LDC with substantial biodiversity and natural resources, signed, ratified & partied to UNFCCC since 1993. The country has since participated in many initiatives with regard to CC mitigation and adaptation, including preparation of national inventories of GHGs. Although Sudan is not an emitter of a significant amount of GHGs, continuing deforestation and forest degradation are of concern. As such, a National REDD+ Programme, which estimates in-country emission sources and sinks for GHGs and helps to address underlying drivers, assumes significant importance. Prerequisites for this are reliable estimates of the changes in biomass density, carbon stocks, forests, woodlands and range areas that may occur due to deforestation and forest degradation. Likewise, envisaged multiple benefits under REDD+, financial, social & environmental, are of interest to Sudan. However, to make REDD+ operational, the ability to catalyse and influence REDD+ investments to have a positive influence on forest & woodland conservation and management is essential. This requires considerable inter-institutional linkages and cross-sectoral coordination to attain the necessary in-country support and commitment. These aspects are key elements for the assessment of existing capacities to operationalize the REDD+ programme and the design of the national REDD+ Readiness Management Arrangements.

Sudan's Vested Interest & Advantages in REDD+

The REDD+ Initiative has the potential to immensely benefit Sudan. Sudan can reciprocate by sharing its wealth of accumulated acquired and traditional knowledge in Agro-forestry, Agro-silvo-pasture and mobilization of peoples' efforts in management of natural calamities and coping with events.

Developmental & Specific Objectives of Sudan National REDD+ Programme

The ultimate objective of the National REDD+ Programme (NRP) of Sudan is:

> "*Conserving the country's renewable natural resources particularly forests, woodlands, range resources and wildlife habitats, assessment of their present condition with inventories and subsequently subject them to sustainable management and maximizing their direct and indirect benefits in a participative, transparent and equitable manner.*"

The specific objectives of Sudan's NRP include but are not confined to:

1. Detailed quantitative and qualitative inventory of the country's forests, woodlands, tree formations, trees outside forests, range & pasture resources and wildlife habitats inclusive of national parks, sanctuaries and private holdings,
    1. Ascertain their status in terms of ownership, registration and disputes,
    2. Judicious assessment of their present condition in terms of stocking, diversity, health and vigour,
    3. Careful evaluation of their designated functions, actual and expected goods provided and services rendered, particularly in terms of augmenting livelihoods of surrounding communities, the country at large and beyond,
    4. Appraisal of modalities of their management.
2. Review of relevant policies, institutional arrangements and legislations in force,

1. Revise, amend and/or promulgate relevant legislation and undertake institutional reform conducive to the fulfilment of the ultimate objective.

Means & Steps Towards Realization of Sudan National REDD+ Programme

It is envisaged that the NRP of Sudan will be realized through the following means and steps:

1. Analysis of the current situation with regard to institutional arrangements and cross-sectoral coordination which are relevant for REDD+,
2. Setting up the necessary institutional structures and supporting arrangements to manage and co-ordinate the REDD+ Readiness process to result in the development and implementation of a coherent and successful REDD+ Strategy and a Sudan Forest Monitoring System with support for Measurement, Reporting & Verification (MRV) functions, together with other attendant components of the Sudan REDD+ Programme,
3. Ensure that the National REDD+ Programme has the necessary enabling decision-making authority, expertise, and wide-ranging stakeholder participation at various societal levels to achieve overall goals for long-term sustainability of desired outcomes,
4. Ensure that the REDD+ programme is supported by technical capacity, effective communication (including awareness raising and consultation with stakeholders), capacity building and human resource development (preceded by a comprehensive needs assessment),
5. Mainstreaming REDD+ into broader cross-sectoral plans and programmes, including national development goals, CC goals and REDD+ goals.

Grievances Management & Conflicts Resolution Mechanism for Sudan National REDD+ (Fig.1A-2)

REDD+ has the potential to reduce emissions, improve forest management, enhance local livelihoods and ultimately promote sustainable development. Its implementation however may also have negative impacts on community livelihoods through activities that are likely to impact on traditional uses of resources and land use particularly for communities that depend on forests for survival. For instance REDD+ has the potential to strengthen the roles of weak and marginalized communities as groups and individuals in forest management as well as potentially having negative impacts on them if their interests are not incorporated in the design and implementation of REDD + strategy.

In this respect, REDD+ implementation is apt to impose challenges of conflict and grievances resulting from such negative impacts. If stakeholders feel their rights are not being respected then grievances may arise through various stages of design and implementation of REDD+ activities. Sudan has a long experience in this area exemplified by the conflicts arising from forests reservation since early 20th century. Experience has been developed in solving problems and approaching resolution of conflicts between communities and government and would be useful in REDD+ issues. Engaging the stakeholders in decision making early on has been helpful in mitigating some of the risks of conflicts but may not prevent their occurrence.

Any prospective Grievances Management & Conflicts Resolution Mechanism (GMCRM) for Sudan National REDD+ is apt to look back and benefit from the country's long experience in the process of forest reservation and the safeguards embedded there in.

Right from the beginning of the Anglo-Egyptian Condominium rule of Sudan (1898-1956) dichotomy of interest and hence conflict over functions of and benefits from forest & range

resources emerged between the central government and provincial authorities. The central authorities were anxious about wood supply for urban needs, especially construction and other infrastructure development. Wood fuel, telegraph & telephone transmission poles, building poles together with sawn timber in the form of railway sleepers and construction timber were the most sought products by the national government. Provincial authorities on the other hand were more concerned about local needs especially fuel-wood, NWFPs and fodder for livestock.

This necessitated a division of functions and authority between the central and local entities, which was elaborated in the 1932 Forest Policy Statement, supported by the Central and Provincial Forest Ordinances 1032. Accordingly, the Central Directorate of Forests and the Governors of Provinces were respectively entrusted to satisfy the national and provincial needs of forest products from central and provincial forest reserves. However, the authority to change the status of forest reserves vested entirely with the Governor General (nowadays The President) and this was permitted only in the context of over-riding national interest. (Nair and Abdel Nour 2011).

Subsequent institutional and legislative measures particularly the 1986 Forest Policy Statement further widened forest classification and ownership into Federal, State (Provincial), Institutional, Community and Private Forests, each to be managed by and benefits accruing to its owner. However, and as of 2013, the total land area registered as forests is in the region of 29 million feddans (12.3 million ha), beside some 19.4 million ha constituted as protected areas including wildlife reserves and national parks.

The process of forest reservation in Sudan, similar to other British colonies in Africa as a precursor to the aforementioned legislations started in the mid-1920s and developed in earnest in the mid-1930s. It was a tug of war between the tribal leadership, native administration and district commissioners on one side and the central government and central government institutions exemplified by Cabinet and Forests Administration respectively on the other side. Each side was genuinely trying to serve the interests and meet immediate and future demands of its constituencies.

Nine decades of forest and protected area reservation (1923-2013) spawned a slow and tedious process with sound safeguards well embedded in. The process goes through some eight steps and passes through an analogous number of agencies.

- It starts with a local forester identifying, reconnoitring and sketching a forest/woodland area,
- He (nowadays could also be She) presents the proposal to constitute the area into a forest reserve (Federal, State or Community') to immediate local authorities (tribal chieftain , village popular committee, locality (district) commissioner),
- The local authorities may approve in principle or reject or approve in principle with a list of demands/requirements to be guaranteed/safeguarded such as stipulation of rights of neighbouring communities and individuals to collect firewood for non-commercial purposes, collection of NWFPs, access & right of way of people and livestock to water sources and usage of public utilities passing through the forest such as roads, market places etc.,
- Prior to the advent of Federal Rule in 1994, the proposal carrying the stamp of local authorities is passed to the National/Federal Director of Forests. Nowadays, if the proposal is for State, Community or Private Forest, the proposal ends in the State Wali

(Governor) and is subsequently announced in the Government Gazette and entered in The Land Registry,

- Proposals for Federal Forests are passed to the National/Federal Director of Forests, who seeks the approval of the designated Minister (throughout contemporary history, Minister of Agriculture or Minster of Environment),
- On the force of the latter, The Judiciary appoints a settlement officer (a law or local government officer or senior civil servant).
- The latter announces on notice boards of locality, market places and some utilities in villages about his intention to look into grievances or claims regarding the area to be constituted into a reserve,
- With the help of local authorities and government surveyors claimed portions of the proposed reserves are omitted or their claimants compensated in cash at current land values,
- The original sketch is firmed up accordingly, declared in the Government Gazette with all the safeguards/reservations stated on the onset and the map entered in the National Land Registry,

This process for some expansive forest reserves took up to 40 years. For some reserves that never materialized, the area in the meanwhile was developed into an agricultural scheme, a village, market place or something other than forest.

The envisaged Grievances and Conflict Resolution Plan in the course of Sudan REDD+ implementation includes but is not limited to:

- Lack of understanding/inability to comprehend the very concept of REDD. Such notion is likely to be flagged at any point in time in the process of a gathering, by any body from the entire spectrum of participants inclusive of State Governors, ministers and the layman or woman.
  - Redress of such a grievance/complaint requires all and immediate tact and wisdom of the function facilitator to accommodate the complaint and press on with prescribed proceedings,
  - To guard against future recurrence of such situation, Sudan National REDD+ Committee needs to continuously improve and widely disseminate informative brochures and structure meetings to start with reiteration of the very concept of REDD+,
- Stakeholder involvement (lack thereof, inadequacy, bias in gender, ethnic or other terms),
- Sharing of benefits and co-benefits,
- Landlessness,
- Equity and sustainability
- Conflict of interest between different land users and government authorities (local, state and national level)

The envisaged Sudanese GMCRM consists of four processes namely complaint receipt, investigation, ruling/verdict and monitoring & database formation with the following sections:

A. Receipt of Grievance/ Complaint:

1. Receipt, stamping with date and place and filing/registration in 'in-coming mail / correspondence ledger,
2. Acknowledgement of receipt to complainer in writing (on cyclostyled stock letter / format)
3. Investigation / collection of information on case,
4. Forwarding case to higher level at State (designated State Minister) or Federal level (FNC HQs).

B. Ruling on Grievance/ Complaint:

1. The process to be followed at State level regarding forests/range/wildlife of local nature and context is yet to be established and agreed with State authorities through the process of REDD+ mainstreaming/internalization,
2. At Federal level (FNC HQs):
    1. Receipt, stamping with date and place and filing/registration in 'in-coming mail/correspondence ledger,
    2. Forwarding to Legal Advisor for comment and forwarding to Director General FNC,
    3. Director General in consultation with Technical Arms (Afforestation, Extension, Investment, etc.) might:
        1. Formulate a ruling, approve it if within his stipulated jurisdiction and convey the verdict to the claimant through the normal channels,
        2. Summon and dispatch a team to investigate the matter on site and report,
        3. On the force of team report:
            1. Formulate a ruling, approve it if within his stipulated jurisdiction and convey the verdict to the claimant through the normal channels,
            2. Formulate a recommendation with a ruling and forward to FNC Management Board if the matter is beyond his jurisdiction,
            3. Convey verdict to claimant through normal channels,
            4. Maintain a national data base at FNC HQs with received and tackled grievances/complaints.

It is perhaps prudent to stress the fact that what ruling is passed on a complaint it does not jeopardize or deprive the complainant from pursuing his claim through normal judicial procedures. There is a Federal Bureau for Grievances affiliated to the National Assembly.

1A.3. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousands US$)				
		2014	2015	2016	2017	Total
Setting up the necessary institutional structures and supporting arrangements to manage and co-ordinate the REDD+ Readiness process	Meetings and workshops with all stakeholders	20	20			40
	Dissemination of Minutes of Meetings (MoM) and reports	5	5			10
Ensure that the REDD+ programme is supported by technical capacity, effective communication, capacity building and human resource development	Hire communication specialists Training workshops and seminars Study tours Meetings and group discussions	30	30			60
Conflicts and Grievances Mechanism development	Consultation Capacity building. Hire 1-2 staff	30	30			60
Mainstreaming REDD+ into broader cross-sectoral plans and programmes, including national development goals, CC goals and REDD+ goals	Meetings and workshops	30	30			60
	Dissemination of MoM and reports Awareness raising Consultation Coordination meetings	10	10			20
Total		**125**	**125**			**250**
Domestic Government						
FCPF						
UN-REDD Programme (if applicable)						

1B. Information Sharing and Early Dialogue with Key Stakeholder Groups

This chapter summarizes the information sharing and dialogue process to date, i.e. up to the submission of this R-PP to FCPF.

1B.1. Consultation process

A consultation process was carried out through meetings, workshops, group discussion, seminars so as to capture the views and opinions of all stakeholders in order to ensure that, these views and comments reflected the priorities of people involved in REDD+ process in Sudan. Communication briefings were also circulated by the PMU via media, internet and direct contact. Links were established to have a continuous feedback from local level through FNC offices, key persons and local NGOs and CBOs. Generic feedback received was 26nalysed and considered centrally. To further improve and enrich information gathered through the national consultation target groups at local level were also asked to provide views on issues that they would wish to highlight as being potentially challenging on the basis of discussions being held with local stakeholders.

Following the initial launch of the consultation, access to the consultation information was fully considered.

The PMU will take forward the lesson learnt from this process and seek to further improve practice in this regard in future where consultation should be managed within constraints defined by the circumstances arising from the implementation of REDD+ programs and activities. Further work is already underway to ensure that all relevant institutions and people have an opportunity to be heard and their views considered through work with the PMU.

The REDD+ process planning was developed through a broad based consultative process where relevant stakeholders have been involved through:

- Planning Workshops at local, State and national levels
- Meetings
- Group discussion sessions at local , State and national levels
- Comprehensive review of REDD-Plus related literature & jargon and translation thereof into Arabic language and dissemination through folders, brochures, posters and newspaper articles
- Validation national workshops (key stakeholders at a national level)
- Approval by the National REDD-plus Steering Committee

The R-PP document sets out a final version that:

- Reflects views, suggestions and comments submitted to the consultation,
- Will follow-up an extensive and continuing programme of targeted engagement, consultation and discussion with different stakeholders.

Overall, Sudan's REDD+ Process went through three stages.

Stage 1

The first one was an **Inception Stage**, courteously supported by UNDP. It encompassed a series of in-house consultations, meetings, workshops & round-table seminars during the period August 2009-September 2011:

The process started with in-house consultations to identify and list potential stakeholder groups & partners. The exercise yielded a list of stakeholders, resource custodians and partners. The most relevant of these partners include:

- Line ministries whose activities impact forest & range resources (Agriculture & Irrigation ; Livestock, Fisheries & Range ; Minerals; Oil and Water Resources & Electricity),
- Government organs,
- NGOs (Sudanese Environment Conservation Society, Sudanese Forestry Society),
- Institutes of High Education & Research,
- Private sector companies (Kenana Sugar, DAL Group),
- CSOs & institutions (Farmer & Pastoralist Unions, Gum Arabic Producer Associations (GAPAs), Women Groups),
- International Organizations (UNDP, UNEP, FAO, WB), and
- Development Partners in Sudan (British Embassy).

The list, mandates and responsibilities of the envisaged stakeholders, resource custodians & partners is displayed in **Annex 1b.1.**

Total population of the country, of some 33.4 million is a combination of indigenous Nilo-Saharan- speaking Africans and descendants of migrants from the Arabian Peninsula. The main ethnic groups are Sudanese Arabs (Approx. 70%), Fur, Beja, Nuba and Fallata. Due to the process of Arabisation common throughout the rest of the Arab world today, Arab culture predominates in Sudan. The greater majority of the population of Sudan adheres to Islam. Official language is Arabic. English is widely used together with several local dialects in Northern, S. Kordofan, Kassala, Darfur and Red Sea States.

Sudanese women obtained the right to vote, equal pay & pension for equal job and right of election in 1953, 1964 and 1964 respectively. They were the first to hold judiciary, ministerial & governor posts in Africa. Women occupy some 68% of civil service and a similar percentage in higher education institutions. They are fairly well represented in all levels of government in ministerial posts, in national assembly (parliament), in Supreme Court, as attorneys and police officers.

It was reckoned prudent to initiate the internalization / mainstreaming of the whole REDD+ process through the translation of available jargon on REDD+ from English into Arabic (**Annex 1b.2**). The latter is the official language of the country and various dialects and vernacular versions are spoken, communicated with and understood by the rank and file. When it comes to implementation of REDD+ programme, gatherings, interviews, training sessions and workshops will be conducted in the most relevant Arabic dialect in the particular region and prevalent local language. These would probably serve as vehicles to improve and adapt the Arabic version in Annex 1b.2. National workshops of importance may be conducted in Arabic & English with simultaneous interpretation.

Information Sharing and Early Dialogue with stakeholder groups was initiated through planning and implementation of a series of Capacity Building Sessions, advocacy & awareness raising gatherings. Throughout this information sharing & early dialogue, as indeed in the forthcoming implementation of REDD+ programme in Sudan, the following criteria is and shall be followed in planning and implementation of activities, including information sharing & early dialogue:

1. Start from the centre and radiate out in concentric circles:
    - Start with FNC staff and that of closely related sectors such as agriculture, livestock & range together with their institutions of education & research,
    - From the FNC of the Ministry of Environment, Forestry & Physical Development reach out and involve Federal natural resource user ministries such as Agriculture & Irrigation; Livestock, Fisheries & Range; Minerals; Oil and Water Resources & Electricity), the legislature and media,
    - Reach out for the nearest States; their governments and relevant constituencies therein.
    - Initial gatherings should endeavour to touch on REDD concepts and those of relevant aspects such as deforestation, forest degradation, resource assessments, biomass, carbon stocks, livelihoods, etc,
2. When inviting participants to functions such as workshops/seminars, training courses, consultations, awareness raising sessions, etc., observe:
    - Geographic, agro-climatic/ecosystem, sectoral, ethnic and gender representation,
    - Reason in numbers involved such that:
        - Numbers are manageable and apt to enrich/enhance participant skills & knowledge such as in training workshops,
        - Numbers are manageable and apt to ensure the highest percentage of participants express their view points, air grievances and exhibit acquired knowledge.
3. When issuing invitations for participation or requesting meetings or consultations:
    - In case of parity organs like line ministries, legislature, State governments etc., issue the request timely, ensure delivery and follow-up through personal communication or through envoy to indicate the level of representation sought,
    - In case of institutions/bodies like Framer/Pastoralist Unions, GAPAs, Women Groups, NGOs, Private Sector companies, issue the notification/request timely and follow-up through REDD Office and FNC decentralized offices to hint/indicate that representation is to meet these criteria and endeavours to achieve the said results.
4. Workshop programme and meeting/consultation agenda and running are structured in such a manner that:
    - The function commences with people registering, filling-in attendance sheets and briefly introducing themselves. This documents participations and furnishes the organizers/FNC-REDD+ Office representation with state/level of knowledge and appreciation of the issues in question,
    - There is an introduction to the REDD+ concept in the context of global happenings in Arabic, English and Colloquial Arabic,

- There is secretariat/note-taking committee/person,
- Aspects touched upon, issues discussed, points of consensus / contention / disagreement and recommendations are read out/reviewed for endorsement by the function.

Early consultations & information sharing process thus undertaken were to a great extent within the aforementioned framework. Consultations thus undertaken, persons met and aspects touched upon are summarized in **Annex 1b.3.**

Stage two

The **second stage** of the Sudan REDD+ process, which encompassed the period February – April 2012, included an **early consultation & participation process** and culminated in the development of **Sudan's First Draft REDD+ Preparedness Strategy**.

The activity was undertaken by FNC 'Sudan National REDD Committee', co-opted members and consultants. The activity was courteously supported by DIFD and UNEP Sudan Country Office. The activity entailed the putting together of a team of international and national consultants. The team comprised International Consultant Dr. Patrick Van Laake, Forestry and Climate Change Expert; Dr. Graham Floater, Economist; Prof. Hassan Osman Abdel Nour, Forestry Consultant; together with National Support Team Dr. Sayeda Ali Ahmed Khalil (FNC), Dr. Hana Hamda Alla Mohamed (HCENR), Dr. Mey Ahmed (UNEP) and Ms. Samia Bakheit Mando (FNC). ToRs for International & National Consultants together with national support Team are depicted in **Annex 1a.3.**

Preliminary liaison and consultations were embarked upon by the team before the arrival of the International Consultant in the country. Activities were envisaged in accordance with the modality and criteria outlined. Thus, team's itinerary and schedule of activities included visits within the Capital Khartoum, briefings and meetings with:

- A wide range of forest & range custodians,
- Stakeholders,
- Line ministries whose activities impact forest & range resources (Water Resources & Electricity; Livestock , Fisheries & Range; MAI; Minerals),
- Government organs,
- NGOs (SECS, SFS),
- Forestry Institutes of Higher Education & Research (FoF-UoK, Faculty of Forests & Range Sciences (FFRS),
- Sudan University for Science & Technology (SUST),
- Forestry Research Centre (FRC) of the Agricultural Research Corporation(ARC)) ,
- Private sector companies (Kenana Sugar, DAL Group),
- International Organizations (UNEP, UNDP, FAO), and
- Development Partners in Sudan (British Embassy).

The entire consultation process, including persons met and aspects touched upon, is documented (**Annex 1.b.**).

Decisions on all aspects of forestry & range land management are mostly taken by various constituencies in capital cities, Sudan being no exception. However, decisions and actions which shape forests and rangelands emanate in the countryside and remote areas where the resources

are; hence the team's schedule of activities in the context of early consultations, included a field excursion and visits to five out of the country's 15 States at the time (now they are 17), Khartoum, Gezira, Gadaref, Sennar and White Nile. The team's Itinerary & Schedule of Activities included courtesy visits to and discussions with state and Civil Society Organizations (CSOs):

- States Ministers in Charge of Forestry & Range (Sennar, White Nile),
- Senior executives of ministries of agriculture & forests (Gadaref) ,
- Farmers' Union (FU),
- Gadaref, Pastoralists Union (PU),
- Gadaref & Native Administration & Tribal Leaders (Sennar),
- Women Development Association-Goley, and
- Gum Producers' Association (GPAs) Sennar States.

A list of entities & persons conferred with is appended in **Annex 1.b.5**.

A *First Draft* REDD+ Preparedness Strategy for RoS was presented to a diverse audience in a '**National Validation Workshop**' celebrated on March 7th, 2012 in FNC. Workshop participants & salient remarks are depicted in **Annex 1b.3.4.**

The team held a debriefing session with representatives of some resources custodians, international organizations and development partners based in Khartoum.

Comments/remarks emanating from the National Validation Workshop and debriefing session were incorporated in the ***First Draft*** **REDD+ Preparedness Strategy**.

The amended Draft REDD+ Preparedness Strategy which embodied a full situation analysis was widely circulated to relevant constituencies in Sudan before it was eventually cleared and endorsed by the FNC (**Annex 1.c.4.**)

Stage three

The **third stage** of the Sudan REDD+ process, which commenced in August 2012 until September 2013 endeavoured to formulate ***Sudan's REDD+ Readiness Preparation Proposal*** (***R-PP).***

The activity was undertaken by FNC 'Sudan National REDD+ Committee', co-opted members and consultants. It was courteously supported by UNDP and UNEP Sudan Offices and the WB. The entire list of consultants who part-took in the development of Sudan REDD+ R-PP is portrayed in General Information chapter **Table 2.**

The team embarked on a series of meetings and seminars which culminated in the present document, **Sudan's REDD+ Readiness Preparation Proposal (R-PP).**

Feedback

The initial consultation started early 2011 to support the Climate Change Report on REDD+ and R-PP. Feedback from different stakeholders received directly during workshops, meeting, seminars and group discussion. Outcome reports were sent to all relevant stakeholders for comments and further revision of reports was made and final versions developed where all views were reflected. A total of more than 500 responses were received from target groups, Local people, environmental organisations, NGOs, CBOs related sectors, etc.

Remarks passed, comments made by various constituencies including REDD+ FTM & consultants and endorsed recommendations were factored into the R-PP write-up. During the outreach, the following comments were received from the listed sources:

Comment	Source of Comment	Reflection of Comment in the R-PP
Lack of awareness	Farmers, pastoralists, local people.	Proposed awareness campaigns
Lack of capacities	Institutions, NGOs	Capacity building programs
Expected grievances	Local communities, farmers, pastoralists, other land users	Proposed grievances redress mechanism
Bias in gender and marginalized groups	Women and local people	Stakeholders involvement and equity in benefits sharing
Landlessness	Stakeholders	Proposed projects in forests areas, REDD+ process advocate and initiate agricultural reform
Sharing of benefits and co-benefits	Stakeholders	REDD+ Planning and implementation
Dissemination of Arabicized REDD+ gorgon and concepts,	Local communities (non-English speakers)	Outreach and sharing of information
Stakeholders involvement		Genders, ethnic group,

Future information sharing, dialogue and consultation shall endeavour to reach all relevant entities so far not reached and further fine tune and improve the overall modality of doing things, including the introduction of SESA as a specific approach to the application of safeguards to REDD+ activities and write-up of documents.

Future information sharing and identification of aspects/points of divergence with communities and/or other stakeholders shall capitalize on existing success stories of deploying National and State Radio Broadcasting Services, National & State Television Services and Private Sector & NGO Cultural Fora such as the on-going 'Let Trees Grow' Programme in Omdurman National Service , 'Green Saturday' in FM100; 'Field & Science' TV programme , DAL Group Cultural Forum, Rashid Diab Art & Culture Forum and Abdel Karim Mirghani Centre and coverage of such functions as Arbor Days, FNC Annual Conferences and Special functions.

Deploy National & State Radio Services, National & State TV Services, Art & Cultural Fora & Centres together with National and State newspapers in publicizing and mainstreaming the REDD+ concept.

Lessons learnt from the consultations

- Most of stakeholders, local communities, indigenous people farmers pastoralists were impressed by high positives impacts of REDD+ on different groups and sectors.
- Clear understanding of social and environmental impact result out from REDD+, but they still asking about the continuity and sustainability of benefits from REDD+
- All local people; women groups, farmers, marginal groups, etc. during the consultations trips they raised their priorities for national programme.

1B.2. FPIC process in Sudan

As outlined in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), the CBD, the ILO Convention 169, and most importantly the Cancun Agreements decision on REDD+, compliance with FPIC principles is the key indicator by which the quality of all

stakeholder engagement will be assessed during implementation of the Sudan R-PP. A system of participatory and multi-stakeholder dialogue will be established based on the old system to ensure that the development and implementation of all policies, programmes and activities under a REDD+ programme are in accordance with the principles of FPIC. Here the CBO/IP Forum would play an important role. The engagement of all forest-dependent communities is very important to success REDD+. Since in Sudan local people were participated in forest management during the long history of Sudan forests, while the document of Free, Prior and Informed Consent which was developed by UNREDD it is very important to organize and engage the local people in REDD+ activities. In Sudan, this document facilitate the media to disseminate the REDD+ in Sudan through the; newspapers, TV, radio (national and local). The processes and activities that require adherence to FPIC include all those that may have an impact on the rights and livelihoods and exploitation of their own land for use under REDD+ for those communities.

1B.3. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousand $)				
		2014	2015	2016	2017	Total
Identify and list potential stakeholder groups & partners	Identification of potential stakeholders, including networks, representatives of forest dependent people and communities	*5*				*5*
	Reach out for and capacity building of stake holders, resource custodians and partners in envision, formulation and ultimate implementation of REDD+ activities	15	10			25
Exchange information with potential stakeholders	Information distribution and up taking (e.g. on existing grievance mechanisms, forest conservation strategies, etc.)	10	10			20
	Translation of available jargon on REDD+ from English into Arabic & reproduction thereof Fully Deploying Radio & TV services by Staging radio broadcasts in Omderman National radio & State Broadcasting Services	10	10			20
Capacity building	Advocacy & awareness raising gatherings	*5*	10		-	15
	Publicizing and subsequently mainstreaming the very concept of REDD+, including safeguards. Declaring 2015 as Sudan REDD+ Year, celebrating the event in all 17 State Capitals Culminating in National Celebration in the Capital Khartoum	10	20			30
Total		*65*	*50*	0	0	115
Government						
FCPF						
UN-REDD Programme (if applicable)						

1C. Consultation and Participation Process

This Component is forward looking and provides a framework for Sudan's engagement of stakeholders during readiness preparation, which means that the proposed activities mostly occur during the implementation phase of the R-PP, once it has been assessed and funded.

1C.1. Consultation and Participation (C&P) Plan

The envisaged C&P plan for formulation of Sudan National REDD Strategy emanates from national and global pretexts:

1. Sudan's Federal Government has a formal Communications Policy, and formal public participation policies including environmental and natural resources policies to ensure that stakeholders are effectively involved in the development of such policies, programs, legislation through different participatory mechanisms including stakeholder respective members of Federal and State Legislatures and a fair representation in management & steering bodies. These are reflected in:

    - Sudan Forest Policy of 1986 and the Draft new 2006 Forest Policy (formulated through extensive community consultation process) emphasized the following aspects concerning forest/range land tenure:
        - Recognized and encouraged the establishment and ownership of community, private and institutional forests,
        - Stressed the role of people participation in forest plantation, management and protection,
        - Conceptualized the multiple uses of forests,
        - Encouraged local populations to participate in preparation of forestry & environmental projects and their implementation,

2. The FCPF & UNREDD requirements for effective stakeholders' engagement & participation of Indigenous People and forest dependent Communities,

3. UNFCCC decisions/ requirements for "full and effective participation" in the UNFCCC that the following principles should be considered in the formulation of the REDD+ National strategy C&P plan:

    - **Inclusive**: involve all stakeholders who are potentially affected by REDD+ in a transparent and equitable manner,
    - **Sharing & Supportive**: ensure involvement of stakeholders in the decision-making,
    - **Meaningful & Responsive** consultation: to be realistic with appropriate clear expectations to the REDD+ issue with appropriate feedback mechanisms,
    - **Flexible**: ensure continuous improvement with appropriate monitoring and evaluation mechanisms for the consultation approaches used.

Analogous to all these, the development of Sudan's national REDD+ strategy shall be based on an institutional structure provided by the R-PP and several lessons and experiences learnt from formulation and implementation of different natural resources and related sectors initiatives and processes, including the REDD+ situation analysis, R-PP process, Community Environmental

Management Plan (CEMP), Sudan Integrated Environmental Programme (SIEP), Joint Forest Management (JFM) in Sudan and of late Sudan National Forest Inventory in the context of FAO Global Forest Resources Assessment (FRA 2015).

1C.2. Objectives

- To guide the country on the pathway to be followed to ensure a broad base, inclusive and effective consultation and participation of all relevant stakeholders & resource custodians, in the formulation of the REDD+ strategy particularly forest dependent communities and women, during the R-PP implementation phase,
- To propose appropriate guidelines for empowerment of stakeholders and ensure equitable access to REDD+ benefits by all related stakeholders,
- Ensure meaningful participation in decision making regarding REDD+ strategies and activities beyond the Readiness Phase by establishing enduring institutional structures (compare chapter 1a).

Components

1. Enabling environment:
   - Communication and awareness raising
   - Conflicts and Grievances (C&G) identification and management
2. Development of consultation and participation framework
   Development of consultation framework including identification of different issues to be addressed at national, State and local levels
3. Stakeholder analysis and mapping
   Identification and analysis of formal and informal stakeholders with a detailed stakeholder mapping to identify stakeholders to engage in the REDD-plus strategy formulation process
4. Key Issues for Consultations
   Further consultation on deforestation and degradation, drivers of deforestation, SFM, safeguards and governance, MRV, M&E, conservation and enhancement of carbon stocks
5. Strategic approaches and modalities
   Development of criteria to guide approaches for implementation of the plan

1C.3. Budget

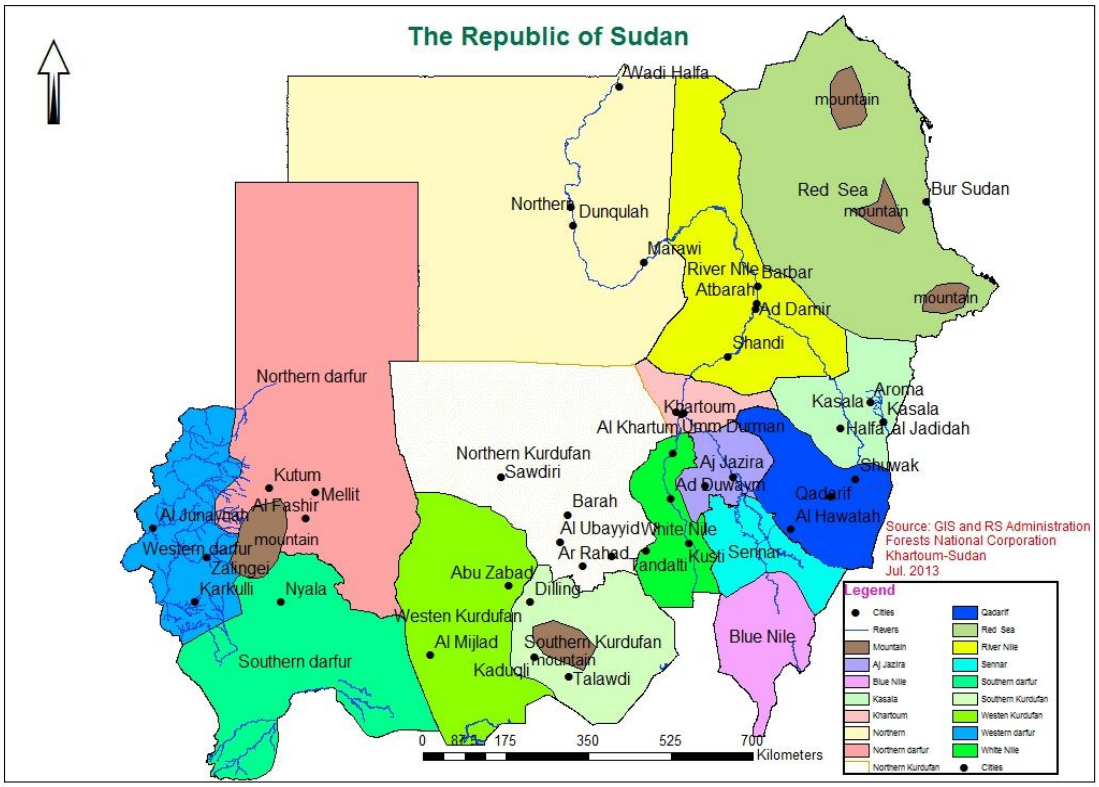
Main Activity	Sub-Activity	Estimated Cost (in thousand $)				
		2014	2015	2016	2017	Total
Reaching for & capacity building of all resource stakeholders & custodians on REDD+ concept, activities formulation & implementation thereof	Reach out for indigenous & women groups: Workshops on land tenure, grievance & conflict management	20	10			30
	Identification of strategic approaches & modalities	20	-	-		20
Promotion of REDD+ concept, publicity and mainstreaming	Communications & awareness raising	15	15			30
	Consultation on key topics as stated in the C&P plan: deforestation and degradation, drivers of deforestation, SFM, safeguards and governance, MRV, M&E, conservation and enhancement of carbon stocks	40	30	20	10	100
Total		55	25			180
Government						
FCPF						
UN-REDD Programme (if applicable)						

Component 2: Prepare the REDD-plus Strategy

2A. Assessment of Land Use, Land Use Change Drivers, Forest Law, Policy and Governance

2A.1. Geographic Characteristics and Population, Geography, Soil, Rainfall and Vegetation

Located in North Eastern Africa, The Republic of Sudan (RoS) is bound by Egypt, The Red Sea, Eretria, Ethiopia, Republic of South Sudan (RSS), Central African Republic, Chad and Libya. (Map II.1). The total area is 1, 886,068 km².



Map II-1: National territory of the Republic of Sudan.

The highest point in the country is Jebel Marra; 3,024 meters above sea level (m.a.s.l.). The lowest is the Red Sea. The most salient geographical features are the Nubian and Bayuda Deserts in the north, the Nile Valley, Jebel Marra, Nuba, Ingessena & Red Sea Hills. The Blue Nile originates in the Ethiopian Highlands. The White Nile runs from the Equatorial Lakes. The two rivers unite at Khartoum and with their tributaries form the River Nile which runs north to the Mediterranean Sea.

2A.2. Population and Gender

In population terms, Sudan in 2012 ranked 35th, 3rd and 9th globally, in Arab and African terms respectively. Total population is 33.4 million' with an annual growth of 2.8% (1993-2008). This is an increase of more than 16 folds in 11 decades as it was around 2,000,000 in 1900. Some 30% of the population live in urban areas and 63% in rural areas. The remaining 7% live a nomadic lifestyle. About 71% of all males are literate which the case is for only 51% of women. Overall life expectancy is 59 years, being 58 years for men and 61 years for women. 43%, 53% and 3% of the population are in the age groups of 14-0, 65-15 and 65+ respectively.

The population is a combination of indigenous Nilo-Saharan- speaking Africans and descendants of migrants from the Arabian Peninsula. The main ethnic groups are Sudanese Arabs (38pprox.. 70%), Fur, Beja, Nuba and Fallata. Due to the process of Arabisation common throughout the rest of the Arab world today, Arab culture predominates in Sudan. The greater majority of the population of Sudan adheres to Islam[1]. Official language is Arabic. English is widely used together with several local dialects in Northern, S. Kordofan, Kassala, Darfur and Red Sea States.

Sudanese women obtained the right to vote, equal pay & pension for equal job and right of election in 1953, 1964 and 1964 respectively. They were the first to hold judiciary, ministerial & governor posts in Africa:

- The first woman in the country's supreme court was Justice Ihsan Mohamed Fakhry,
- The first woman State Governor was Mrs. Agnes Lukudu, Governor of Eastern Equatoria 1991,
- The first Sudanese woman Minister without portfolio was Mrs. Nafisa Ahmed El Amin in 1971,
- The first Sudanese woman Minister with portfolio was Dr. Fatima Abdel Mahmoud 1973,
- Women in current National Assembly (Parliament): 78 =25% of seats,
- Women Ministers in current cabinet (2013): Five: Social Care, HRD & Labour, Parliamentary Affairs, Education and Information,
- Women Supreme Judges: 78,
- Women Attorneys, Councillors: 254 (40% of sector),
- Women police officers :10% of force,
- Women lawyers: 41% of total,
- Women in Education: 69%,
- Female university students: 67%,
- Female diplomats: 7%
- Sudanese Women Union branches: 27,000.

2A.3. Economic situation

Sudan is overwhelmingly an agricultural country. Much of farming is of subsistence kind. Agriculture occupies some 70% of the workforce but contributes 35% of the GDP. The government plays an important role in planning the economy. The leading export crops are

[1] Sudan: Land of Opportunity-Facts & Figures (Arabic). Ministry of Information. July 2011. Khartoum, Sudan.

livestock, meat, sesame, gum Arabic, groundnuts, cotton and sugar. Sheep, cattle, goats and camels are raised. Sudan has the largest livestock inventories in Africa next to Ethiopia. Good natural pastures cover almost 75 million feddans[2] and the nomadic pastoral sector accounts for more than 90% of the huge animal population. Cattle, sheep and goats provide an important capital asset and a risk management tool for pastoralists and farmers at times of drought. A variety of forest products are produced, by far the most being gum Arabic with Sudan accounting for much of the world production.

Sudan began exporting crude oil in 1999. Until the second half of 2008, Sudan's economy boomed on the back of increases in oil production, high oil prices and large inflows of Foreign Direct Investment. GDP growth registered more than 10% per year in 2006 and 2007. From 1997 to date Sudan has been working with the International Monetary Fund (IMF) to implement macroeconomic reforms including managed float of the exchange rate. The Darfur conflict, the aftermath of two decades of civil war in the South and the lack of basic infrastructure in large areas are the most pronounced impediments to economic stability. On November 3rd, 1997, the US Government imposed trade embargo against Sudan and a total asset freeze[3].

Sudan is a LDC that has had to deal with social conflict, civil war, and the July 2011 secession of South Sudan – the region of the country that had been responsible for about two-thirds of the former Sudan's total oil production. Following South Sudan's secession, Sudan has struggled to maintain economic stability, because oil earnings now provide a far lower share of the country's needs for hard currency and for budget revenues. Sudan is attempting to generate new sources of revenues, such as from gold mining, while carrying out an austerity program to reduce expenditures. Services and utilities have played an increasingly important role in the economy. Agricultural production continues to employ some 70% of the work force and contributes a third of GDP. Ongoing conflicts in Southern Kordofan, Darfur, and the Blue Nile States, lack of basic infrastructure in large areas, and reliance by much of the population on subsistence agriculture indicate that much of the population will remain at or below the poverty line for years to come.

Forests play a significant role in integrated land use systems in Sudan in the sense of socio-economic development and environmental protection functions in addition to provision of the needs of the various stakeholders and in livelihood support. However, of the total population (33.4 million) 70% is rural & nomadic and considered as forest-dependent for livelihood, wood energy and on round timber for buildings. Contribution of forests sector to the national economy is under-estimated where the formal national accounts reveals an under-estimation of the forestry sector to the GDP in the range of 3%. The 1994 energy consumption study confirmed that the per capita consumption of fuel wood is 0.7 m^3/annum which, when converted into Ton/Oil Equivalent (TOE), could be valued at nearly 2.0 Billion US dollars. Moreover, NWFPs are diverse and have substantial contribution in the livelihood at the household level and at the national economy. Table II-1 only portrays the proceeds from the sale of wood from forest reserves and royalty levied on products from outside forest reserves. The table does not refer to revenue from the annual export of 50-60 thousand tons of Gum Arabic, which averaged US$ 74.4 million per year over the period 2008-2013 making up 2.4% of total non-oil exports and 0.7% of total exports.

[2] Equal to 31.5 million hectares (1 feddan = 0.42 ha)
[3] http://www.cia.gov/library/publications/the-world-factbook/geo/su-html

Income generation from forests in Sudan include income at the government level (federal, state and local), household and the private sector. Various sources of income generation presently under government control can be listed including direct sales of wood products such as fuel wood, construction timber and sawn timber. Sudan forests produce diversity of NWFPs that constitute potential sources for industrial development for local use and for export. At local level, cottage industry is recognized at many households. Cottage industries could make up to 20-50% of rural household income, amounting to some US$ 1 billion a year. Traditional cottage industry supplies the market with many products that are attractive to tourists.

The contribution of forests and rangelands to the national economy is grossly under estimated. The Bank of Sudan and Ministry of Finance tend to only consider the direct revenue realized by FNC and export proceeds from forest products and estimate that to contribute 3.0% of GDP. They do not take into account:

- The value of total consumption of the country of wood at 0.73 m^2 per capita per annum (FAO 1995) derived from the country's forests, directly collected by people for no payment or traded in informal market,
- The total consumption of fodder & animal feed for national herd of 130 million head derived from natural pastures & woodlands,
- The monetary value of the environmental services particularly the protection of watersheds & courses, agricultural land and human habitats.
- The direct revenue from institutional, community or private forests which accrues to the owners of these forests.

Table II-1: Summary of the value of Sudan's oil & non-oil exports (2008-2012).

	2008		2009		2010		2011		2012	
Commodity	M$	%	M$	%	M$	%	M$	%	M$	%
Petroleum Oil &Products[1]	11,094	94	7,041	74.3	9695	76.2	7304	65	2,562	32.1
Non-oil : Agri. &Livestock	339	3.4	495	5.2	499	3.9	717	6.2	802	10.1
Cotton	62	0.5	43	0.5	34	0.3	27	0.3	12	0.4
Gum Arabic	61	0.5	73	0.4	78	0.2	78	0.9	82	2.0
Sorghum	46	0.4	0	0	0.2	0	19	0.2	14	0.4
Sesame	142	1.2	143	1.7	167	1.5	223	0.3	224	6.6
Ethanol	0	0	0	0	16	0.1	15	0.2	14	0.4
Ground nuts	0.6	0	0	0	0.2	0	1	0	4	0.1
Vegetable oil	0.2	0	0	0	0.1	0	0	0	1	0.3
Sugar	15	0.1	19	0.2	0	0	3	0.1	0	0.0
Molasses	21	0.2	0	0	0	0	10	0.1	4	0.1
Livestock	46	0.4	180	2.2	136	1.2	294	3.0	372	11.0
Livestock[2] product	6	0.1	27	0.3	68	0.5	47	0.5	75	2.2
Non-oil : other	160	1.4	967	10.2	1262	9.9	1601	14.2	2301	28.9
Gold	112	0.9	403	4.3	1018	8.0	1442	12.7	2158	27.1
Other[3]	48	0.4	564	5.9	244	1.9	159	1.4	143	1.9
G. Total	**11,814**	100	**9,475**	100	**12,718**	100	**11,223**	100	**7,971**	100

Source: Central Bank of Sudan

[1]. Inclusive of Crude oil, Benzene, Kerosene, light Gas, Naphtha, Furnace, Mixed Butagas & other Petroleum products

[2]. Inclusive of Meat, Hides & Skins,

[3]. Inclusive of Iron Scrap.

2A.4. Governance

As of 2014, Sudan is administratively arranged into 18 States (Wilayat; singular Wilayah). Wilayat are further divided into localities (provinces). Each Wilayah is governed with an elected Legislature and an elected Wali (Governor), assisted with a cabinet of 5-8 appointed ministers. Each locality is governed by an appointed Commissioner and an elected legislature. With their capital cities and in order of population, the Wilayat are as in table II-2.

Table II-2: Regions and States of Sudan 2012.

#	Region	#	State	Capital
I	Khartoum	1.	Khartoum	Khartoum
II	Central	2.	Gezira	Wad Medani
		3.	Sennar	Singa
		4.	White Nile	Rebek
		5.	Blue Nile	Ed damazine
III	Kordofan	6.	N. Kordofan	El Obeid
		7.	S. Kordofan	Kadugli
		8.	W. Kordofan	El Fula
IV	Darfur	9.	N. Darfur	El Fasher
		10.	W. Darfur	El Gineinah
		11.	S. Darfur	Nyala
		12.	C. Dar Fur	Zalingi
		13.	E. Darfur	Ad daian
V	Eastern	14.	Red Sea	Port Sudan
		15.	Kassala	Kassala
		16.	Gadaref	Gadaref
VI	Northern	17.	Northern	Dongola
		18.	River Nile	Ed damar

Legislature

There is a Bicameral National Legislature which consists of a Council of States (50 seats, members indirectly elected by State Legislatures to serve six-years terms) and a National Assembly (450 seats , 60% from geographic constituencies, 25% from a woman's list and 15 from party lists; members to serve six-years terms).

Judicial branch

Constitutional Court of nine justices; National Supreme Court ; National courts of Appeal; other national courts; National Judicial Service Commission undertakes overall management of the national Judiciary.

Political Pressure Groups & Leaders

Umma Party (Sadig al-Mahdi); Popular Congress Party (PCP) (Hassan al_Turabi); Democratic Unionist Party (Mohamed Osman al-Mirghani).

Line Ministries

As per Presidential Decree No 22 for 2010, the Cabinet is made up of 35 line ministries. Line & State Ministries, subsidiaries thereof, private sector companies, NGOs, CSOs and others with activities that have an impact on renewable natural resources and hence on REDD+ are portrayed in Annex (Ib.1).

Private sector

The private sector as individuals, national or multinational companies are involved in agricultural, industrial, mining and services sectors. Some are already exhibiting positive aspects of their corporate social responsibility. Examples of the latter include Kenana Sugar Company, DAL Group, the Greater Nile Petroleum and many steel works in Khartoum suburbs. The notion is exemplified in landscaping & greening their very premises, investing in social amenities in their vicinities, assisting in environmental sensitization and awareness raising and adhering to directives of allocating set percentage of the area of their holdings to forest & tree formations. All private sector entities will benefit from awareness raising and training in REDD+ aspects.

NGOs

A number of indigenous and international NGOs have been functional in Sudan implementing donor funded projects in the sphere of agriculture, animal production, socio-cultural & humanitarian assistance and the environment at large through partnerships with CSOs. Of the Indigenous NGOs it is perhaps judicious to list SECS, the Environmentalists Society (ES), Babiker Badri Society and Social & Human Development and Consultative Group. As for the international NGOs it's worth mentioning SOS Sahel (Sudan), Help Age (Sudan) and Practical Action. All NGOs active in Sudan can benefit from training in aspects of REDD+ implementation.

Civil Society Organizations

A diverse and wide range of CSOs have been in existence and functional in the country; some throughout contemporary history. Those involved in land-use, natural resources management and environmental fields include tribal indigenous administration leaders, trade unions such as Farmers & Pastoralists Unions, Societies and Associations. Their activities spanned good resources stewardship (forest & range), Agricultural Development, Awareness Raising and implementation of customary law. Of the ones involved in Agricultural Development, Awareness Raising and Sensitization, it's perhaps judicious to name the Sudanese Horticultural Society. All CSOs active in Sudan can benefit from training in aspects of REDD+ implementation.

Sudan and the International Community

Sudan is member of the following Regional & International Organizations: ACP, AfDB, AFESD, AMF, AU, BADEA, CAEU, COMESA, FAO, G-77, IAEA, IBRD, ICAO, ICRM, IDA, IDB, IFAD, IFC, IFRCS, IGAD, ILO, IMF, IMO, Interpol, IOC, IOM, IPU, ISO, ITSO, ITU, LAS, MIGA, NAM, OIC, OPCW, PCA, UN, UNCTAD, UNESCO, UNIDO, UNWTO, UPO, WCO, WFTU, WHO, WIPO, WMO, WTO (observer).

2A.5. Water Resources & Land use

Water Resources

Total water resources in the Sudan are 30.8 billion cubic meters (bnm^3). Average River Nile discharge in Central Sudan is 93 bnm^3, of which Sudan's share as per 1959 Nile Water Treaty is 18.5 bnm^3. Average annual precipitation adds 400 bnm^3, renewable ground water extraction is 4.02 bnm^3. Average other water sources (Khors & wadis): 6.00 bnm^3

Table II- 3: Water sources and usage.

River	Annual Yield bnm³	Water Consumption	
		Source	Amount bnm³
Blue Nile	50	River Nile	15.0
White Nile	27	Renewable Ground water	1.2
Atbara River	12	-Used in Agriculture	0.7
Rahad River	3	-Used for drinking	0.5
Dinder River	1	Khors & wadis	2.5
Total	93	Total	18.7

Land-use

Land use	Characteristics
Arable land: Stable, cash and export crops	200 million feddans' (84 million ha): Sorghum, wheat, millet, cotton, cane sugar, ground nuts, sesame, dates, sunflower, citruses, tropical fruits and vegetables.
Irrigated cropped land	11 million feddans (4.6 million ha),
Rain fed cropped land	29 million feddans (12 million ha),
Forests, wood and rangelands	67 million ha (669 471 km²)
Green area per capita	1.68m²/person.

Although most of the country is arid, the economy has predominately depended on the agricultural sector, including livestock production, forestry and fishing. Together, they used to contribute about half of the GDP before the discovery & exploitation of oil in 1999. Despite the emergence of Sudan as an oil exporter and the diminishing share of agricultural sector in overall export earnings, agriculture continues to be the backbone of the country's economy in terms of its contribution to GDP. It contributed 31.6% to the GDP in 2011 (of which 20% was from crop production and11.6% from livestock) and around 35% during the years 2007-2010; in comparison to about 60% contributed by the petroleum sector. Agriculture also remains the main source of employment as about 70% of the work force is employed in agriculture and related activities such as agro-industries, transport and trade and the main source of household income in rural areas where 70.2% of the population live.

Farming systems have evolved mainly as a function of agro-ecological conditions, acquired technology, market and socio-economic conditions. Crop production is practiced in three main farming systems, namely: irrigated, mechanized rain-fed and traditional rain-fed, which are described in further detail in Annex Ib.4. and Annex 2a.

2A.6. Ecological classification of the vegetation of Sudan

The soil in about 60% of the country, particularly in the northeast, north and northwest is predominantly sandy. Heavy cracking clay soils form a triangular in the central eastern plain which makes some 25% of the country. Red soils of different types are characteristic of the remaining south-western portion.

The rainfall varies from zero in the northern desert to more than 1,200 mm in the High Rainfall Woodland Savannah (HRWS) in the south western portion of the country.

The vegetation of the Sudan has been ably described by Harrison and Jackson (1958) and the following account is largely based on this work with some modifications based on several works such as Agriculture in the Sudan, Arabic version (Anon 1999), a study on sustainable modern technologies for Forest Resources Development in the Arab Region, Arab Organization for Agricultural Development (AOAD 1998), and Wickens (1991).

The vegetation can be divided into seven principal types which in general follow the isohyets and form consecutive series from north to south : 1. Desert; 2. Semi-Desert; 3. Acacia Short Grass Scrub; 4. Acacia Tall Grass Scrub; 5. Broad-leaved Woodlands & Forests; 6. Swamps (permanent swamps, seasonally inundated land), 7. Grassland and Mountain Meadow. The effect of the topography on vegetation is limited and confined to mountain massifs, hills, upland country and Nile Valley and its tributaries (see Map II-2).

This classification encompassed the old Sudan, which in 2011 separated into two brother countries: The Republic of Sudan (RoS) (Map II-3) and the Republic of South Sudan (RSS). The vegetation classification, forest extent and estate in the two brother countries can be extrapolated by super imposing the map of Harrison & Jackson's 1958 on the maps of the two countries (AbdelNour 2011). See Maps II-2; II-3; and Tables II-4 and II-5 for details. The ecological classification is further elaborated in **Annex Ib.4.**

Table II-4: Ecological Classification of vegetation in the Republic of Sudan (RoS) and the Republic of South Sudan (RSS)

	Major Division	Subdivisions	Area	RoS	RSS
			x 1,000km²		
I.	Desert	-	**716.8**	**716.8**	**-**
II.	Semi-Desert	1.*Acacia tortilis* – *M. crassifolia* Scrub	184.3	184.3	-
		2.Semi-Desert Grassland on Clay	102.4	102.4	-
		3. Semi-Desert Grassland on Sand	84.5	84.5	-
		4.*Acacia mellifera* – *Commiphora* Scrub	84.5	84.5	-
		5.*Acacia glaucophylla* – *Acaica etbaica* Scrub	30.7	30.7	-
		Total	**486.4**	**486.4**	**-**
II.	Woodland Savannah	A. Low Rainfall			
		1. On Clay			
		(a) *Acacia mellifera* – thorn land			
		(i) Dark cracking clays alternating with grass	94.7	94.7	-
		(ii) On soils formed *in situ*, with *Commiphora* and *Boscia*	51.2	51.2	-
		(b) *A. seyal* – Balanites savannah alternating with grass areas	117.7	100.1	16.6
		© *Anogeissus-Combretum hartmannianum S.* Woodland	48.6	48.6	-
		Total on Clay	**312.2**	**294.6**	**16.6**
		2. On Sand			
		(a) Acacia seyal savannah	64.5	64.5	-
		(b) Combretum hartmannianum- Albizzia sericpcephala-Dalbergia savannah woodland	84.5	84.5	-
		© *Terminalia – Sclerocarya – Anogeissus – Prosopis* savannah woodland	64.5	63.2	1.3
		Total on Sand	**213.5**	**212.2**	**1.3**
		3.Special Areas			
		(a) Toposa Hills	35.8	-	35.8
		(b) Hill Catenas	69.1	69.1	-
		© Baggara Catena	17.9	17.9	-
		(d) Raqaba Catena	33.3	31.6	1.7
		Total Special Areas	**156.1**	**118.6**	**37.5**
		Total Low Rainfall Woodland Savannah	**681.8**	**625.4**	**56.4**
		B. High Rainfall			
		(a) *Anogeissus – Khaya – Isoberlinia* Savannah woodland	307.2	30.7	276.5
		(b) Woodland savannah recently derived from rain forest	35.8	-	35.8
		Total High Rainfall Woodland Savannah	**343.0**	**30.7**	**312.3**
IV.	Flood Region		**243.2**	**7.3**	**235.9**
V.	Montane Vegetation		**6.4**	**3.8**	**2.6**
	Total Area		**2477.8**	**1850.2**	**627.6**

Map II-2: Ecological Classification of vegetation of Sudan. Harrison & Jackson (1958).

Table II-5: Percent-wise coverage of Forests & Woodlands in The Republic of Sudan (2011)

Desert	Semi-desert	LRWS		HRWS	Special Areas	Montane	Flood Region	Total
		Clay	Sand					
38.6	26.2	15.9	11.4	0.9	6.4	0.2	0.4	100
Arid				Sub-humid			Humid	
92.1				7.5			0.4	100

Map II-3: Republic of Sudan post July 9th, 2011.

2A.7. Forestry in the Sudan

Following the Battle of Omdurman at Karare between the Mahdist and the Anglo-Egyptian army, and the start of condominium rule in 1898, forestry activities started in the Sudan in 1901. The Government commissioned an Indian forester, Mr. C.E. Moriell to tour the country and produce a report about the state of forests in the country. As a result of his report the Woods & Forests Ordinance was promulgated in 1901 and the Department of Woodlands & Forests established the same year. The Ordinance was replaced in 1908 by the First Forest Act. Adoption and implementation of administrative & legislative measures continued ever since. The most salient of these are the endorsement of Sudan's Forest Policy in 1932, the Central & Provincial Forest Ordinances (1932), the Local Government Act of 1972, Regional Government Act 1980, the amendment thereof in 1985, the revision of Forest Policy in 1986 and creation of the Forests National Corporation (FNC) and Revision of Forest Act in 1989.

Civil war erupted in South Sudan in August 1955, barely four months before independence in January 1956. The Addis Ababa Accord of 1973 which was reached to stop the civil strife in the South created three ministries for agriculture; one in each of the three provinces of South Sudan, for which the forest sector was added. Since then forestry matters formally went out of the jurisdiction of the Central Government and Director of Forests in Khartoum.

The Civil war was rekindled in 1983. The Comprehensive Peace Agreement signed between the Government of Sudan and South People's Liberation Movement (SPLM) and Army (SPLA) in 2005 which ended a 50 years civil war embodied a self-determination referendum. In the referendum which took place on January 9th 2011, a majority of voters in Southern Sudan voted for cessation from Sudan Republic. Six month later, on July 9th the whole world starting with the GoS recognised the Republic of South Sudan (RSS) as member nº 193 of the United Nations and member nº 54 of the African Union (Map II-3).

2A.7.1. Forest Resources of Sudan

The RSS goes away with some 619 745 km² and 8.26 million people of the area and population of Sudan. It will also go with some 47%% of the forest & woodland area of Sudan. The Republic of Sudan retains an area of 1 886 068 km² and some 50% of the forest & woodlands of its pre July 9th estate.

In FRA (2010) "Forest" is defined as land spanning more than 0.5 hectares with trees higher than 5 meters and a canopy cover of more than 10 percent, or trees able to reach these thresholds *in situ*. It does not include land that is predominantly under agricultural or urban land use.

Other wood land (OWL) is land not classified as "Forest", spanning more than 0.5 hectares; with trees higher than 5 meters and a canopy cover of 5-10 percent, or trees able to reach these thresholds *in situ*; or with a combined cover of shrubs, bushes and trees above 10 percent. It does not include land that is predominantly under agricultural or urban.

Other land (OL) is land that is not classified as "Forest" or "Other wooded Land".

Table II-6 portrays Sudan land cover classes in 2012, while table II-7 depicts the country's forest cover and areas 1990-2010.

Table II-6: Land Cover Classes in Hectares.

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

Source: FAO 2012: Land Cover Atlas of Sudan

Official Sources cite total area of Sudan as 1 886 068 kmº (188 606 800 ha.).

Harrison and Jackson (1958) estimated the tree cover in Sudan at 36-43%. The Global Forest Resource Assessments ''FRA'' indicated a **decreasing trend in the forest cover** from 76.4 million ha in 1990 to 70.49 million ha in 2000 and 69.95 million ha in 2010 (30.5% to 28.1% and 27.9% of the country total area, respectively). For the period 2000-2008 the estimated area of actual forest loss was 907,599 ha/year and that of regeneration was 853,350 ha/year. These figures were used in FRA (2010) report to estimate the forest area in 2010 using the following formula:

Forest in 2010 = *Forest in 2000 + (Annual regeneration x 10 years) - (annual forest consumption x 10 years).*

Removal rate for OWL during the period 1990-2010 was based on the assumption that total removal of forest and OWL is proportional to the area of each of the two classes (57 % for forest and 43% for OWL). Although some OWL may have been converted into forest during this period, some of this loss was outweighed by the substantial increase in the area invaded by Mesquite (*Prosopis chilensis*), which is classified as OWL and was estimated to be 149,420 ha/yr (FRA 2010). Accordingly, figures in Table II-7 suggest that the OWL area as percentage of the country area decreased from 23.2% in 1990 to 21.6% in 2000 and 20.0% in 2010.

Table II-7: Sudan forest cover and areas in 1990, 2000 and 2010.

FRA categories	Area (000) ha		
	1990	2000	2010
Forests	76,381	70,491	69,949
Other wooded land	58,082	54,153	50,224
Other land	103,137	112,956	117,427
Inland water bodies	12,981	12,981	12,981
Total area	250,581	250,581	250,581
Percent of forests area %	32.1	29.7	29.4
Percent of OWL area %	23.2	21.6	20.0

Source: FRA (2010)

The data in the table indicate that about 6,432,000 ha of the Sudan's forest land was deforested between 1990 and 2010, and this is equal to 2.57% of the total country area and to over 8.4% of the forest area. During the same period, about 7,858,000 ha of OWL were removed (3.14% of the total country area and over 13.53% of the OWL area). The great loss in both categories paved the way to land degradation and diminution of water resources. The loss of forestland in the marginal areas of the north, accelerated by mechanized farming, animal ranging and drought, resulted in a steady encroachment of the Sahara southward, a process widely known as desertification. The main causes of deforestation in all regions of Sudan are land clearance for agriculture and the unsustainable extraction of wood through legal and illegal cutting of trees mainly for fuel wood (FNC 2011b). In conflict regions such as Darfur the rate of loss is significantly greater partly due to the destructive nature of the conflict and partly due to the concentrated needs of displaced people, especially in the vicinity of camps. Moreover, the absence of a clear framework of land tenure constrains the development of incentives for communities/households to take responsibility for protecting trees.

2A.7.2. Benefits of Forests & Rangelands in Sudan

Productive functions of forests, trees, shrubs and rangelands in the country include provision of wood and NWFP (Box II-1). Wood products include lumber, sawn timber, industrial wood, building poles, firewood and charcoal. Sudan is well endowed with valuable timber trees. Examples include Sunut (*Acacia nilotica*), which grows on the banks of rivers and is suitable for railway sleepers and building material. Many indigenous species such as Mahogany (*Khaya senegalensis*), Gimbeel (*Cordia africana*), Humeid (*Sclerocarya birrea*) and exotic species such as Teak (*Tectona grandis*), Sarru (*Cupressus lusitanica*) provide high-quality wood for joinery and construction.

2A.7.3. Policies & Legislation Relevant to Forest Management

Land Ownership and Usufruct Rights

Traditional land tenure in rural areas of Sudan is mainly based on the concept of customary tribal homelands. Even in the northern riverine regions land has become a commodity only during the 18th century. A detailed review is in Annex 1b.4.

There is dire need to map land use and ownership to prepare the ground for policy and legislative actions.

Land and Forest Policies

Contemporary Policy Changes in Sudan that have a bearing on natural resources conservation started with the passing of a new Forest Policy for 1986 by H.E. the Minister of Agriculture, which formed the basis for the strategy for forestry sector in the country. It was an update for an earlier statement, the Forest Policy 1932.

The Prime objective of both statements was the reservation, establishment and development of forest resources for the purpose of environmental protection and meeting the needs of the population for forest products. Over and above, the Forest Policy 1986:

a. Stressed the role of forests in environmental protection,
b. Recognized and encouraged the establishment of community, private and institutional forests,
c. Subjected tree cutting outside forest reserves to the discretion of the Director, Central Forest Administration (CFA) provided that these areas are reserved immediately following their utilization for the purpose of their protection and regeneration,
d. Made obligatory the utilization of tree stocks on land allocated for agricultural investment (not to be burnt into ashes) and to leave specified percentage of tree cover inside and around agricultural investment schemes in the form of shelterbelts and windbreaks,
e. Stressed the mobilization of popular and international efforts for participation in afforestation, tree planting and forest protection,
f. Raised the national goal of forest reserves from 15 to 20% of the total area of the country for environmental protection and meeting the population's needs for forest products,
g. Stressed the role of forest extension,
h. Conceptualized the multiple use of forest,
i. Divided forest administration responsibility between the Central Government and the Regions (States and Provinces),
j. Made the Director, CFA, the official counsellor to the regional authorities and institutions on forestry matters.

At the policy making level the forestry sector started to receive increasing attention and the environmental role of forests and trees, including the containment of desertification and land degradation, has been appreciated.

Box II-1: Benefits of Sudan Forests & Rangelands

Forests and rangelands in the Sudan have significant protective and productive functions and as such offer many opportunities to contribute to the economic, environmental and social development of the country. As such, they can contribute to poverty alleviation and the enhancement of the well-being of people living in the vicinity of forest and of the country at large.

Protective functions of forests, trees and rangelands in Sudan encompass their safeguard of watersheds; protection & amelioration of soil; shielding of agricultural systems; habitat for livestock & wildlife and shelter to human settlements.

Productive functions of forests, trees, shrubs and rangelands in the country include provision of wood and NWFPs.

Wood products include lumber, sawn timber, industrial wood, building poles, firewood and charcoal.

NWFPs on the other hand include a wide range of products such as browse & range material; bush meat; bee-honey & wax; gums & resins; bark derivatives such as tanning material; fruits, nuts & seeds such as Gonglais (fruit of Tabeldi=Boabab-*Adansonia digitata*), Goddeim (fruits of *Grewia tanix*), Aradaib (fruit of *Tamarindus indica*), Lalob= Desert dates (Fruit of *Balanites aegyptiaca*), Dom (fruit of *Hyphane thebaica*), Dolaib (Fruit of *Borassus aethiopum*) and Nabag (fruit of *Ziziphus spina-christi*) together with medicinal plant parts such as Senna pods & leaves (*Cassia sennna*), Garad pods (of *Acacia nilotica*).

Products from forest tree leaves include robes, baskets, mats, food covers and hats made from Dom and Doleib fronds together with bark of Tabeldi.

Range products include browse and grazing material from thorny trees & shrubs together with thatching material and food covers made from Banu (*Arigrostis sp*).

2A.7.4. Forest & Range Policy Changes in the Wake of Cessation of South Sudan

The signature of the Addis Abba Accord of 1972 put an end to the civil war which erupted in August 1955. With the endorsement of the Southern Sudan self-autonomous government (1972), jurisdiction over, management of and haulage of wood products from forest resources in South Sudan went out of the hands of the central forest authorities in Khartoum. However, the overarching intangible forest benefits remained. Still, the country is classified as 29, 20 and 51% Desert, Semi-desert and Savannah woodland. Sedentary and transhumant animal herders from the North roamed about freely in their seasonal migrations right through to Bahr al Arab River. With the formal cessation of South Sudan in July 2011, things changed drastically and just as abruptly:

- Republic of Sudan is now re-classified as 38.6, 26.2 and 35.2 % Desert, Semi-desert and Woodland Savannah/Montane vegetation. i.e. Republic of Sudan is now 92% arid and 8% Sub-humid,

- Hundreds of thousands of sedentary and transhumant animal herders from what used to be Northern Sudan who resided in the South for decades had to move out together with their herds; millions of head of cattle, sheep & goats and reside/relocate temporarily in reserved and other forest land in border States of Blue Nile, Sennar, White Nile, South Kordofan, East & South Darfur.
- Hundreds of thousands of Misseriya from the disputed Abye District and other tribes who used to spend the Summer in Bahr al Arab River could no longer do so as freely as they are accustomed to,
- The prices for tattered social matrix of communities on both sides of the border, losses in trade and resulting commodity shortages are literally incalculable.

The dust has not yet settled of the aftermath of the Cessation of South Sudan before other calamities spawned:

- Civil unrest erupted in Darfur,
- Hostilities started in South Kordofan and South Blue Nile,
- Construction commenced of The Renaissance Dam in neighbouring Ethiopia with all the imminent controversial consequences in terms of regulation of high Blue Nile floods and reduction of silt reaching Sudan,
- And of late hostilities between the Government of South Sudan and dissidents forced thousands of inhabitants as refugees back into Republic of Sudan.

In the wake of all that policy changes in many sectors became inevitable, particularly in Forest & Range, Agriculture and Water:

- In the midst of political and other variables, the ball started rolling to summon a politically and socially wide-based multi-disciplinary national team to initiate dialogue over a revision/formulation of forest & range policy:
- The Academic Circles were the first to pick the challenge. Sudan University of Science & Technology has already amalgamated its Forestry and Range courses into one. The Faculty of Forestry of the Khartoum University is almost there,
- FNC is in communication with other stakeholders over the forest policy review,
- A parallel effort is underway to advocate explicit articles in the forthcoming Sudan Permanent Constitution about Federal, Provincial and Local prerogatives over Land, Water, Forest , Range and Minerals,
- Budgetary allocations for some of the aforementioned activities have been proposed in the current R-PP,
- The happenings in Darfur, South Kordofan and South Blue Nile are apt to be cited as risks when it comes to any Project Formulation/Implementation in the context of REDD+.
- The envisaged forest policy review will inevitably be consultative and participatory but would quite likely consider re-establishment of designated functions for riverine, non-riverine and montane forests to accommodate meeting livelihoods and grazing needs of forest dependent & neighbouring communities; embed forestry concerns into those other competing land using sectors such as Water, Mining and Oil Resources; build/consolidate synergies between National Forest & Food Security Policies & programmes and reiterate importance of judicious & rational utilization of natural resources.

2A.7.5. Forest Legislation

The Woods & Forests Directorate was established in 1902 with the start of the colonial rule in the Sudan. The department, under the principles of sustained yield in perpetuity and rational exploitation of the resources, commenced to manage wood- stations along the Nile and its tributaries to supply steam paddle boats with firewood and establishing forest reserves where future felling and regeneration can be concentrated, protect the forests against fires and introduce fast growing tree species. A substantial number of legislations have since been promulgated addressing such issues as forest reservation, levying of a royalty on wood collection from outside forest reserves, sharing of authority over, benefits from and responsibility towards forest resources and promulgation of a series of forest policy statements.

The most prominent of these legislations were perhaps:

- 1901: Enactment of the first forest act,
- 1932: Announcement of the first policy statement together with enactments
- of provincial & central forests ordinances,
- 1939: Endorsement of the Royalty Ordinance,
- 1948: Reform of the Provincial Forest Act to delegate power to the local level,
- 1971: Endorsement of the Local People Government Act,
- 1972: Endorsement of the Southern Sudan self-autonomous government,
- 1980: Endorsement of the Regional Government Act,
- 1981: Endorsement of the Local People Government Act,
- 1985: Re-centralization of Central Forests Authority,
- 1986: Amendment of the 1932 Forest Policy & adoption of 1986 Forest Policy,
- 1989: Enactment of Forests National Corporation (FNC) and new Forest Act,
- 1994: The adoption of the Federal System of Government,
- 2002: Endorsement of the Forests & Renewable Natural Resources Act, replacing the FNC & the Forests Acts of 1989,
- 2006: Development of a new Forest Policy under the process of approval,
- 2007: Agricultural Revival & Revitalization,
- 2011: Cessation of Southern Sudan.

The Forest Act 1989 prescribed the allotment and upkeep of 10% and 5% of rain fed and irrigated agricultural land respectively to forests in the form of wood lots and shelter belts._The Comprehensive National Strategy 1992-2002 stipulates the allotment of 25% of the country's land area to forest, rangelands and wildlife.

2A.7.6. Forest & Woodland Tenure, Functions & Management

Sudan's Forest Policy (1986) defines and recognizes several levels of forest ownership:

- **Federal Forests** which fulfil national protective, productive & social functions (such as the *Acacia nilotica* forests along the banks of the Blue and White Niles & tributaries thereof, mountain forests on watersheds and forests on the fringes of the desert curbing further spread of the latter), owned by the Federal Government and managed on its behalf by the national forest service, currently the FNC,

- **State Forests** which fulfil productive and social roles at the State (Provincial) level, contribute to national protective functions, owned by the State Government and managed on its behalf by State Forest Service or by FNC,
- **Institutional Forests** such as the ones in large agricultural schemes e.g. Gezira, New Halfa and Rahad Schemes and sugar estates as in Kenana, Assalaya, W. Sennar N.Halfa, Guneid and White Nile Sugar Companies. These fulfil productive, protective or social functions in the vicinity but contribute to the national environmental matrix and carbon dynamics. They are owned by the respective institutions and are managed on their behalf or by own forest units,
- **Community Forests** which fulfil a multitude of functions to their respective communities, are owned and managed by them,
- **Private Forests** which fulfil various functions and are owned and managed by their initiators.

The status of forest reservation is reflected by the data given in Table II.8. The total reserved area consists of public, institutional, community, private and wildlife forest reserves and by the end of 2012 it reached 12.3 million ha. All reserved forests (public, community, private) represent 4.54% while, that occupied by other protected areas (including wildlife reserves) represent about 7.12% of the total area of the country. Thanks to a Presidential Decree in 1993, public (FNC) reserved forest area was remarkably increased (by nine times) from 1.25 million ha, which were reserved before 1993, to approximately 12.3 million ha by the end of 2012. Community and private forest reservation started in mid-1980s and is showing an increase of over six and twelve times, respectively, between the periods 1986–2000 and 2001–2012. The area of institutional forests is very small. It increased by nearly 8,687 ha (2.7 folds) from 1986 to 2012. (FNC 2011b).

Currently, only 11.66% of the total area of the country is reserved to forests and other natural resources uses, while the Quarter Century Strategy (2003–2027) entails that 25% of the total area should be assigned for natural resources. This gives a great opportunity to more than double up the area of reserved forests for various purposes allowing for better protection and development of the forest resources and environment. Future reservation of productive forests would likely be either state or community forests because since the establishment of federal system all unregistered land became under the administration of State Governments.

Table II-8: Area (ha) of reserved forests by type of ownership.

Type of land ownership	1901–1985	1986–2000	2001–2005
Public forests	1,253,280	10,032,322.9	11,362,204.6
Institutional forests	5,040	13,723.5	13,723.5
Community forests	0	4,150.44	26,056.38
Private forests	0	4,752.72	59,770.2
Wild life protected reserves	17,740,800	17,740,800	17,740,800
Total	**18,999,120**	**27,795,749.5**	**29,202,554.6**

Source: FNC (2011b)

2A.7.7. Forest Governance

The Decree No. 40 (1997) issued by the Council of Ministers specifically stated that forests protecting inter-state water, watersheds and federal structures and forests arresting the process of desertification are Federal Forests to be managed by FNC. Other forest reserves are to be

managed by the States, and private, community and institutional forests are to be managed by their owners. This is expected to encourage further reservation by various tree growers.

Areas where legislation needs to be reviewed, revised or promulgated a fresh

In view of recent political & administrative variables such as cessation of South Sudan, outstanding tug of war between FNC and State Governments over responsibility for and sharing of benefits from forest & woodland areas, ravaging conflict over resources between pastoralist & agricultural communities such as in Darfur and Abeyi District between RoS & RSS, there is evident need for review, revision and modification of existing policies & legislation or the formulation a fresh of others together with substantial resources management activities & studies:

- Range, Livestock and Water Policies to be formulated a fresh,
- National Forest Programme and Forest Policy to be revised,
- Full-fledged national forests & woodlands inventory system to established,
- Management plans of riverine, non-riverine and montane forests to accommodate revised designated functions of meeting livelihoods and grazing needs of neighbouring communities to be reformulated,
- Full-fledged national reclassification of the country's fauna & flora and assessment of biodiversity to be undertaken
- Forest, range & wildlife concerns to be integrated into policies and activities of other sectors such Water, Mining and Oil Resources,
- Synergies between National Forest & Food Security Policies & programmes to be consolidated,
- Importance of judicious & rational utilization of natural resources in forthcoming constitution of Sudan to be spelled out.

2A.7.8. Management Status of Forest Reserves

The annual plantation areas include afforestation, reforestation, natural regeneration of existing forest lands and natural expansion of forests into land not previously forested. The data on regeneration include areas which are cleared and then regenerated on both forests and other wooded land, but they exclude natural regeneration under existing tree cover. The data indicates the fluctuating nature of the annual planting, which depends on the availability of resources, perhaps mainly foreign aids. It also shows that community plantations are significantly increasing during recent years (Table II-9 and Figure II-1).

The current forest monitoring system is based on a bottom up system of reporting from the forest circles (the smallest management unit) up to the state forest and then to FNC at the national level. The data reported includes both qualitative and quantitative information on forest resources with more focus on reserved forests, afforestation and reforestation areas, harvest and production, fires, personnel, etc. This reporting system is done on monthly and annual basis. The current national reporting does not include estimation of GHGs emission/removal. However, FNC reports GHGs estimate to FAO and has at least six of its technical staff trained on GHGs inventory estimation and they participated in the two national communications on GHGs conducted so far in Sudan for UNFCCC. This is in addition to a large number of its experts and experts from other related institutions who received training on technical issues related to GHGs inventory, A/R CDM and REDD+.

Table II-9: Afforestation/reforestation areas (in ha) from 1990 to 2012.

Period	Public (in and outside reserved forest)		Community		Total
	Total	Average/year	Total	Average/year	
1990-1994	122,940	24,590	56,390	11,280	179,330
1995-1999	117,230	11,160	60,170	12,030	177,400
2000-2004	69,870	13,970	52,440	10,490	122,310
2005-2009	133,630	26,730	107,980	21,600	241,610

Source: FNC (2011b)

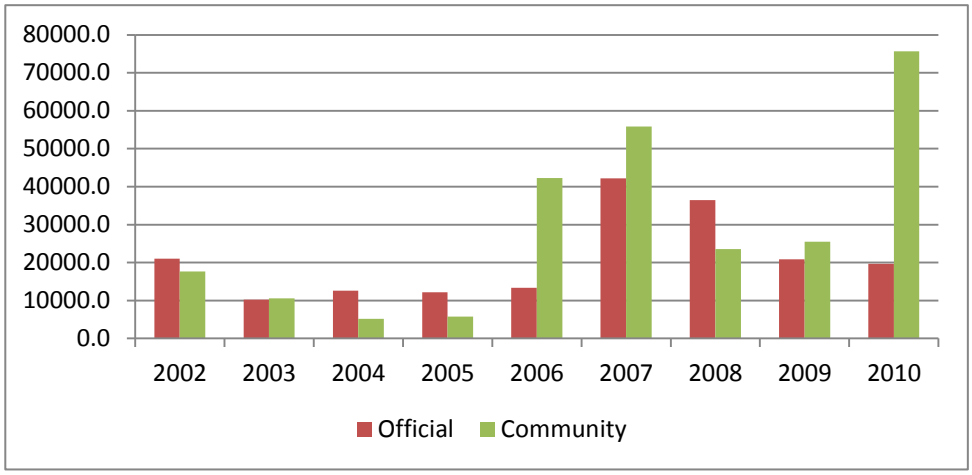


Figure II-1: Annual planting areas during 2002-2010.

Table II-10: Forest ownership and management/use systems.

Category of ownership & Management system	Area (ha)	% of total
Government/Public Forests	15 000 000	70.3
Privately Managed:		
1. Gum Arabic Producers (Societies/families)	6 006 000	28.1
2. Individual Farmers	49 000	0.2
3. Private Companies	126 000	0.6.
Community Managed	166 000	0.8
Total	**21 347 000**	**100**

Community Forests

Community and private forest reservation started in mid-1980s and is showing an increase of over six and twelve times, respectively, between the periods 1986–2000 and 2001–2012, as indicated in Tables II.9 and II.10.

Traditional Knowledge

The Sudan has been home to indigenous civilization, such as Meroe, and road for others, namely Pharaonic, Christian and Islamic Civilizations. The country has been heavily influenced by fusion of different cultures. The immigrant Arab culture and the neighbouring cultures (mainly Egyptian and West African cultures) have strongly influenced Sudanese culture. There is a wide range of practices, which fall under the umbrella of traditional medicine (Al-Khalifa, 2003). Medicinal plants represent an important component of traditional medicine in Sudan and the flora of Sudan

is relatively rich in medicinal plants corresponding to the wide range of ecological habitats and vegetation zones.

Traditional knowledge and practices on forestry, range and natural resources management in Sudan have recently been reviewed by Abdel Magid (2012) (**Annex 2a**). That knowledge spans a wide array of aspects and activities such as:

- Traditional & herbal medicine,
- Indigenous Agro-forestry & Agro-silvo--pastoral Systems,
- Gum tapping, collection & post-harvest handling
- Date palm culture & husbandry,
- Nutritive, economic, cultural & social forestry-related knowledge in rural communities,
- Traditional fermented foods,
- Traditional coping with climate variability & environmental phenomena: Water harvesting; Rain-makers; Society mobilization to combat locust swarms (Dambari),
- Sudanese pastoralist's local knowledge in rangeland management- Transhumant pastoralism,
- The role of traditional institutions in resolution of conflicts over natural resources

Plate II-1: *Cupressus lusitanica* plantation-Jebel Marra-Darfur

2A.7.9. Animal & Rangeland Resources

Animal Resources

Sudan possesses an immense and diversified wealth of animal resources, ranging from domesticated livestock species to the wild and aquatic life. The country's total national herd is estimated in 2010 at 103.6 million head of livestock (sheep, cattle, goats and camels), 8.3 million head of equine (donkeys and horses) and 36.6 million head of poultry. As such the country has the largest livestock inventories in Africa next to Ethiopia. Most of the wildlife resources of the

country are to be found within the High Rainfall Woodland Savvanah. Recent surveys indicated that in spite of losses and disturbance to wildlife in the region due to wars and civil strife there still remain substantial numbers of migratory wildlife between RoS and neighbouring countries particularly Ethiopia, RSS and Central African Republic.

Range & Animal Feed

Rangelands cover an estimated area of 96.4 million (M) ha composed of 53.4 Mha of grassland and 43.0 Mha of woodlands containing scattered trees and shrubs (Afri-cover 2003). This vast area encompasses different ecological zones extending from desert and semi-desert in the north to the LRWS to the South and South West. Nearly 80% of all rangelands are located in semi-desert and LRWS ecological zones that are characterized by variable and unpredictable rainfall.

Rangelands are endowed with a great diversity of forage plants genetic resources (FPGR) and a total count of 704 range species was reported (over and understory). However loss of FPGR in contemporary times is being experienced at an alarming rate. Trends of decreasing annual rainfall and increased rainfall variability have contributed to drought conditions in many parts of Sudan.

Average annual rainfall has declined from about 425 mm/year during the 1941-1970 period to about 360 mm/year in the 1970-2000 period. This represents a decrease of annual rainfall of about 0.5% per year. Accordingly, agro-climatic zones shifted southward, negatively affecting pastoralists and agro pastoralists living in many parts of the country who became increasingly unable to sustain production levels of animal feed and subsistence agriculture. The impact of the CC in FPGR is clearly manifested in a reduction of rangelands productivity per unit area from 1.2 ton/hectare in 1980s to 0.2 ton/ha in 2009 (RPA 2009).

Rangelands are estimated to have a total production of 34.8 million tons of forage. Total available feed is 50 million tons composed of 34.8, 14.1, 0.5 and 0.2 million tons of forage from rangelands, crop residues, irrigated pastures and concentrates, respectively. Total animal feeding is estimated at 93 million tons. Animal inventories, range & feed are elaborated in Annex 2a.

Plate II-2: Sheep grazing in forests

Plate II-3: Camels browsing in Semi-desert scrub lands

Plate II-4: Transhumant Cattle Grazing Western Sudan

Rangeland Utilization

Communal grazing is the dominant system of grazing adopted in Sudan and pastoralism is a traditional mode of life. It is a form of natural resource use and management that comprises a variety of movements ranging from pure nomadism characterized by year around camel rearing and long-distance migration, to seasonal transhumance. The rangelands are thus used in common with each tribe or clan utilizing a definite grazing area and traditionally known stock routes.

The established practice for raising nomadic pastoral stock is by adopting regular grazing migrations, between wet and dry season grazing areas denoted by routes. Each tribe has its own routes with certain stopping sites along these routes known as homes. Up to late 1940s, these movements were limited to the tribal land "Dar" for most nomadic groups. A multitude of factors have since came into play to reshape events, such as increase in number of animals, prevalence of insecurity in the country side, provision of water sources, expansion of other agricultural systems and development plans and general resource degradation. Most tribal groups began to seek grazing resources outside their recognized tribal domain. This situation spawned conflicts between tribal groups. The on-going conflict in Darfur since 2003 and the brewing on in Abye Area between RoS & RSS are but examples.

Wood & Rangelands and Traditional Livestock Sector in the National Unity & Economy

Being the main source of livestock feed (80% of the total feed requirements), wood and rangelands contribute substantially to income and subsistence of a large sector of the population who are either pastoralists (nomads) or agro-pastoralists.

Traditional Livestock Sector goes beyond its influence on the economy to its role in securing national and strategic food. It allows self-sufficiency in meat and goes a long way towards meeting national needs in dairy products. Animal exports in 2012 counted as 3,770,240 head out of which 3,415,739 head of sheep accounting for some US$451 million (MoLFR 2012).

The Secession of South Sudan spawned a plethora of problems for the two brother countries the most salient of which in this respect is hindrance of free mobility of people, trade, pastoralists and rational utilization of rangelands. This situation has cumulatively impacted livestock & wildlife with regard to feed availability as well as plant diversity thus endangering many valuable range plants. Pastoralists, especially in South Kordofan, Eastern Darfur, White Nile, Sennar and Blue Nile States, are deprived from good summer grazing lands leading to concentration and confinement of animals on limited areas and the attendant phenomena of over grazing, conflict among and human suffering of pastoral communities; all culminating in tattering of social matrix and disturbance of social peace.

There is therefore dire need to define practical approaches at the Federal/National, regional and local levels to rectify the situation, resolve conflicts and thereby reduce the vulnerability of pastoral communities to the cumulative impacts of climatic extremes, unfolding geopolitical realities and ultimately conserve resources, biodiversity, enhance historic & traditional livelihoods and modes of life and enhance carbon sink.

Rangelands Management Institutions

The Range & Pasture General Directorate (RPGD) is the principal institution responsible for rangeland management and its sustainable use. Its mandate includes

1. Range Protection: Fires are among the most important factors that have destructive effects on natural resources. They also affect plant species composition and soil characteristics. Control of wild fires is achieved through the construction of firebreaks in collaboration with stakeholders.
2. Surveys: Reliable comprehensive data is one of the prerequisites for proper planning. With regards to the pastoral sector and the resources there are few, sometimes contradicting, data to depend on. Efforts to produce reliable data were carried on adhoc basis with little coverage.
3. Maintenance & Rehabilitation of Migration Routes: Within its framework of activities RPGD developed programmes to rehabilitate and clearly redefines the migration routes.
4. Rangeland Rehabilitation: Using seeding and water harvesting techniques, two approaches were tested by RPGD to re-vegetate degraded rangelands:
    - The first approach was complete protection to allow natural plant succession to take place when causes of degradation were excluded by fencing. This method was found to be expensive and the recovery was very slow.
    - The second approach was direct reseeding, using adaptable forage plant seeds along with soil treatment and water spreading for soil moisture improvement.

In consideration of the necessity to initiate immediate measures to restore the ecological balance following the drought of 1983, the RPGD combined the two approaches (reservation and seeding) within the framework of a National Range Seed Collection and Broadcasting Programme which is funded from Ministry of Finance. This programme was however adversely affected by communal grazing and legislative shortcomings.

Forests, RPGD and Wild life have been affiliated to various line ministries in the last three decades such as Agriculture, Livestock, Interior and Tourism.

Rangelands Legislation

The Civil Transaction Act is one of the few statutory legal provisions that provide regulating access to pasture land (De Wit, 2001).The Act (Section 565) treats as pasture all fallow land in the country. Nevertheless it stipulates the right of Government to impose temporal or spatial restrictions on grazing in these areas or to allocate land for grazing for the benefit of an entire community or for the protection of wildlife. The Act, as outlined in De Wit (2001), stipulates that:

- All fallow land is pasture,
- State authorities may impose restrictions on grazing as to time and space,
- State authorities may allocate land for grazing for the benefit of the whole community and the protection of animal resources.

Access to pasture land is vaguely described by the Act, with the identification of pastureland obtained through subtraction from other lands (agriculture and forests). Although the Act offers the opportunity to allocate, and possibly to register, pasture land in the name of the community, it paradoxically gives the authorities the right of restricting and cancelling such benefits (ibid).The day-to-day realities of rural Sudan are such that economic activities (agriculture, pastoralism, forestry, etc.) are inextricably linked and so any livelihoods strategy that regarded them holistically, rather than in isolation would, arguably, have more relevance and prove more effective.

To partially overcome these limitations, a Range Protection and Pasture Resources Development Bill was introduced in 1996. The Bill put forward a framework defining what constituted pastureland. In addition, it proposed measures for participatory natural resource management that empowers communities to manage pastoral reserves under the overall authority of the State Range and Pasture Departments.

Due to a lack of political endorsement, the Bill was not ratified at the time, and it was only in 2002 that the Government passed a Forest and Renewable Natural Resources Act. The Act recognized the access rights of pastoralists for grazing and clear passage. Unfortunately, due to provisions that gave a discretionary power to the FNC to, in some cases, limit access rights, the Act was perceived as being biased in favour of sedentary communities. Although these provisions were put in place with the given intent of giving the FNC oversight over land use for environmental protection, this perception limited the acceptability and practical effectiveness of the Law. (IFPRI 2007)

In Darfur, the relevant legislation is the Farming and Grazing Regulation Act. In West Darfur, where the legislation was amended in 2009, the Act officially recognizes seven grazing routes (or corridors), determines their width at 100-150m, sets the annual migration schedule which determines when pastoralists can move with their animals, and outlines rights and obligations for both pastoralists and farmers.

2A.7.10. The Way Forward

The judicious integration of activities of resource custodians and stakeholders is vital in this respect. The latter spans such institutions as those of agriculture, forests, rangelands and wildlife together with pastoralists, framers and the entire rural communities. A package of legislative, institutional and management measures are called for. These are envisaged to include but are not limited to:

1. Legislative measures: A national quest to harmonize and reflect the concerns of renewable natural resources use agencies into each other's policies and in policies of developmental, economic and non-renewable resource use agencies; exemplified in:
    1. Formulation a fresh, passing and promulgation, in the most consultative & participatory manners, of polices & legislations for sectors or sub-sectors which altogether lack them like Range & Pasture, Wildlife and Water Resources,
    2. Revision of policies & legislations of relevant sectors such as Environment, Agriculture and Forests,
    3. Harmonization of newly formulated policies & legislations such as those of Range & Pastures, Wildlife and Water Resources , together with revised ones such as those of Environment, Agriculture and Forests ; with policies & legislations of Investment, Minerals, Petroleum, Rural and Developmental Planning.
2. Resource Management:
    1. Conduct of national inventories of forest, range, livestock and wildlife resources to re-assess compatibility with national demand & requirements in the face of contemporary climate, political, population and demographic variables,
    2. Conduct studies to ascertain interaction/dependency of forest/range dependent communities on specimen neighbouring resources such as forests, range, wildlife parks, etc.,
    3. Design, formulate, implement, assess & monitor representative specimens of community participatory management of and sharing of benefits from forest reserves, woodland & range resources and wildlife parks.
    4. Design, formulate, implement, assess & monitor representative specimen projects of community-based management of:
        - Wild land fire in forests, woodlands & range,
        - Tracts of invasive plant species such as Mesquite (*Prosopis spp*), Rantuk (*Xanthium brasilicum*) and Addar (*Sorghum spp*)
        - Specimen stock routes
        - Tracts of wood and rangelands

2A.8. Biodiversity of Sudan

Sudan is endowed with a wide range of ecosystems and species 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. More details are provided in Annex 2a.

There are some 184 species of trees and shrubs including 33 exotics together with a few endemic and near endemic. Special areas with a wealth of rare species are found in the Red Sea Coast and the tropical rain forests in the south west. About 704 range species were identified. Most of the wildlife resources of the country are to be found within the HRWS. Recent surveys indicated that there in spite of losses and disturbance to wildlife in the region due to wars and civil strife there still remain substantial numbers of migratory wildlife between RoS and neighbouring countries particularly Ethiopia, RSS and Central African Republic.

Fire is a serious problem in all forest, range and wildlife areas except the semi-desert area where the grass is sparse and the small areas of the moist closed forests in the South West.

There is need to re-assess wildlife stocks & composition together with their habitats.

2A.9. Drivers of deforestation and forest degradation

2A.9.1. Decline of forest cover in the Sudan during the last 50 years

The area of the Sudan under forest cover was estimated by Jackson (1960) at 585,000 km² of productive forests or 58.5 million ha, being 23% of Sudan's land area. Jackson admits that adequate data are not available for sound estimates and the figures he gives are merely guesswork to provide some sort of a picture of the forest resource as a guide to future policy.

World Bank (1986) explains that productive forests are interpreted in the narrow forestry sense of containing commercially exploitable trees in areas where the tree cover is greater than about 40%. It estimates the forest cover at 94 million ha in 1983 stating that no national inventory has been done to verify that datum, and only limited inventories were made for specific purposes such as sawmilling and forest production were carried out. FNC (2001) adds that in response to the environmental crisis that befell the country during the 1970s and the surge in agricultural expansion, forests denudation for fuel, the intensification of overgrazing, desertification and the environmental and energy problems were the prime concern. The National Energy Administration (NEA) undertook the task of a nationwide survey to assess the country's energy resources and needs. The Forests Administration co-operated in the forest inventory component. NEA (1982) used 1970s land sat photo-imagery covering the country, supported by ground surveys in the provinces of Kassala, Blue Nile and White Nile. The total area was shown to be 112.5 million ha of woody biomass vegetation. NEA explains that land sat and ground survey reveal clearly that forest distribution within the northern provinces was heavily skewed, with the provinces of southern Kordofan and Darfur containing more forested area than all the other northern provinces combined.

FNC (1998) conducted a national inventory covering the northern Sudan south of lat 16°N, excluding the desert region and areas of conflict in southern Kordofan and southern Blue Nile. The exercise indicated that Northern Sudan had 41.5 million ha of forest and shrub land with an annual change of 193,000 ha and at an annual rate of change - 0.5%.

FAO (1992) published estimates of forest and deforestation rate in tabular form for countries in the five continents. For developing countries FAO defines forest as an ecosystem with a minimum of 10% crown cover of trees and/or bamboos, generally associated with wild flora and fauna and natural soil conditions, and not subject to agricultural practices. The backbone of the data is based on information and knowledge provided by the countries, verified and supplemented with the studies and remote sensing analysis using the latest technology. The estimates for the (former) Sudan given by FAO (ibid) between the years 1980 – 1990 were:

Forest area	1980	47.79 million ha,
Forest area	1990	42.98 million ha
Annual change	1981/90	481.700 ha
Annual rate of change	-1.0%	

FAO (1999) gave data on change of the forest cover for the Sudan 1990-2000 as shown below:

Forest area	1990	43.38 million ha
Forest area	2000	41.61 million ha
Annual change	1990/2000	353,000 ha
Annual rate of change	-0.8%	

The forest cover data provided in FAO (2001) for the year 1990 are quite different from those given in FAO (1992). FAO (2001) explains that recent figures represent the most current global data set available for forest area and forest area change. This is largely due to the inclusion of areas of Other Wooded Lands. The source of the data is FAO Forest Assessment 2000 project adjusted by FAO to the standard reference years 1990 and 2000. Accordingly the data for Sudan 1990 and 2000 are shown below:

Forest area	1990	71.2 million ha
Forest area	2000	61.6 million ha
Annual change	1990/2000	959,000 ha
Annual rate of change	-1.4%	

Ali and Bayoumi (1999) attempted to assess and map desertification and deforestation in Kordofan and Darfur, using Normalized Difference Vegetation Index Images created from Advanced Very High Resolution Radiometer Sensor on board the National Oceanic and Atmospheric Administration Satellite. The result produced from the images gave good indicators of vegetation degradation through the period 1982-1994. The areas affected were divided into four classes as follows:

	Km^2
Light desertification	101,836
Moderate desertification	68,367
Severe desertification	20,817
Very severe desertification	8,163
Total area desertified	199,183

The area of the desert increased from 205,000 km^2 in 1958 to 340,000 km^2 in 1994 at the rate of 8 km per annum (2.1% per annum).

The forest and woodlands have decreased at a rate of 598,000 ha/yr equivalent to 0.08% during 1990-2000 and 54,000 ha/yr during the period 2000-2010. As such Sudan is one of the ten countries in the world with largest net loss of forest area during the last decade of the 20th Century (FAO 2010). However, in the last decade (2001-2010) the decrease of forest lands has apparently slowed down remarkably.

July 2011 witnessed the cessation of South Sudan and the creation of RSS. The RSS goes away with some 619 745 km^2 and 8.26 million people of the area and population of Sudan. It will also go with some 50% of the forest & woodland area of Sudan. The Republic of Sudan retains an area of 1 886 068km^2 and some 50% of the forest & woodlands of its pre July 9th estate.

2A.9.2. Underlying causes of deforestation and forest degradation

The primary underlying causes of deforestation & forest degradation are perhaps increased human and animal populations together with demographic changes, further exacerbated by environmental and socio-economic & political variables. Since the emergence of present day Sudan in 1916 with the annexation of present day Greater Darfur, its human and animal populations have risen from 2.0 and 10.0 to 33.4 and 103.6 Million respectively.

Major direct causes of deforestation & forest degradation are highlighted in Box II-2 whereas major indirect causes are highlighted in Box II-3.

Box II-2: Major direct causes of deforestation and forest degradation in Sudan:

Agricultural expansion: The most prominent direct cause of deforestation in Sudan is the conversion of natural forests to cropland and pasture. Some 40 million Feddans (17 million ha) have been converted into mechanized & traditional rain fed and irrigated agriculture during the period 1940-2012. The country is home to some of the largest irrigation schemes in the world (Gezira, Rahad, New Halfa, Suki, Kenana and White Nile Sugar Schemes).

Energy consumption: The energy sector is closely linked to deforestation through wood extraction for fuel and charcoal. Sudan depends mainly on the forest sector as a household, services and industrial energy source. Forests contribute the equivalent of 4.11 million TOE representing 70 - 81 percent of energy supply in the country (FNC, 1995). Demand for wood fuel increased in the last four decades due to rapid population growth, urbanization and shortage in supply of other forms of energy. Sudan consumed a total of 21 million m^3 round wood in 2010 including wood fuel, construction, maintenance and furniture wood. The wood fuel share of the total is estimated to be 87.5%.

Increasing demand for grazing & browse material: Grazing by burgeoning domestic herds devastate the young tree seedlings in forest gaps caused by felling and numerous other factors causing serious impediment to the natural restocking of forest stands. Animals eat up the leading shoots and tips of branches & twigs causing the trees to remain stunted and unable to develop to maturity. The actual concern is that animal population exceeds the potentiality of the resource and causes severe damage to the forest. Overgrazing can result in a slowing of root growth, diminished moisture-carrying capacity, and overall loss of plant vitality, making forage more vulnerable to disease and suppression/ replacement by invasive species.

Refugees and internally displaced people: Contribute to the removal of forests to obtain their requirements of fuel-wood and building houses (IDPs in Darfur and refugees in the Eastern and Western Sudan).

Factors affecting forest health: Little information is available about insects, diseases and other hazards impacting forests and the forest sector in Sudan. One report estimated that 102,874 km^2 of forested areas in four states – Darfur, Kordofan, Eastern and Central – were affected by insect pests and diseases. Fire, fungal and insect attacks and overgrazing hinder natural regeneration. Fires are used for land preparation for cultivation but it also destroys the range land and large animals leave their habitats to remote areas or may be subjected to death.

Natural Disturbances: Mainly drought, related to CC.

Box II-3: Major indirect causes of deforestation and forest degradation in Sudan

Previous forest policies:(early forest policies may be caused the undervaluing of the forests) mainly in Sudan there is no study to find the contribution forests in GDP)

(a). Early forest policies such as that of 1932 endeavoured to instil the concept of division of authority over and benefits from forests & woodlands between the Central and Provincial levels of government. A great deal of the concept was established,

(b). Subsequent Forest Policy Statement , that of 1986 endeavoured to fine tune the concept and devolve authority to lower levels of governance. The numbers and extent of forest reserves or holdings have increased substantially of literally all categories of forests namely Federal, State (Provincial), Institutional, Community & Private Forests,

(c). yet, the rate of deforestation continued due to many interwoven environmental, socio-economic & political factors,

(d). Forest clearance and tree removal went on unabated while the various sectors were slowly assimilating and adopting the reservation and allocation process while clearance of forest tracts for all developmental activities did not go through any impediments. Both forces were chipping away from the same resource; one to 'fence away' some tracts, the other clearing a wider area. At the end of the day, out of some 60 million ha (140 million feddans) forest land in early 1960s some 3,000,000 million were reserved or allocated under the 1932 policy and 27,000,000 under the 1986 policy while during the same period mechanized rain fed and irrigated agriculture expanded from 1.5 and 4.0 to 6.0 and 35 million feddans respectively.

Policies of other sectors(There is no integrated policies for natural resources, or may say cross cutting issues in related sectors`s policies).

It is the policies or lack thereof of three sectors that had the greatest effect on deforestation in Sudan:

(a). The agriculture policy of horizontal expansion,

(b). Global & local humanitarian policies of caring for refugees & internally displaced populations. When such people temporarily settle in an area, they take to the forest: wood for shelter, fuel and sale for income. The forest authorities are implicitly and explicitly directed to leave these people alone. The settlement of some 1 000.000 refugees from neighbouring countries in Eastern Sudan between 1963-1995 is but an example. If these people, one million strong, consumed the same amounts as local population of 0.72 m^3/annum over some 30 years, how much is that in terms of area?

(c). The lack of policies of such sectors as range and war lords at times of civil strife such as the case of Darfur since 2003. The former is reflected in the uncontrolled growth of herds while the other simply means devastation with foresters being the first to abandon the area and do not come back until the war or strife end if they ever do.

Demand for forest products (mainly poverty increase the demand for forest products)

(a).The most notable of these is superior charcoal with metallic lustre from *Balanites aegyptica*, *Acacia seyal* and *A. mellifera*. Such charcoal is in demand for a number of domestic purposes such as barbeque, roasting coffee beans and smoking sheesha or argela all over the Arabian Peninsula and the north up to Turkey. If it is not openly allowed for export it is simple smuggled all along the Red Sea from almost all countries; Sudan being no exception.

(b). Technically, it has been proven to be very profitable from sustainably managed forest tracts with supplementary irrigation from rain water harvesting. It even lends itself to a certification scheme. Yet the Sudanese forest authorities are conscientious objectors to the notion.

The preceding narration and analysis of renewable natural resources and identified gaps furnish a framework for a business case and a work plan.

Table II.11 lists the various causes of deforestation and forest degradation in Sudan and highlights areas for intervention through financing along the R-PP implementation phase.

Table II- 11: Causes of Deforestation and Forest Degradation (D & FD) and related areas for intervention through finance from REDD+ .

Causes of D &FD	Causes & Consequences	Areas for intervention
1. Excessive cut for firewood and charcoal	The high demand for rural (mainly firewood) and urban (mainly charcoal) cooking fuel, and to produce bricks, leads to overuse and illicit cutting of forests.	*Consider subsidising alternative fuels, e.g. LPG, hydropower, and/or improving firewood / charcoal production and/or efficiency.*
2. Requirements of wood, wood products & NWFPs, browse & range material and habitat for wildlife	Rising demand of such products lead to overuse and destruction of forests.	*Reformulate designated forest functions and management to accommodate rising livelihood, forest products and grazing needs*
3. Demand for food and food security due to populations growth	Pretexts easily echoed by politicians to justify putting forests and woodlands under the plough. In many situations this is what triggers horizontal expansion of agriculture at the expense of forest and rangelands and resulting deforestation.	*Reconcile forest policy with policies and activities of other sectors like agriculture , livestock, security & humanitarian notions.*
4. Climatic & Environmental Variables	Intrinsic aridity and erratic rainfall coupled with recently setting-in vagaries of CC and the attendant extremes of climatic phenomena such as drought and floods. As such tree establishment is difficult and expensive (Nair and Abdel Nour 2011).	*Search for adapted and tolerant multi-purpose plant species and varieties and measures to mitigate the effects of CC and associated phenomena.*
5. Rising demand for such commodities as building material, furniture and learning material (paper)	With a high segment of young people in the growing population and their changing requirements.	*Intensify SFM of high yielding forest types such as riverine and irrigated forests.*
6. Influx of political and environmental refugees and IDPs due to wars and civil strife	Their heavy dependence on wood for shelter building, energy requirements and sale for income, is combined with the physical absence of forest authorities from the scene, domination by war lords or the explicit directives from government and humanitarian activists to them not to intervene	*Rehabilitate areas affected by Refugees & IDPs through community-based and other modalities,* (Annex II.2.)
7. Urbanisation	Sprawl on forests & woodlands, requirements of building timber and fuel wood for brick and lime-making and bakeries, charcoal for domestic & service sectors, for leisure and the consequent demand for parks and greeneries	Revise & update demand survey of forests goods & services, Increase areas of and intensify SFM of high yielding forest types, Enhance urban forests, greeneries and tree planting
8. Destruction by seasonal wild land fires	Seasonal fires, mainly started by man intentionally or otherwise destroy unquantified amounts of biomass and degrade resources in all aspects	*Initiate Community-based forest fire management programme (e.g. controlled use of fire)*
9. Genetic pollution	E.g., through invasive alien species such as Mesquite	*Revise control/management*

Causes of D &FD	Causes & Consequences	Areas for intervention
	(*Prosopis spp.*)	*modalities of invasive alien species with the notion that if you can't beat them, join them*
10. Economic, industrial, physical & infrastructure development	E.g. Deforestation and forest degradation by petroleum extraction, mining activities and power transmission lines, or Pollution and gas emissions by petroleum extraction and associated activities of transport, refining, petrochemical products	*Reconcile forest policy with policies and activities of other sectors like Water, Minerals & Oil Resources, implying 'polluter pays ' principles*
11. Institutional Variables	There is response by forest & range institutions to the changing and rising demands and the drive for institutions to change forest & range functions, to change their mandates in response to calls by various level of government, communities, ethnic or other interest groups and international community in sharing the benefits from and management of the resource	*11.1. Formulate new water policy and range policy and functions* *11.2. Fully integrate/merge Research & Higher Education Institutions of Forestry, Range & Wildlife,* *11.3. Revise research programmes and teaching/training curricula of Forestry, Range & Wildlife to accommodate variables emanating from CC, Desertification, geo-political variables and socio-economic development*
12. Lack of appreciation of forest & woodland values	There has been no serious attempt to assess the contribution of forests & woodlands to such aspect as protection of watersheds, GDP, employment, or to assess the contribution of home grown wood to the national energy budget and wood-based industries, and there lacks an official tally of the value of exported NWFPs like gum Arabic, Senna, Garad pods (of *Acacia nilotica)*	*Assess the contribution of forest & range products to the GDP* *Quantify and value environmental services of forests, woodlands and range resources*
13. Low profile of forestry and institutions and low place in national agenda	All in all the lack of appreciation of the role of forests & woodlands in Sudan stems from the facts that wood and NWFPs are largely directly collected by people from forests or are traded in informal markets, and the science of environmental and natural resources accounting is in its infancy. Hence, Sudan forestry is marginalized and placed low in national agenda and public expenditure on it is generally low.	*Initiate advocacy and debate on the need for and means for embedding importance of judicious & rational utilization of natural resources in forthcoming Constitution of Sudan* *Assess the contribution of forest & range products to the GDP,* *Quantify and value environmental services of forests, woodlands and range resources*
14. Political variables	Conflicts , e.g. like the one in Darfur or between Sudan and the newly borne RSS over Abeyi District, inevitably strains the national economy and limits the options for public expenditure to more pressing needs than forestry. On the contrary, such situations tempt authorities, especially local governments, to cash in forest resources.	*Reconciliation of forest policies and streamlining with policies of other economic sectors particularly Agriculture, Livestock & Range, Industry, Mining, Tourism and Finance & National economy.*
15. Inadequate	Revision & accreditation of educational curricula to	*Revision of Curricula of higher*

Causes of D &FD	Causes & Consequences	Areas for intervention
forestry human resources	generate a new breed of forester/range ecologists capable of meeting societal changing demands and address contemporary socio-economic, climatic and other variables such as merger of forestry & Range.	*educational institutes of Forestry, Range & Wildlife*
16. Inadequate research	Revision of and support to research programmes to accommodate variables.	*Revision of and support to research programmes of research institutes of Forestry, Range & Wildlife*
17. Institutional capacity of stakeholders	Being in the early stages of establishing its National REDD+ programme, Sudan needs capacity development (CD) in most areas of the programme. The envisaged CD applies to the three spheres of the process namely: A) The Enabling Environment, B) the Organizational Level, C) The Individual Level	*Three priorities: Awareness raising among stakeholders on REDD+ and CC, Governance for REDD+ mechanism, engagement of ethnic minorities, gender. Other topics include land use mapping, forest inventory, construction of Reference (Emission) Levels, forest research (allometric equations, carbon pools, key categories, etc.), safeguards on reversals and conservation of natural forest & biodiversity, forestry economics: use of forest resources (incl. secondary benefits: gum Arabic, honey, resin, fruit, etc.), opportunity cost analysis of REDD+ interventions, benefit sharing, and safeguards on displacement of emissions.*

Capacity Development for Sudan National REDD+ Programme is envisaged to be implemented through three steps which jointly comprise the Capacity Building Needs Assessment (CBNA):

1. Identification and engagement of stakeholders for each of the three priority development areas.
2. Assessment of requirements of the priority development areas and current capacities of stakeholders in implementing those development priority areas, followed by an assessment of the institutional and individual capacity gaps.
3. Development of a capacity building plan. According to the aforementioned needed legislative and technical actions there emerge the Areas for Intervention portrayed in the budget below.

2A.10. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousand $)				
		2014	2015	2016	2017	Total
Assessment of livestock, range & water policies	Advocacy and workshops to assess range & water policy	25	25			50
	Advocacy and workshops to formulate new range & water policy	25	25			50

Revise Sudan's National Forest Programme (nfp) and Forest Policy	Undertake sector review and revise nfp	50	30			80
	Revise forest policy	25				25
Reclassify and assess biodiversity status of flora & fauna	Undertake botanical, ecological and biodiversity surveys	50	30	10	10	100
Undertake research for adapted and tolerant multi-purpose plant species and varieties and measures to mitigate the effects of CC and associated phenomena	Conduct pilot research on tree species to suit the changing environment due to CC and in anticipation of construction of Renaissance Dam in Ethiopia	50	30	10	10	100
Revision of curricula of higher educational institutes together with research programmes of forestry , range & wildlife	A series of training and validation workshops together with curriculum formulation	25	25			50
Assess the possibilities and requirements to rehabilitate areas affected by Refugees & IDPs	Pilot reforestation of degraded areas impacted by IDPs and refugees Studies based on lessons learnt to identify proper A/R techniques and suitable silvicultural practices.	150	150	50	50	400
Revise & update demand survey of forests goods & services,	(using equipment provided for NFI) In collaboration with NSB and a university design survey, organize training sessions, conduct survey, analyse, endorse and publish findings	150	150			300
Revise control / management of invasive alien species,	Piloting biological control for *Prosopis* & other invasive species	25	25			50
Assess the contribution of forest & range products to the GDP	In collaboration with universities and research centres conduct required studies to ascertain contribution of forests & range goods and services and national validation workshop	25	25			50
Initiate advocacy and debate on the need for and means for integrating forest, range & wildlife concerns into policies and activities of other sectors such as	Review of policies of related sectors such as water, energy, mining, etc. together with validation workshop	25	25			50

Agriculture, Water, Mining and Oil Resources						
Initiate advocacy and debate on the need for and means for embedding importance of judicious & rational utilization of natural resources in forthcoming Constitution of Sudan	A series of brainstorming session, advocacy and publicity	20	10			30
Total		645	550	70	70	1,335
Government						
FCPF						
UN-REDD Programme (if applicable)						

2B. REDD-plus Strategy Options

2B.1. Activities that can reduce deforestation & Forest Degradation

To address the drivers of deforestation and forest degradation as outlined in the previous section, a set of REDD+ strategy options is proposed in this section. The strategy options lean on and draw from the country's wealth of experience amassed through practice of over a century of forest management, afforestation, reforestation, tree planting, educating, training and involving a wide spectrum of resource stakeholders and custodians, all through harnessing of support from development partners, Government and society support.

Past efforts at curbing deforestation & land degradation

The Woods & Forests Directorate was established in 1902 with the start of the colonial rule in the Sudan. The Department, under the principles of sustained yield in perpetuity and rational exploitation of the resources, commenced to manage wood- stations along the Nile and its tributaries to supply steam paddle boats with firewood and establishing forest reserves where future felling and regeneration can be concentrated, protect the forests against fires and introduce fast growing tree species.

Supply of societal needs for forest & range products while simultaneously curbing deforestation & land degradation, conservation of biodiversity and overall environmental rehabilitation was focus of the country's forest service to attract investment, financial and technical support, promulgation of legislation & passing of policies. Table II-12 portrays investment & support by Development Partners and counterpart funding from RoS & Local Agencies over the past century or so. Through this and previous track record FNC and several generations of staff have accumulated measurable experience in tree planting in various modalities & settings in almost all ecosystems, working with Development Partners and involvement of other stakeholders.

Table II-12: Afforestation/reforestation , tree planting & environmental amelioration projects funded by Development partners and RoS and implemented by International Organizations, Forest Service & NGOs 1970-2013

#	Project/Activity	Funding source /Implemetation	Duration
1	Management on Sustained Yield Basis of Riverine Forest Reserves in Blue Nile, Sennar, Gadaref and Gezira States	RoS/Forests Dept./Communities	1933-2013
2	Reforestation of abandoned mechanized rain-fed farms Dali & Mazmum-Sennar State directly by FNC or through community participation	RoS+ Communities	1971-2013
3	Restocking of the Gum Belt Kordofan: UNSO/SUD/89/X05	Netherlands-RoS /UNSO	1981-1985
4	Forestry Development in Sudan-GCP/SUD/047/NET	Netherlands-RoS/FAO	1983-1987
5	Sudan/Ireland Afforestation Programme	Republic of Ireland-RoS/FNC	1986-1997
6	Village Extension Scheme River Nile	United Kingdom-RoS/SOS-Sahel	1984-1996
7	Afforestation/Reforestation in Northern Province	Denmark-RoS/FNC	1988-1994
8	Jebel Marra Circle (Darfur) Forest Management	Germany-RoS/GTZ	1989-1997
9	El-Ain (Kordofan) Natural Forest Management	United Kingdom-RoS/SOS-Sahel	1989-1998
10	Northern Province Community Forestry	Netherlands-RoS/FNC	1988-1997
11	Tree Seed Project-UNSO/SUD/88/S06	Denmark-RoS/UNSO/FNC	1994-2000

#	Project/Activity	Funding source /Implemetation	Duration
12	Afforestation Activities in Areas affected by Refugees-Eastern & Central Sudan	UNHCR-RoS/FNC	1993-1996
13	Support to Women in Tree Planting	IGAD-RoS/FNC	1994-1997
14	Women in Development –Hamdnalla-Sennar State	UNDP-RoS/FNC	1994-1996
15	Social Forestry Network	Ford Foundation-RoS/SSFC	1994
16	Conservation & Management of Habitat & Species & Sustainable Community Use of Biodiversity in Dinder National Park-Sennar-Gadaref States	UNDP-GEF-RoS/SECS/FNC/Wildlife Admin.	2000-2003
17	Reforestation of 10% of Mechanized Rain-fed farms in Gadaref State	Gum Arabic Company-GAPAs-Farmers Union-Framers/Sidney Company/FNC	1993-2013
18	Integrated Carbon Sequestration Project in Sudan-Butana, Gezira State	GEF-RoS/FNC	2012-2015
19	Revitalizing the Sudan Gum Arabic Production and Marketing	Multi Donor/IFAD/WB-RoS/FNC	2009-2013

2B.2. REDD+ Strategy Options

Generally, activities that reduce deforestation incur opportunity costs (foregone profits from wood, agricultural and livestock sales) as well as forest protection policy and administration costs. The mitigation costs can be divided into two categories: capacity building costs (e.g. carbon measuring and monitoring capacity) and on-going costs (including opportunity costs and forest protection costs).

The most effective means of reducing deforestation and degradation through economic instruments is to use an integrated approach. Many of the options below are inter-related, and even those that are mutually exclusive will be more effective if used in combination with other options or on-going or future programmes. E.g. the presently proposed US$7.73 million GEF/World Bank project „Sudan Sustainable Natural Resources Management (SSNRMP) to be implemented by MoEFPD is part of the Sahel and West Africa Program (SAWAP) in support of the Great Green Wall Initiative (GGWI). Its three components – (i) Institutional and Policy Framework; (ii) Community based sustainable management of rangelands and forests and biodiversity conservation activities; (iii) Project management, communications and monitoring and evaluation – will have many synergies with the planned R-PP activities, especially in its three targeted states of Kassala, Gezira and White Nile. The FNC, RPGD and the Wildlife Conservation General Administration (WCGA) will be actively involved in this project, which also will receive support from the regional 'Building Resilience through Innovation Communication and Knowledge Services' (BRICKS) project (The World Bank 2013). So a close cooperation with this project is key for the REDD+ readiness preparation of Sudan.

In a second step of the preparation process, the proposed options need to be screened and prioritized in an inclusive and participatory process with consultations with key stakeholder groups.

2B.3. National economic policy instruments for REDD+

In order to realize the objectives of the National REDD+ Program the RoS could use three broad types of economic policy instrument to reduce deforestation and forest degradation:

- Regulatory instruments (e.g. policies, laws, regulation, levies),
- Fiscal instruments (subsidies through REDD+ finance and other public sources of funding, levies),
- Capacity building (workshops, field visits, courses).

To date, the mechanisms that have been used for financing forestry development in Sudan include:

- Self-financing mechanism from FNC own resources;
- The National Development funding mechanism which finances development projects;
- Projects funded by other Development Partners and private sector;
- Forestry investment.

While funding for forestry development needs to be a crucial component of REDD+ strategy, this on its own will not be sufficient. For policies to have an effective impact on deforestation rates, financial and non-financial policy instruments will need to target the drivers of deforestation directly – particularly demand for wood fuel and agricultural land.

The following section explores options for REDD+ activities that use a combination of both types of economic policy instruments. A combination of instruments, if designed well, will be the most effective, and cost efficient means of reducing deforestation and degradation.

The following sections cover in a first step options for:

- Pilot projects on sustainably growing wood, harvest and processing thereof
- Reducing and eliminating the opportunity costs of reduced deforestation and degradation (e.g. through economic policy instruments that lower temporarily the price of Liquid Petroleum Gas (LPG) in the private market relative to the price of wood fuel),
- Providing public subsidies to make up the gap between the value of standing trees compared to cut trees (e.g. through carbon finance that incentivizes landowners and tenants to reduce the rate of deforestation and degradation).

Energy Related Options (1-4) referring to cause no. 1 of D & FD of table II-12

Option 1: The carbon balance and incentives for energy substitution to LPG:
A thorough understanding of the carbon balance of using wood as a source of energy and non-renewable resources such as LPG needs to be developed, based on the eco-physiological properties of the forests. In the current situation of over-consumption of forest products the resource is depleted to a level where productivity is seriously impaired. Reducing the pressure on the forest to a level where the productivity reaches a higher level will lead to a point where forest exploitation is sustainable. At this point the use of non-renewable energy resources should not be further encouraged.

Ultimately the success of the National REDD+ Program depends on the acceptance of the provisions of the Program by the local communities living in or near the forest; to them it is a question of their livelihood rather than climate change. The analysis of the carbon balance therefore needs to be supplemented by an econometric analysis of how the individual households or communities perceive the options from an economic perspective. The alternative of non-renewable energy sources should be considered in this context.

Wood consumption study implemented by FNC, FAO & University of Gezira (1995) indicated that per capita annual consumption of wood in Sudan was 0.7 m^3, of which 18% was for firing bricks: with the rapid rise in cement production in 2011 there is a noticeable shift of construction in urban centres towards concrete blocks. Municipal authorities in Khartoum & Gezira States have already started to phase out brick kilns for environmental/ health/aesthetic considerations. However, there are still some aspects of construction in urban centres and most of rural areas that prefer baked mud bricks. The outcome is a curse and a blessing for FNC and all members of fire wood value chain. All riverine forests of *Acacia nilotica* are managed on sustained yield basis since 1930s to produce railway sleepers, sawn timber, building poles & fire wood. Demand for all of them is declining. Revenue from them makes a good 30% of revenue for FNC and respective State Governments.

It is recommended to:

1. Implement pilot projects to support FNC and private sector to process/manufacture small - size *A. nilotica* wood,
2. Undertake studies to assess:
    1. Technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG,
    2. Technical, socio-economic and environmental benefits/drawbacks of shifting building with wood-fired clay bricks to concrete blocks.

Proposals:

- Pilot projects to support FNC and private sector to process/manufacture small -size *A. nilotica* wood.
- Technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG.
- Technical, socio-economic and environmental benefits/drawbacks of shifting building with wood-fired clay bricks to concrete blocks.

Energy alternatives have been promoted before in Sudan to reduce wood fuel consumption. For example, the Gabat Gas Project aimed to reduce firewood and charcoal consumption by 50% over 3 to 5 years. Any further research on the financial and other incentives required to meet the current wood fuel challenge should use this project as part of the analysis.

Research could also draw on examples of fuel substitution projects in nearby countries. For examples, a 2001 DFID report in Kenya identified a number of barriers to substitution from wood fuel to LPG including (1) high prices of LPG relative to wood fuel; (2) high cost of LPG stoves; and (3) low competition in the LPG sector as LPG companies compel consumers to purchase separate valves/regulators for gas cylinders that are brand specific: this acts as a disincentive to change company, thereby reducing consumer choice and maintaining higher prices. In Senegal, a DFID project to switch from charcoal to kerosene and LPG directly benefited around 250,000 families in the principal urban and surrounding areas of Senegal. Training and micro-credit schemes helped overcome the relatively high upfront costs of purchasing an improved stove.

Significant switching from wood fuel (firewood and charcoal) will occur when the cost per unit of energy from LPG stoves meets or drops below the cost per unit energy of wood fuel. These costs will depend on subsidies, consumption taxes and import tariffs on the different energy sources.

Furthermore, even if the unit costs of LPG are lower, the upfront costs of purchasing an LPG stove may still act as a barrier to their take-up.

As fuel substitution has large potential for reducing wood fuel consumption – one of the key drivers of deforestation and degradation – it is recommended that further research is undertaken in the following areas:

- Eco-physiological analysis of current and sustainable extraction of wood from forests, and determination of the carbon footprint of non-renewable resources.
- Economic analysis of the unit costs of wood fuel and alternative fuels including tax and subsidies.
- Examination of non-cost demand factors that could act as barriers to fuel substitution (e.g. traditional cooking styles such as using wood fuel for roasting meat) including an analysis of price elasticity.
- Examination of the fiscal instruments linked to REDD+ finance that would make LPG cheaper at point of sale.
- Examination of the costs and benefits of micro-financing initiatives to provide upfront funding for purchasing stoves.

Proposal:

- Undertake studies & pilot experimentation on non-cost demand factors that could act as barriers to fuel substitution and fiscal instruments linked to REDD+ finance that would make LPG cheaper at point of sale.

Option 2: Incentives for using sustainable charcoal:
While fuel substitution from wood fuel to LPG could be an important means of reducing wood fuel demand, it may not be sufficient in itself to halt deforestation even if the opportunity costs of switching are eliminated. For example, charcoal has unique cooking properties (e.g. roasting of meat and coffee beans) that make it more attractive than other fuels. In the past, when the price of LPG fell to a third that of charcoal in Sudan, many homes still purchased charcoal (Ibrahim 2003 quoted in Mugo and Ong 2006). Furthermore, evidence suggests that as living standards rise, household demand for cooking charcoal may actually increase.

One option is to develop a more sustainable industry for charcoal, based on sustainably managed plantations, high efficient kilns and improved charcoal cooking stoves. There are already precedents for sustainable charcoal production in Sudan that FNC has managed. Plantations of *Acacia seyal, A. mellifera* and *Balanites aegyptiaca* are grown in 12 to 15 year rotation cycles, and the wood burned in conical earth mound charcoal kilns. Specific legislation covers the charcoal industry.

There are expansive areas of Mesquite (*Prosopis chilensis*) in flood irrigated areas in Eastern Sudan and gravity irrigated areas in Central & Northern Sudan. The most practical methods to control & manage Mesquite are to burn it into charcoal and mill the pods and use in animal feeds. The charcoal form Mesquite is inferior to that of Acacias in view of its sparks and rapid burning.

The Sudan Charcoal Producers Association was created to negotiate with the government on behalf of traders. Some members produce 2,000 - 5,000 bags of charcoal, earning up to US$50,000 a season. However, some members have complained of high taxes, unclear boundaries and conflicts due to animal routes through contracted land.

Given the potential for the government and the private sector to increase sustainable charcoal production to meet urban domestic consumption and international export markets:

1. Implement pilot projects in various settings to produce sustainable high quality charcoal for domestic urban consumption and export,
2. Further research is recommended in the following areas:
    1. Analysis of the international export market for certified sustainably produced charcoal,
    2. Analysis of the fiscal incentives/disincentives that drive the expansion/contraction of charcoal plantations,
    3. Analysis of the risks and opportunities of liberalizing the sustainable charcoal market both domestically and internationally with regard to plantation expansion and protection of Acacia natural stands,
    4. Pilot testing of a combination of *Acacia* and *Balanites* species, rotations and mix of water regimes (supplementary irrigation through water harvesting),
    5. Pilot experimentation with means of improving Mesquite charcoal qualities.

Proposals:

1. Pilot projects to produce certified sustainable high quality charcoal for domestic urban Consumption and export,
2. Technical/environmental/socio-economic studies on charcoal from Acacia-Balanites mix and from Mesquite.

Option 3: Incentives for firewood efficiency:
Even with incentives to switch from firewood to LPG and sustainable charcoal, demand for firewood will still remain, particularly in rural areas. Using firewood more efficiently could reduce overall demand for firewood further. A 2010 FAO report estimated that a Fuel Efficient Stove (FES) programme in rural and urban areas could reduce consumption by up to 1.1 million m^3 (from 5.9 to 4.8 million m^3 or from 3.5 to 2.8 million oven-dry tons).

Pilot projects to:

1. Establish firewood plantations of high calorific value indigenous tree species such as *A. nilotica* and *A. seyal* and exotic trees such as *Eucalyptus spp.* in various settings and ownership,
2. Improve harvesting efficiency & recovery of firewood from riverine *A. nilotica* forest plantations. Current methods of using axes leave 25-50 cm stumps.
3. Design, test and disseminate FESs particularly in high consumption such regions like Darfur

Technical & socio-economic studies are recommended:

1. To compare the costs and benefits of implementing an FES programme compared to incentives for substituting to LPG stoves,
2. To consider means to reduce siltation in riverine *Acacia nilotica* forests. Siltation of ox-bow lakes, the ideal habitat for *A. nilotica* tends to bury the bottom log, literally the cream of 30 year rotation.

Technical & socio-economic studies to:

1. Compare the costs and benefits of implementing an FES programme compared to incentives for substituting to LPG stoves.
2. Consider means to reduce siltation in riverine *Acacia nilotica* forests.

Option 4: Subsidising renewable energy production and grid infrastructure:

The majority of the Sudanese population has no access to electricity grids. Only 34% of the population has such access in 2012. For this reason, most people have no electric alternative to wood fuel or LPG. One potential area for public subsidies from carbon finance is investment in grid infrastructure as well as renewable sources of energy such as hydro, solar, wind and geothermal.

In 2013, hydro made up around 1.0% of Sudan's energy mix after wood fuel (73%) and oil (26%). Following the drop in oil supplies following the secession of South Sudan, there may be potential to increase the efficiency of existing hydro plants to fill the energy gap at least partly. Furthermore, according to some sources, more than 200 suitable sites may exist for the use of in-stream turbines along the Blue Nile and the Main Nile.

Average solar insulation in the country is about 6.1 kWh/m^2/day, providing a high potential for solar energy use. A recent GEF/UNDP-funded project installed solar Photo Voltaic (PV) to electrify 13 communities. Around 50,000 households in Sudan and Sudan/Chad borders are now using PV systems. However, the carbon abatement cost of solar PV is generally relatively high compared to other mitigation measures, and an economic analysis would be needed to determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar would be cost effective.

Proposal: Study to determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar/ wind energy would be cost effective.

Wind energy in Sudan is currently used for pumping water from deep and shallow wells to provide drinking water and irrigation through the use of wind pumps. Geothermal has been estimated to have a potential of 400 Mega Watt (MW) generation capacity with potential geothermal fields near the Jabel Marra volcano, the Tagbo and Meidob hills, the Bayud volcanic field and the Red Sea coast. Both of these renewable energy sources would be high cost and alternative sources of funding need to be available for their development.

In conclusion, given the existence of hydro in the Sudanese energy mix (albeit on a small scale compared to wood fuel and oil), and the relatively high cost of alternative renewable sources of energy, it is recommended to undertake:

- Economic analysis of the cost effectiveness of increasing the efficiency of existing hydro plants and the development of small hydro plants along the Nile.
- Economic analysis of extending the electricity grids (both public and private) to reach a higher proportion of the Sudanese population.
- Analysis of alternative sources of carbon finance, including REDD+ and funding for renewable energy.

Proposal:

1. Study to analyse cost-effectiveness of increasing efficiency of existing hydro plants, development of small hydro plants along the Nile, extending electricity grids to reach a higher proportion of population and alternative sources of carbon finance, including REDD+ and funding for renewable energy, determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to hydro energy would be cost effective.

Improving Forest Production Options (5-7) referring to causes no. 2, 5, 6, 7 and 8 of D & FD of table II-12

Option 5: Incentives for increased gum Arabic production:

Around 95% of gum Arabic is produced by small scale farmers, with the remaining 5% being produced from plantations. Exports totalled 52 928 tons valued at $ 77 832 000 and 49 318 tons valued at $82 693 000 in 2011 & 2012 respectively. A World Bank study in 2007 estimated that Sudan's gum Arabic export market could potentially be worth around US$150 million, assuming a world market of around 60,000 MT per annum. That position is overtaken by events. The recent approval of the European Union of Gum Talh (*A. seyal*) as a food additive paves the way for many areas outside the gum Arabic Belt of Sudan to come into production. A study commissioned by the Gum Arabic Board in 2010 indicated that domestic consumption of processed gum has risen from 500 tons in 2008 to around 8 000 tons in 2010 with a significant upwards trend. The on-going WB/IFAD project in support of GAPAs is already giving good indications that support across the board to such CSOs yields good fruit in terms of equitable prices for producers and enhancement of an enabling environment for gum and indeed other traditional agricultural production.

The following pilot projects are recommended:

- Develop a 'protocol' for production of talha gum (*A. seyal*). With the acceptance of Europe and FDA of USA for gum talha as a soluble fibre and a food additive, demand for the friable gum is on the rise. *A. seyal* is Sudan's national tree. It produces gum all over the country.
- Develop a 'protocol' for Kakamut gum (*Acacia polycantha*). *A. polycantha* is closely related to Hashab gum (*A. senegal*). *A. polycantha* regenerates prolifically in abandoned mechanized farming areas particularly those affected by war in South Kordofan. According, Kakamut gum due consideration is conducive to more gum production and will avert adulteration of gum Arabic.

Proposal:

- Develop protocols for production of gums other than gum Hashab (*Acacia senegal*) through popular participation, agroforestry and agro-pastoral systems.

Option 6: Incentives for forest conservation and sustainable forest management:
While the most effective instruments for reducing deforestation and degradation are economic incentives that eliminate the opportunity cost of keeping trees standing, government regulations for forest and woodland conservation remain very important for protecting natural stands and their associated biodiversity.

Based on 2012 figures, Sudan currently has 24 million feddan of forest reserves and 42 million feddan of wildlife reserves. In total these reserves represent around 11% of Sudan's land use. The area of these reserves could be increased. However, forest conservation is generally more effective when local communities have buy in – this means that they gain economic benefits of conservation compared to the benefits of cutting down trees. In many cases the benefits can come from sustainable forest management that enables the local community to benefit economically from the forest while avoiding deforestation and degradation. Economic benefits of standing forest in Sudan include non-wood forest products such as fodder, gum, honey and arts and crafts. Tourism could also be promoted in forest reserve areas.

Currently, the FNC is funded by means of a self-financing budget largely through levying of value and royalties on wood and non-wood forest products and from support by Government through Developmental Expenditure. The total budget for 2013 was 30.8 million Sudanese Pounds (SDG), equivalent to US$5.53 million. An area for investigation would be a better understanding of the incentives and disincentives that these levies have on forest preservation and deforestation. For example, replacing a levy on firewood has the potential to shift incentives of the FNC towards forest conservation. However, removing the levy also has the potential to lower the costs of firewood relative to alternative fuels. Consequently, an integrated approach would be needed. At the same time, removing the levies on non-wood forest products could lead to an expansion of sustainable forest management in the private sector.

The following interventions are recommended:

- Pilot projects to design various modalities of community participation in forest, rangeland & wildlife conservation & management, including fire management, across Sudan
- A study is conducted to assess the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds.

Proposals:

1. Design and implement various modalities of community participation in forest & rangeland conservation & management across Sudan.
2. Assess the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds.

Option 7: Incentives for reforestation and plantations:
Sudan already has significant plantations of both indigenous and exotic tree species. The largest plantations (52,227 ha) comprised *Acacia senegal* raised to compensate for areas damaged by fire, illicit felling and senility. Other important plantations include *Acacia nilotica* (18,200 ha) planted as part of a managed rotation to produce millable timber, building poles and firewood and *Eucalyptus microtheca* (5,742 ha). Various other species are planted on a small scale. Forest Policy and Laws have encouraged local communities, private individuals and organizations to establish plantations. However, according to FNC, the areas annually planted fall well below the strategic and policy targets due to insufficient funding.

Prior to nfp implementation, the private sector's involvement in Sudan's forest sector was restricted to small-size sawmills, carpentry workshops and gum orchards on the sand plains (Abdel Nour 2000). Since the creation of the nfp, private sector partnership in forestry has widened to include:

- Sugar schemes such as Kenana, Assalaya, W. Sennar, Guneid, and N. Halfa have each established irrigated plantations.
- A Saudi Company, Gandil, is now active in tree planting for gum production.
- Many small holder farmers around Kordofan, in Gezira, Rahad Scheme, Jebel Marra, etc. have established irrigated & rain fed plantations.
- Mechanized scheme owners in Gadaref are now involved in tree planting around the schemes for gum production and environmental rehabilitation.

Afforestation and reforestation activities are restricted to areas constituted as reserves and subsequently put under management, almost exclusively owned by FNC, institutional forests such as those owned by agricultural schemes e.g. Gezira, Rahad and Kenana, community woodlots, private woodlots, forests or windbreaks or shelterbelts (Abdel Nour 2000). In afforestation inside forest reserves, trees/shrubs usually used are indigenous in areas of less than 500 mm rainfall and exotic in more humid areas. Indigenous trees most commonly used are Acacias particularly *A. senegal, A. nilotica, A. seyal and A. mellifera* and *Khaya senegalensis*.

Incentives for expanding reforestation and afforestation include supply side measures – particularly subsidies – and demand side measures that increase domestic and international demand for sustainably managed plantation wood products. Consequently, it is recommended to undertake*:*

A programme of several pilot projects to facilitate:

- Production of small size wood for value adding processing from different high value & yield timbers species on sustainable bases under short rotations,
- Production of good quality charcoal from *Acacia seyal* for export under short rotation from plantations partially irrigated through water harvesting,
- Production of cash crops/fodder/gum in agroforestry systems partially irrigated through water harvesting,
- Use of a revolving fund to finance reforestation, afforestation and wood processing.

Studies on:

- Analysis of the profitability of plantations with and without state subsidies,
- Economic analysis of the domestic and international market demand for sustainably managed plantation timber, charcoal and firewood (see also option 2 on sustainable charcoal), including examination of certification schemes and fiscal instruments such as levies, tariffs and consumer taxation,
- Analysis of possible incentives to persuade mechanized rain fed farmers across the belt of Sudan to conform to regulations of putting 10% of holdings under tree formations.

Proposals:

1. Analysis on the profitability of plantations with and without state subsidies,
2. Economic analysis of the domestic and international market demand for sustainably managed plantation timber, charcoal and firewood (see also option 2 on sustainable charcoal), including examination of certification schemes and fiscal instruments such as levies, tariffs and consumer taxation,
3. Analysis of possible incentives to persuade mechanized rain fed farmers across the belt of Sudan to conform to regulations of putting 10% of holdings under tree formations.

Improving Food Production Option (8) referring to cause no. 3 of D & FD of table II-12

Option 8: Incentives for crop intensification and more balanced livestock production:
One of the key drivers of deforestation and degradation in Sudan has been the previous agricultural policy programme that encouraged the expansion of crops. Reducing overall food production is not a viable option. Sudan is already facing major challenges in terms of food security with a poor crop harvest in recent cropping seasons. REDD+ strategies will be successful only if they address the challenge of food security , domestic and international demand for

commodities produced on cleared land (such as sesame, sunflower, ground nuts, fodder, cotton, etc.) or livestock that can lead to over-grazing.

Agricultural intensification has significant potential to reduce pressure on forests and woodlands by meeting food demand more efficiently. Productivity for cereals has been stagnant in sub-Saharan Africa for around 30 years. This is in contrast to cereal yields in East Asia that have risen by 2.8% a year from 1961 to 2004.

As well as crop intensification, agroforestry can be an effective method to maintain woodlands and forest. Using rotations of farming and forestry with supplementary irrigation from water harvesting can promote the sustainability of tree cover while diversifying production to reduce the impact of crop specific failures (e.g. from drought).

The following activities are recommended:

- Pilot projects to aid learning and adoption besides alleviating chronic problems of landlessness:
    - Agroforestry and/or agrosylvopastoral projects to produce high value food cash crops,
    - livestock & products thereof, building poles, firewood, charcoal and gums in communal
    - lands, private holdings & FNC and State forest reserves, capitalizing on recent developments in water harvesting.

Research/studies on:

- Cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting.

Proposals:

1. Piloting with agroforestry and/or agrosylvopastoral systems to produce high value food cash crops, livestock & products thereof, building poles, firewood, charcoal and gums in communal lands, private holdings & FNC and State forest reserves, capitalizing on recent developments in water harvesting.
2. Research/studies on cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting.

Institutional Arrangements to support & consolidate sustainability of realized objectives.

Option 9. Reconciliation of conflicting policies of rival economic sectors and streamlining of activities of supporting sectors such as education and research:

Such arrangements include quest towards:

- Reconciliation of policies forestry, range & wildlife with those other economic sectors such as Agriculture, Industry, Mining, Oil, Tourism and Finance & National Economy.
- Full integration/ merger of research and higher education institutes of Forestry, Range & Wildlife,
- Revision of research programmes and teaching/training curricula of Forestry, Range and Wildlife to accommodate variables emanating from CC, Desertification, geo-political realities and socio-economic development.

Proposals:

1. Reconciliation of policies of rival natural resources sectors,
2. Judicious utilization of resources

The aforementioned options together with issues to be addressed, key requisite activities and expected mitigation benefits are summarized in table II.13.

Table II.13. Strategy Options for Sudan REDD+ and expected mitigation benefits

Option	Issues to be addressed Key requisite activities	Envisaged mitigation benefits
Energy Related Options		
1.The carbon balance and incentives for energy substitution to LPG	1.Excessive cutting for firewood & charcoal *1. Pilot projects to support FNC and private sector to process/manufacture small -size A. nilotica wood,* *2.Technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG,* *3.Technical, socio-economic and environmental benefits/drawbacks of shifting building with wood-fired clay bricks to concrete blocks.*	1.Reduce amounts of wood cut and hence deforestation 2. Reduce waste and improve wood: sawn timber conversion factor, 3. Enhance forest plantation establishment
2.Incentives for using sustainable charcoal	1.Excessive cutting for firewood & charcoal *1.Pilot projects to produce sustainable high quality charcoal for domestic urban consumption and export* *2.Technical/environmental/socio-economic studies on charcoal from Acacia-Balanites mix and from Mesquite.*	1.Improve wood: charcoal conversion factor, 2. Enhance plantations and sustainable management of charcoal producing trees, 3. Reduce overall wood removal for energy and hence Deforestation & Degradation
3. Incentives for firewood efficiency	1.Excessive cutting for firewood & charcoal *1.Pilot projects to:* *1.1. Establish firewood plantations of high calorific value indigenous tree species and fast growing exotic trees in various settings and ownership,* *1.2. Improve harvesting efficiency & recovery of firewood from riverine A. nilotica forest plantations.* *1.3. Design, test and disseminate FESs particularly in high consumption such regions like Darfur.* *2. Technical & socio-economic studies to:* *2.1. Compare the costs and benefits of implementing an FES programme compared to incentives for substituting to LPG stoves,* *2. Consider means to reduce siltation in riverine A. nilotica forests.*	1.Enhance sustainable management of firewood plantations & natural stands 2. Improve recovery of high calorie lower part of trees 3. Reduce dissipated heat and hence reduce the need for more wood and deforestation, 4. Enhance live standing biomass,

Option	Issues to be addressed Key requisite activities	Envisaged mitigation benefits
4. Subsidising renewable energy production and grid infrastructure:	1.Excessive cutting for firewood & charcoal *1. Study to determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar/ wind energy would be cost effective* *2. Study to analyse cost-effectiveness of increasing efficiency of existing hydro plants, development of small hydro plants along the Nile, extending electricity grids to reach a higher proportion of population and alternative sources of carbon finance, including REDD+ and funding for renewable energy, determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to hydro energy would be cost effective*	1. Enhance understanding of national energy mix
Improving Forest Production Options		
5. Incentives for increased gum Arabic production	1. Requirements of wood, wood products, NWFPs 2. Rising demand for such commodities as building materials, furniture & learning materials 3. Influx of Refugees & IDPs 4. Urbanization 5. Destruction by seasonal wild fires *1.Develop protocols for production of gums other than gum Hashab (Acacia senegal) through popular participation, agroforestry and agro-pastoral systems*	1. The More gum the more trees the more amelioration of agricultural environment, the higher crop yields and better livelihoods
6. ***Incentives for forest conservation and sustainable forest management:***	1. Requirements of wood, wood products, NWFPs 2. Rising demand for such commodities as building materials, furniture & learning materials 5. Destruction by seasonal wild fires ***1.Design and implement various modalities of community participation in forest & rangeland conservation & management across Sudan,*** ***2.Assess the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds,***	1. Build awareness of forest neighbouring communities and their vested interest in non-destructive benefits of forests & trees.
7. Incentives or Reforestation &Forest Plantations	1. Requirements of wood, wood products, NWFPs 2. Rising demand for such commodities as building materials, furniture & learning materials 3. Influx of Refugees & IDPs 4. Urbanization 5. Destruction by seasonal wild fires ***1.Analysis of the profitability of plantations with and without state subsidies,*** ***2.Economic analysis of the domestic and international market demand for sustainably managed plantation timber, charcoal and firewood including examination of certification schemes and fiscal instruments such as levies, tariffs and consumer taxation,*** ***3.Analysis of possible incentives to persuade mechanized rain fed farmers across the belt of Sudan to conform to regulations of putting 10% of holdings under tree formations.***	1. Understand the dynamics of viable expansion of forest plantations for sustainable production of wood & NWFPs for domestic consumption & export
8. Incentives for crop intensification & more balanced livestock production	1.Demand for food and food security due to populations growth ***1.Piloting with agroforestry and/or agrosylvopastoral systems to produce high value food cash crops, livestock & products thereof, building poles, firewood, charcoal and gums in***	1.Proove, consolidate and sustain multiple benefits of multi layers of the same plot of land

Option	Issues to be addressed Key requisite activities	Envisaged mitigation benefits
	communal lands, private holdings & FNC and State forest reserves, capitalizing on recent developments in water harvesting. *2.Research/studies on cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting.*	
Institutional arrangements to support & consolidate sustainability of realized objectives		
9. Reconciliation of conflicting policies of rival economic sectors and streamlining of activities of supporting sectors such as education and research.	1. Conflicting policies & interest of rival resource using sectors 2. Disparity in capacity & human resource capabilities of renewable natural resources institutions particularly forestry, range and wildlife *Advocate and urge:* *1. Reconciliation of forest, range and wildlife policies with those of rival sectors particularly Agriculture, Industry, Mining, Petroleum, Tourism and Finance & National Economy* *1. Full integration/ merger of research and higher education institutes of Forestry, Range & Wildlife,* *2. Revision of research programmes and teaching/training curricula of Forestry, Range and Wildlife to accommodate variables emanating from CC, Desertification, geo-political realities and socio-economic development*	1.Upgrade the appreciation of all recourse users and custodians of sustainable resource use 2. Rationalize and Maximize the use of available meagre resources

2B.4. Budget

Output (major Activity)	Organizations involved	Activities or Sub-activities	Budget allocations (estimated cost in thousand $				
			2014	2015	2016	2017	Total
Outcome 1: Process of carbon balance initiated							
1.1 Amount of wood wasted through wasteful harvesting & poor conversion into sawn wood reduced, 1.2. Feasibility of shifting brick firing from wood to LPG examined, 1.4. Feasibility of shifting domestic, service and industrial consumption of wood & charcoal to other energy sources assessed.	FAO / UNEP / WB / FNC / Private sawmill owners / private forest owners / universities	1. Pilot projects to support FNC and private sector to process/manufacture small - size *A. nilotica* wood	50	50	50		**150**
		2. Technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG	25	25			**50**
		3. Technical, socio-economic and environmental benefits / drawbacks of shifting building with wood-fired clay bricks to concrete blocks.	10	10			**20**
Outcome 2: Process of promoting sustainable charcoal industry initiated							
2.1. Charcoal conversion improved, 2.2. Productivity of charcoal producing forests enhanced, 2.3. *Acacia/Balanites* mix and Misquite for charcoal examined	FAO – UNEP -WB – FNC - Private charcoal producers & exporters researchers.	1.Pilot projects to produce sustainable high quality charcoal for domestic urban consumption and export	100	50	50		**200**
		2. Technical / environmental / socio-economic studies on charcoal from *Acacia-Balanites* mix and from Mesquite.	10	10	10		**30**
Outcome 3: Process of promoting sustainable firewood production initiated							
3.1. Recovery of high calorie lower part of trees improved, 3.2. Efficiency of firewood stoves enhanced, 3.3. Cost & benefit of implementing FES programme compared to that of incentives for shifting to LPG stoves, 3.4. Means of curbing ox-bow lake siltation looked into	FAO – UNEP - WB – FNC - Private Firewood value chain stakeholders, producers, researchers	1.1. Establish firewood plantations of high calorific value indigenous tree species and fast growing exotic trees in various settings and ownership,	100	100	100		**300**
		1.2. Improve harvesting efficiency & recovery of firewood from riverine *A. nilotica* forest plantations.	25	25			**50**
		1.3. Design, test and disseminate FESs particularly in high consumption such regions like Darfur.	25	25	25		**75**
		Technical & socio-economic studies to: 2.1. Compare the costs and benefits of implementing an FES programme compared to incentives for substituting to LPG stoves,	10	15			**25**

Output (major Activity)	Organizations involved	Activities or Sub-activities	Budget allocations (estimated cost in thousand $				
			2014	2015	2016	2017	Total
		2.2. Consider means to reduce siltation in riverine *A. nilotica* forests					
Outcome 4. Understanding of national energy budget & mix better understood							
4.1. Understanding of national energy mix enhanced	UNDP-UNEP-WB – FNC-Ministries of Electricity & Dams, Energy Research Centre, International Consultants.	Studies into the role and position of wood-based energy compared to sustainable alternatives such as solar power, wind and hydro options.	25	25			**50**
Outcome 5. Process of diversification & sustainable production of Gums enhanced							
5.1. Development of protocols for production of Gums other than Hashab (*A.senegal*) initiated.	FAO-UNEP-WB – FNC-Communities, Gum Arabic Board, GAPAs, researchers,	Develop protocols for production of gums other than gum Gum Hashab (*Acacia senegal*) through popular participation, agroforestry and agro-pastoral systems	25	50	50		**125**
Outcome 6. Sustainable management of isolated forest & woodland tracts initiated together with community involvement & bond to local environs							
6.1. Awareness of forest neighbouring & dependent communities and their vested interest in sustainable non-destructive benefits from forests & trees enhanced	FAO-UNEP-WB – FNC-Communities, Farmer & Pastoralist Unions, NGOs, consultants, researchers	1. Assess the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds,		25			**25**
Outcome 7. Case built for expansion of reforestation & forest plantations for sustainable production of wood & NWFPs for domestic & export purposes.							
7.1. Dynamics of viable expansion of forest plantations for sustainable production of wood & NWFPs for domestic & export better understood	FAO-UNDP-UNEP-WB – FNC, consultants, researchers	Study into the profitability of forest plantations, considering the domestic and international markets, and potential economic incentives to foster the development of forest plantations.	10	15			**25**
Outcome 8. Viability, sustainability & realization of tangible benefits of agroforestry and agro-silvo-pastoral systems demonstrated							
8.1. Prove, demonstrate, consolidate & instil concepts of multiple tangible benefits of agroforestry & agro-silvo-pastoral systems	FAO-UNEP-WB – FNC-Communities, Farmer & Pastoralist Unions, NGOs, consultants, researchers	1. Piloting with agroforestry and/or agrosylvopastoral systems to produce high value food cash crops, livestock & products thereof, building poles, firewood, charcoal and gums in communal lands, private holdings & FNC and State	100	100	100		**300**

Output (major Activity)	Organizations involved	Activities or Sub-activities	Budget allocations (estimated cost in thousand $				
			2014	2015	2016	2017	Total
		forest reserves, capitalizing on recent developments in water harvesting. 2.Research/studies on cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting					
Outcome 9. Reconciliation of initiated of conflicting policies of rival economic sectors together with streamlining of activities and capabilities of sister supporting sectors such as education & research							
9.1. Appreciation of all recourse users and custodians of sustainable resource use upgraded 9.2. Rationalization and Maximization the use of available meagre resources initiated	FAO-UNEP-WB – FNC-Academia, NGOs, CSOs	Advocate and urge: 1. Reconciliation of forest, range and wildlife policies with those of rival sectors particularly Agriculture, Industry, Mining, Petroleum, Tourism and Finance & National Economy 1. Full integration/ merger of research and higher education institutes of Forestry, Range & Wildlife, 2. Revision of research programmes and teaching/training curricula of Forestry, Range and Wildlife to accommodate variables emanating from CC, Desertification, geo-political realities and socio-economic development		10	15		25
Total			*515*	*535*	400		1450
Government							
FCPF							
UN-REDD Programme (if applicable)							

2C. REDD-plus Implementation Framework

Analogous to similar donor assisted initiatives/projects, Sudan National REDD+ Programme implementation is envisaged to be undertaken by an administrative structure of that designation, through normative institutional arrangements. The actual REDD+ Implementation Framework is hence similar to this structure, but will undergo changes and revisions, once the readiness management arrangements are better visible, along the emerging REDD+ strategy.

2C.1. Institutional Arrangements

In line with similar bilateral/multilateral assistance modalities, the process starts with the signature of a financial agreement Between UN-REDD finance agencies and Ministry of Finance & National Economy.

On signature of financial agreement, Ministry of Finance & National Economy (MFNP) appoints and mandates the FNC as the project implementing agency.

The Minister responsible for Forests (currently The Minister of Environment, Forests & Physical Development) shall eventually establish/appoint a Sudan National REDD+ Programme Implementation Body (SNRPIB). This is envisaged to encompass:

- Sudan REDD National Steering Committee (SRNSC),
- A Programme Manager who will lead the day to day programme implementation He/she shall be assisted by Communication Officer, Administrative Officer & Secretary
- An Advisory Group,
- Structure, composition, ToRs and work modalities of SNRPIB are described in **Annex Ia.4**. and its structure is depicted in **Figure IA-1**.

The National Programme Manager is envisaged to act as convenor of SNRPIB. The composition of the latter is envisaged to:

- Observe fair and equitable gender and regional/state representation,
- Observe relevant aspects of transparency and integrity.

A tentative list of stakeholders to involve in the RED+ implementation process is provided in Table II-13.

Work plan of the Sudan National REDD+ Programme Implementation Body (Table II-14):

- Establish an appropriate institutional structure to undertaken the executive studies, capacity building and elaborate and disseminate the documents, tacking in consideration the support from different stakeholders groups.
- Capacity building institutions relevant to REDD+ Programme in Sudan
- Integration of Environmental Concerns into Development Policy

Table II-13: Envisaged Tentative Stakeholders List for implementation of REDD+ in Sudan.

Ministries	Related Formal Institutions	Others (NGOs, CBOs.etc.)
Ministry of Animal Resource, Range &Pasture	Wildlife Department, RPGD	Pastoralist Union
Ministry of Electricity & Dams	Electricity Generation & Distribution Companies	
Ministry of Agriculture & Irrigation	State Ministries of Agriculture & Livestock, Agricultural Research Corporation, Forestry Research Centre, Land use Department	Farmers' Union
Ministry of Minerals	Mining Companies Individual miners	
Ministry of Communications	Communications & Information Technology Companies	
Ministry of Energy	Petroleum Exploration & Producing Companies	
Ministry of Information & Culture	Public Media : TV, Radio, Newspapers	Pens & Artists Unions, Individual journalists & playwrights
Ministry of Social Security	Zakat Bureau, Microfinance Schemes, Women Groups, SECS, Sudanese Forestry Society, Practical Action,	
Ministry of Higher Education	-Universities & Training Institutes - Remote sensing Authority	Teaching Staff, Individual Experts & Consultants
Ministry of Human Resources Development & Labour	Training & Capacity Building Institutes	Workers' Trade Unions
Ministry of Finance & Central Bank of Sudan	National Council for Strategic Planning	Microfinance Schemes,
Ministry of Environment, Forests & Physical Planning	FNC, HCENR	Sudanese forestry society -Sudanese Environmental Conservation Society -Social Forestry Society -Environmentalists Society - Gum Arabic associations
Presidency & Ministry of Council of Ministers	National council of Population Gum Arabic Board & National Strategic Planning Council	Trade Unions Women`s Union
National Assembly (Parliament)	State Legislatures,	Native Administration (Emirs, Nazirs, Sheikhs, etc.
Private Sector	DAL& KSC, Small businesses, small size sawmills, carpentry & furniture workshops, Gum Processors & Exporters, Whole Sale & Retailers of Wood & NWFPs	

Table II-14: Work plan implementation framework

Main activity	Related institutions	Time line
Stakeholder engagement in REDD+ readiness process enhanced	FNC, HCENR, NGOs, CBOs, private sector, line ministries, Gum Arabic union, state forests UNEP, UNDP, FAO, etc.	2014 - 2015
Management Arrangements contributing to the National REDD+ Process	FNC, HCENR, NGOs, FRC, Remote Sensing Unit, Uof K, U of Sudan, State Forests, National Council for Population	2014 – 2015
National REDD+ Strategy and Implementation Framework	FNC, Line Ministries, HCENR, FRC, National Council for Population	2014 - 2017
National forest & woodland inventory system	Remote sensing unit, FRC, Energy Research Centre, FNC, State Forests,	2014 - 2017
Reformulate management plans of riverine, non-riverine and montane forests to accommodate revised designated functions and consolidate livelihood aspects	FNC, HCENR, NGOs, FRC, RPGD, Remote Sensing Unit, Uof K, U of Sudan,	2014 - 2017

Sudan R-PP shall pay attention especially on how to define and develop an institutional and organizational framework to use to build an advanced system for REDD+ capacity building.

FNC and their partners started to establish the REDD+ framework to raise awareness and capacity building & REDD+ implementation for all stakeholders and communities around the forests. Also FNC has an established well linked system distributed geographically, (FNC Technical Sectors (FNCTS)) (Figure IIa.1) which can facilitate the implementation for REDD+ in Sudan in collaboration with FNC partners (Figure II-2), such as Ministries (Environment, Agriculture, Minerals, Animal Resources, RPGD, Water Resources, Electricity & Dams), HCENR, FRC, Educational institutions, NGOs (related), and CBOs.

Other institutions to involve are the Sahelian Training Centre for Forestry (STCF) and the Energy Research Centre (ERC).

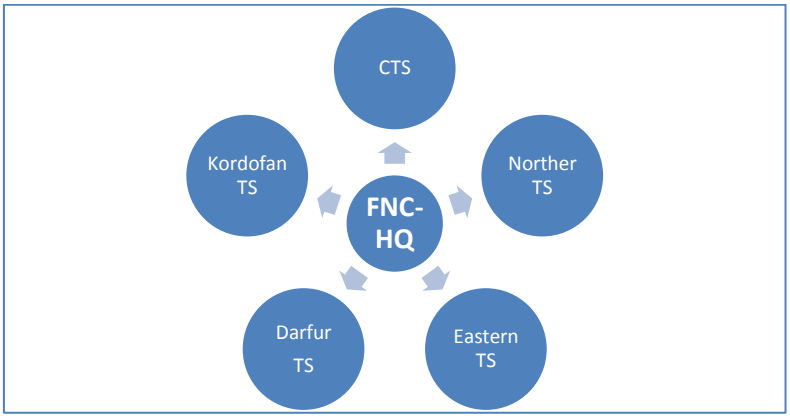


Figure II-2: The Forests National Corporation (FNC) and Geographical Technical Sectors

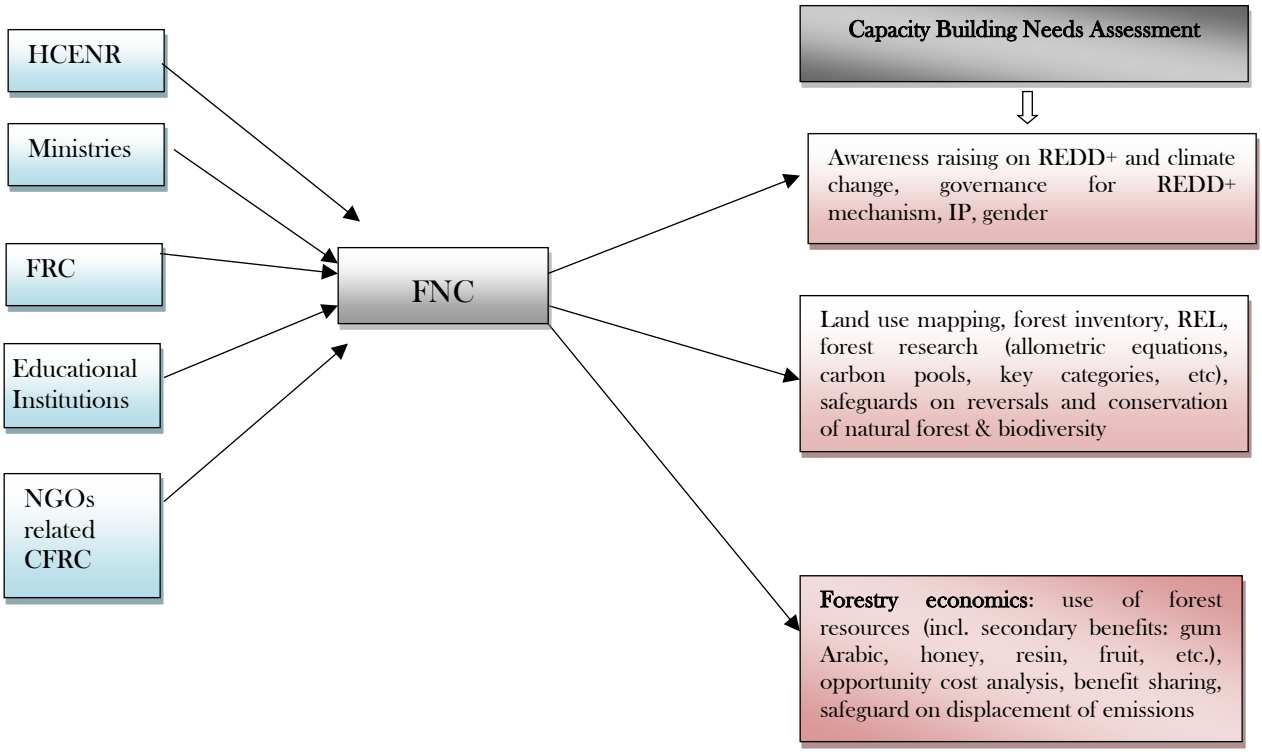


Figure II-3: The Forests National Corporation (FNC) & related institutions (implementation of REDD+& Capacity Building) Geographical Technical Sectors

Other institutional arrangements encompass such actions as establishing a Carbon Registry

2C.2. Carbon Registry

Sudan envisages establishing a Carbon Registry for National & Sovereign purposes and to avoid double accounting from the likely nested REDD+ activities at national, sub national and local levels. It is perhaps prudent to be housed in the Higher Council for Environment & Natural Resources being a subsidiary of The Ministry of Environment Forestry & Physical Planning & the national focal point for UNFCCC. A budget of seed fund has been proposed for the purpose within the relevant component.

However, Sudan shares the view that the creation of an information hub at the international level could facilitate the transparency and robustness of REDD+ results and the transparency of corresponding payments. Such hub can maintain information on measured, reported and verified results and track payments. Moreover the hub would also facilitate access to relevant information needed by implementing countries, donors and financial institutions, including how safeguards are being addressed and respected

Mainly the carbon registry will facilitate and incentivize the:

- The design of safeguards systems
- Incentive to reduce the deforestation and forest degradation rate
- Development of the environmental services in general
- Proper accounting of carbon benefits
- The equitable distribution of benefits to the relevant stakeholders

2C.3. Integration of Environmental Concerns into Development Policy

Sudan has several policies and strategies at national and sectoral levels covering natural resources that include water, forests, range and agriculture aiming at the main objective of sustainable development and achievement of the Millennium Development Goals. Sustainable development and efficient use of these resources has been an important part of these strategic policies.

The earliest reference to conservation and development objectives in natural resource assume that sustainable management is a central issue. In this respect, natural resource management planning in Sudan may be found in the Six-year Development Plan (1977-1983), which considered conservation of the country's natural resources as one of the methods for attaining the objectives of the plans, (Tolentino, 1991). A number of strategies, policies and programmes were adopted in the wake up of the Salvation and Recovery Development Programme that increased the speed of development. Mention is made here to the National Strategy for Comprehensive Development (CNS) (1992 – 2002) which represents a mile stone in national planning towards integration of environment and development. The CNS and its successor, the Quarter Century National Comprehensive Strategy (2002 to 2027), considered environmental development in more depth, comprehensiveness and integration than being sectorally stated in previous strategies. The latter has highlighted fifteen goals as the most important "National Challenges" to be addressed. Three of these are of significance within the realm of the environment:

- Achieving integrated human resources development;
- The conservation of natural resources and the striking of a balance in their exploitation between the present needs and the rights of the coming generations, and preserving the sustainable environmental purity of the natural resources,
- Emphasizing and achieving rural development.

The CNSs emphasized on the achievement of the MDGs that consider protection and development of natural resources as important elements in human health, self-sufficiency of population needs and contribution towards the well-being of Sudanese citizens. The CNSs give priority to cost-effective utilization and management of the natural resources and waters, their rehabilitation and sustainable management. In this respect rural development through participation has been placed as important tool in the development strategies of the natural resources. Water development has been stressed upon in the strategy noting that environmental changes coupled with population increase may create scarcity.

Since 1992, Sudan has developed several strategies, policies and programmes which also aimed at environmental protection and sustainable development. These include:

- National Environmental Action Plan Capacity 21Sudan,
- National Biodiversity Strategy (2001),
- National Action Plan to Combat Desertification (2002),
- Climate Change Enabling Project (2002).

The National Environmental Action Plan is based on governmental efforts and non-governmental organizations contribution. It is a basic document containing baseline information and identifying major environmental issues.

Other policies include Water Policy, Forest Outlook and the Document on Sudan's Commitment to Social Development and Population Policy. However, Sudan is lacking a comprehensive environmental and natural resources policy and legislative framework that deals with land use in an integrated way (Atta Elmoula 1985). Rather, there are a number of individual sectoral policies e.g. agriculture, forestry, wildlife and other resources. Tolentino (1994) refers to the lack of legislation that specifically deals with land use and land management as a principal reason for the absence of environment and natural resources policies.

The absence of land use plans and a lack of laws governing land tenure and land use resulted in a situation that led to conflicts between land uses and land users. Land settlement is based on various approaches including old historical land settlement acts and traditional customary practices which are based on local leaders and elders. The conflicting interests of traditional rain fed farmers, mechanized farmers, pastoralists, forest users and the state (as owner of all unregistered land), discouraged proper forms of land management and might have caused social and environmental negative impacts. Examples of such conflicts can be cited in areas where previous rights of the subsistence farmers (traditional agriculture), forest users and pastoralists were not respected and usually encroached upon in favour of the mechanized farmers or state owned and private corporations.

Land use under government control, such as mechanized farming practices, generally focuses on resource use for income generation to national and state treasuries, rather than efforts to improve local livelihoods and sustainable development. However, land under customary tenure could be more sustainable because of the effectiveness of the traditional laws governing ownership but even these traditional systems have been violated. The effectiveness of the traditional systems may be due to the fact that the tribal customs as implemented by the local leaders try to ensure equity and right of subsistence cultivation for every member of the local community (Sudan Report, 1991).

Agricultural expansion policies typically dominate at the expense of forestry and other natural resources development and management including the lack of coordination. This has greatly influenced present day forest and range policies and practices and resulted in vast land degradation (Elsiddig 2004).

In 1991, Sudan adopted the federal system as an approach to decentralization which resulted in establishment of fifteen States in North Sudan that assumed responsibility for local administration. The objective behind decentralization is to transfer responsibilities and to re-divide power and revenues among Sudanese people. The federal system policies relating to environment protection, in general, are perceived as joint responsibilities between the federal and state governments aiming at coordination of policies and fulfilment of sustainable development. However, there is a lack of comprehensiveness and absence of effective coordination in the sectoral institutes that resulted in serious behaviour on the environment and the natural resources (Abdel Ati and Awad 1996). Improvement of cooperation between these sectoral institutes would be one of the arrangements of the REDD+ strategy to improve institutional and governance shortcomings.

Some further information on sectoral policies (Agriculture, Forestry, Water, Range, Wildlife, Livestock and Land Tenure is provided in Annex 1c.

Issues relevant to Sudan REDD+ Implementation

Key such issues include but are not limited to:

- Awareness raising to mainstream the REDD+ concept,
- Concerted legislative & institutional efforts to embed forestry, range & pasture & wildlife concerns into policies and planning of other land users,
- Coordination with the five year plan for Sudan (2012-2016) that includes the natural resources, wildlife, agriculture, minerals, energy, environment, animal resources and Range & pasture, electricity & dams,
- Policy & legislative measures to safeguard, institutionalize and effect the carbon and non-carbon rights of forest neighbouring communities, and to establish benefit sharing mechanisms,
- Implement pilot activities addressing livelihoods, SFM, Biodiversity and community-based natural resources management as identified in the process of REDD+ consultation & outreach (Annex 1c),
- Design and implement various modalities of community participation in forest & rangeland conservation & management across the country , further consolidating benefit sharing notions,
- Development of protocols for production of Gums other than Gum Arabic –Hashab- *Acacia senegal*
- Ownership of carbon rights, with links to land tenure, clarifying land tenure issues,
- Key governance concerns, with a policy of using existing institutional structures wherever possible,
- Sharing and distribution of REDD+ benefits to local communities.
- Establishing of a National REDD+ Registry at MEFPD.
- Hostilities in S Blue Nile, S. Kordofan and a couple of states in Darfur, are considered risks for the implementation of REDD+ in those areas of Sudan

Some detailed descriptions of the work plan are also provided in other sections of the R-PP such as in Component 2B. At this moment, the institutional and legal arrangements necessary to implement the REDD+ strategy are not clear yet, because some details of the strategy are still in process of shaping up. Some preliminary implementation framework activites and their estimated budgets are, however provided in Table 2c.

2C.4. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousand$)				
		2014	2015	2016	2017	Total
Establish a work plan and ToRs to dress up a more concrete REDD+ Implementation Framework	Workshops	10	10			20
	Elaborate and disseminate documents	5	5			10
Conduct studies on the raised topics	Execute studies	20	20			40
	Disseminate policy briefs of results	5	5			10
Establish appropriate institutional structures	Capacity building workshops		10			10
	Carbon Registry	20				20
Design and implement various modalities of community participation in forest & rangeland conservation & management across Sudan		100	150	150		400
Total		**160**	**200**	**150**		**510**
Government						
FCPF						
UN-REDD Programme (if applicable)						

2D. Social and Environmental Impacts during Readiness Preparation and REDD-plus Implementation

A number of possible social and environmental impacts were evident or emerged during the course of REDD+ Strategy & R-PP preparation. Many technical, legislative and institutional studies, consultations and measures are planned to be undertaken. These were presented in sections 2b. In all countries receiving FCPF funding for Readiness preparation, the potential impacts of such measures need to be compliant with the requirements of the *Common Approach*[4]. This means that they normally need to be assessed against the World Bank's safeguards, especially where the World Bank is the chosen Delivery Partner, following a Strategic Environmental and Social Assessment (SESA) with its key output, the Environmental and Social Management Framework (ESMF).

SESA is a proven specific approach to the application of safeguards to REDD+ activities. The strength of a SESA for REDD+ is that it combines consultation and analytical work in an iterative process to inform the preparation of the REDD+ strategy. SESA requires a participatory and consultative process to help identify the key drivers of deforestation, and social and environmental priorities and recommendations to manage the response to these drivers of deforestation. This will shape then into Sudan's REDD+ strategy.

In the planned SESA process, two basic components, i.e. strategic risk diagnosis and risk management will be followed-up. It will progress from determining environmental & social *issues* to defining the environmental & social *priorities*, to *recommendations on measures* to address legal, institutional, policy, and capacity gaps according to those priorities. The following two phased approach will be taken:

During Preparation of the REDD+ Strategy:

- Addressing legal, institutional, regulatory and capacity gaps to manage environmental and social priorities associated with the drivers of deforestation and forest degradation
- Proposing risk minimizing REDD+ Strategy Options

During Implementation of the REDD+ Strategy:

- Addressing remaining environmental and social risks and potential impacts of policies, regulations, investments, or projects during the implementation of the R-PP or R-Package (ESMF)

The following steps will be taken during the National SESA process during the REDD readiness phase (Table II-15):

[4] The Common Approach to Social and Environmental Safeguards for FCPF Multiple Delivery Partners is a common platform of the FCPF Delivery Partners (The World Bank, UNDP, IDB and FAO) for risk management and quality assurance in the REDD+ Readiness Preparation process, using the safeguard policies of the World Bank as a minimum acceptable standard. It ensures that the strongest standards are maintained by a Delivering Partner, setting the bottom line at the World Bank's social and environmental safeguard policies.

Table II-15: Steps, responsible entities, actions and documentation along the National SESA process in the Readiness Phase.

Step	Responsible	Actions taken	Referenced in
1. Include provisions for coordinating SESA in national readiness management arrangements	GoS	Determine which entities will be responsible for SESA implementation and oversight, respectively; Create Sub-Committee or Working Group on safeguards application or SESA implementation	Component 1a of R-PP
2. Establish SESA-specific outreach, communication, and consultative mechanisms		Revisit composition of cross-sectorial, national-level REDD working group; Plan and carry out capacity building events; Organize a national-level multi-stakeholder workshop to engage in initial issues scoping	Consultation and Participation Plan for REDD+ Readiness
3. Prepare SESA Work Plan or Terms of References		Have relevant specialists prepare the SESA work plan (if from Government); or Initiate the bidding process (if SESA is implemented by a consulting firm);, Organize a national-level, multi-stakeholder workshop for SESA Work Plan/ToR validation or refinement	Components 2b and 2d of R-PP
4. Prioritize the drivers of deforestation and forest degradation, define environmental and social issues, impacts, and priorities in relation to them	SESA implementing entity	Contract and carry out special studies, with publicly consulted ToR; Conduct interviews; Organize workshops and/or meetings at national and sub-national levels	Draft description in R-PP Progress Report; Final description in R-Package
5. Assess environmental and social risks and potential impacts (positive and negative) of proposed REDD+ strategy options			
6. Identify existing legal/regulatory, policy, institutional, and capacity gaps to manage the previously defined priorities		Conduct interviews; Organize focus groups	
7. Make recommendations for filling the previously identified gaps		Organize a national-level multi-stakeholder workshop to generate and/or validate the recommendations; Refine existing and/or generate new REDD+ strategy options based on the results	
8. Develop Terms of References for preparing the ESMF		Disclose draft or final ToRs for public comment; If ESMF is to be prepared by a consulting firm, initiate the bidding process	ToRs included in R-PP Progress Report
9. Prepare ESMF consistent with the applicable safeguards	SESA implementing entity or ESMF preparation entity	Organize meetings at the national and/or sub national levels, to consult on initial draft ESMF; Disclose ESMF or advanced draft ESMF for public comment	ESMF or advanced draft ESMF included in the R-Package

Step	Responsible	Actions taken	Referenced in
10. Prepare summary of SESA outcomes and outputs	GoS	Prepare summary of SESA activities and outcomes	SESA Summary, for inclusion in R-Package

The ESMF is an instrument that applies for programs or series of sub-projects where the impacts cannot be determined yet. Still, as early as possible in the planning process, there should be some provisions in place to set out the principles, rules, guidelines and procedures to address the anticipated negative or positive impacts. The ESMF can be started once the country's REDD+ strategy begins to take concrete shape and discrete investments with site-specific impacts are identified.

The following table II-16 provides a preliminary estimate what issues might be expected and which safeguards might be triggered by the envisaged strategic options of the R-PP, as planned in component 2B.

Table II-16: Preliminary estimate of WB safeguard policies (OP) possibly triggered by the planned strategic options as of component 2B.

Planned Outputs	Option	Issues and safeguards possibly triggered
1.1 Analytical studies on alternative energies and wood energy efficiency	Study on technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG	No safeguards triggered, but if study is prepared by consulting, due diligence of bidding process needs to be assured ToRs of studies should cover safeguard aspects, i.e. that the studies include a section on how the analysed topic, if executed, could impact on people and nature. This should most notably include possible impacts on environmental (and social) aspects (OP 4.01), natural habitats (OP 4.04), indigenous peoples (OP 4.10), involuntary resettlement (OP 4.12), forests (OP 4.36), projects in disputed areas (OP 7.60), physical cultural resources (OP 4.11) and pest management (OP 4.04).
	Studies & pilot experimentation on non-cost demand factors that could act as barriers to fuel substitution and fiscal instruments linked to REDD+ finance that would make LPG cheaper at point of sale	
	Technical/environmental/socio-economic studies on charcoal from *Acacia-Balanites* mix and from Mesquite	
	Technical & socio-economic studies on design and dissemination of firewood efficient stoves	
	Study to determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar/ wind energy would be cost effective	
	Study to analyse cost-effectiveness of increasing efficiency of existing hydro plants, development of small hydro plants along the Nile, extending electricity grids to reach a higher proportion of population and alternative sources of carbon finance, including REDD+ and funding for renewable energy, determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar/ wind energy would be cost effective	
Output 1.2. Analytical studies on improving forestry production	Assessment of the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds	
	Analysis on the profitability of plantations with and without state subsidies	
	Economic analysis of the domestic and international market demand for sustainably managed plantation	

Planned Outputs	Option	Issues and safeguards possibly triggered
	timber, charcoal and firewood (see also option 2 on sustainable charcoal), including examination of certification schemes and fiscal instruments such as levies, tariffs and consumer taxation	
1.3 Analytical studies on improving agriculture and rangelands	Analysis of possible incentives to persuade mechanized rain fed farmers across the belt of Sudan to conform to regulations of putting 10% of holdings under tree formations	
	Analysis of the supply and demand effects of integrated policies for agricultural intensification, rangelands and sustainable forestry and forest protection	
	Cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting	
2.1 Wood processing is improved	Technical and economic support to FNC & private forest owners to process small -size *Acacia nilotica* wood	Notably check on OP 4.01, and 4.10
2.2 Participatory modalities in various production systems are in place	Develop protocols for production of gums other than gum Hashab (*Acacia senegal*) through popular participation, agroforestry and agro-pastoral systems	Notably check on OP 4.01, 4.04, 4.09, 4.10, and 4.36
	Design of various modalities of community participation in forest & rangeland conservation & management across Sudan within and without the context of such regional initiatives as the Great Green Wall of Sahara & Sahel	Loss of biodiversity, converted land cover may impact wildlife migration and foraging habitats. Run-off of inadequately treated wastewater may cause contamination. Land degradation from animal pressure. Notably check on OP 4.01, 4.04, 4.09, 4.10, 4.11, 4.12, 4.36 and 7.60.
3.1 Mechanisms are in place to coordinate sectoral policies of forestry, agriculture and rangelands	High level meetings to create new administrative structures	No safeguards triggered, but check for gender balance
4.1 Priority strategic options are endorsed	Dissemination of strategic options and meetings with key stakeholder groups	No safeguards triggered, but check for balanced representation, including gender

2D.1. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Stakeholder identification	Workshops	20				20
Analysis of environmental and social issues of baseline situation in Sudan and of the planned REDD+ process	Develop TORs	5				5
	Conduct study	15	20			35
Development of ESMF	Develop TORs		5			5
	Conduct study		10		20	30
Total		**40**	**35**	**15**	**20**	**95**
Government						17
FCPF						38
UN-REDD Programme (if applicable)						40

Component 3: Develop a National Forest Reference Emission Level and/or a Forest Reference Level

3.1. Introduction

In order to assess the net benefits of the implementation of REDD+ eligible activities, periodic assessments of carbon stored in the forest need to be compared against a reference (emission) level in order to establish **reduced emissions** and **enhanced removals**.

Decision 1/CP.16, paragraph 71(b), requests countries aiming to participate in the REDD+ mechanism to develop a national forest Reference Emission Level (REL) and/or Reference Level (RL), covering the entire forest estate of the country. Following the suggestion in the footnote to this paragraph, Sudan will, in fact, produce a number of RELs and RLs to account for the variety of forest ecosystems, drivers of deforestation and forest degradation, and eligible activities. These individual, specific RELs and RLs will be used for the assessment of reduced emissions and enhanced removals under the specific conditions that they apply to, and they will be composited into a national aggregate for reporting to the UNFCCC. In constructing the RELs and RLs Sudan's national circumstances will be considered, including national development priorities, competition and post-conflict impacts on national forest resources, the role of forests in people's livelihoods, land use, deforestation rate, drivers of deforestation, related environmental and socio-economic aspects.

In accordance with **Decision 12/CP.17** and **Decision 13/CP.19**, Sudan's RELs and RLs will be constructed in a step-wise approach and submitted to the UNFCCC for technical assessment, prior to their application in determining REDD+ performance.

Based on the UNFCCC requirements to establish the RELs/RLs and Sudan national circumstances, this R-PP proposes an action plan, approaches, methods and an outline of the data to be collected and be used to establish the RELs/RLs. It is expected that during the implementation of the Sudan National REDD+ Programme, the country shall undertake the surveys, studies, data collection and data fine-tuning using proposed methods and approaches to establish a national (or as an interim measure, sub-national) REL/RL and shall continue to adjust and improve on them in light of any subsequent international guidance, and improvements in methods and data.

3.2. Past forest assessments

Sudan has not yet established a regular or permanent national forest inventory system, mainly due to lack of resources. Numerous efforts (surveys and studies) have however been undertaken to study forest and range resources and changes in land use and vegetation cover in the Sudan. The state of forest cover can only be assessed from these incomplete and *ad hoc* surveys and studies in addition to global Forest Resources Assessments (FRA) and other international literature. This section provides a brief overview of existing information on forest cover; full details can be found in the Annex 3.

3.2.1. Completed forest assessments

Early surveys

Several studies were conducted during the late forties and fifties including Andrews (1948), Harrison and Jackson (1958), Lewis (1953) and Ferguson (1954). The Forests Department conducted various surveys in the Central and Eastern regions mainly for the preparation of Working Plans in reserved forests.

Forest resource survey 1972-1975

In 1982, the National Energy Administration (NEA) in collaboration with Forests Administration, UoK, FRI and the Regional Remote Sensing Facility (Nairobi) conducted a forest resource survey to address the country energy requirements. Landsat 1 Multi-Spectral Scanner (MSS) satellite imagery for the period 1972-1975 was used. A composite vegetation map, divided into thirteen strata and one sub-stratum (forestry plantations), was designed for this period. The crown cover of forest strata ranged between 30–80%. The survey showed considerable depletion of forests in the Central and Eastern part of Sudan compared to earlier maps and more recent images. Consequently an intensive ground survey was conducted to validate satellite images interpretations. The total forest area in North Sudan was calculated to be 37.2 Mha.

National forest inventory 1995-1997

The 1995-1997 Forest national Inventory NFI covered most of the area north of latitude 10^0N with crown cover ≥10%, which now represents more or less the area of the RoS after the cessation separation of South Sudan. It covered an area of 62.27 Mha, spread over 15 of the 16 states of RoS at the time (except the Northern State), equivalent to 33% of the total area of the RoS. The inventory results showed that forest cover was slightly less than 12% of the inventoried area. When extrapolating this result to the territory of RoS a total national forest area of about 22.6 Mha is estimated. This value is much smaller than the 1972-1975 inventory in spite of the fact that the considered crown cover is 10% against 30% in the earlier inventory.

As a follow-up to the NFI, a pilot was conducted in some areas of Blue Nile State to study the computer-assisted interpretation of satellite imagery. The future national inventory may possibly follow this same procedure of ground survey by map sheet and state-based, with systematically distributed sample plots and to use this for remote sensing application in order to provide good sample coverage at national level to provide reliable estimation of forest cover. Based on Sudan's experience, use could be made of the compatibility and efficiency of combined remote sensing and ground inventory from many studies and survey conducted by FNC where, integrated data from different sources (combination of remote sensing and ground survey) using different methods and approaches to analyse the long-term land use and land cover changes and trends during the previous decades.

Africover

In 1997 the Africover project commenced its activities covering 10 Nile Basin countries in addition to East African countries, including the Sudan. It is the only total survey of the country to date. The project used Landsat TM coverage of 1997-2000 and the maps produced were visually interpreted. Ground validation in the Sudan was, however, limited to some areas in Western Kordofan, Southern Darfur and Red Sea States and limited scattered samples in Central Sudan. The land cover was aggregated into six main land cover types. A total of 27.0 Mha of land was

classified as forest, using the FAO classification of forest, and an additional 44.0 Mha as rangeland, which is not considered forest under the standard FAO classification but which will (partially) be covered under Sudan's forest definition for the UNFCCC and REDD+ purposes.

An update of the Africover data generated in 2010 from high resolution satellite imagery showed 21.8 Mha of forest and 45.7 Mha of rangeland.

3.2.2. Forest cover change assessment

The NEA assessment (for 1972-1975) and the Africover dataset (for 2000) constitute data sources for estimating Sudan's forest state and changes in forest cover. Based on World Bank report and NEA the total forest area in Sudan (with crown cover more than 30%) was estimated to be 37.2 Mha. Hence, an approximate estimation of the forest cover loss could be calculated as:

$$37.2 - 27.0 = 10.2 \text{ Mha}$$

This equates to an annual change rate of 10.2 Mha / 28 years = -363,473 ha/yr, or approximately 1.14 % per year (period 1972 until 2000).

The base year for NEA was taken as 1972 and the base year of Africover was taken as 2000 and the period was taken as 28 years. Information regarding Other Wooded Land (OWL) estimation for the year 1972 was insufficient to estimate the change rate for OWL. The basic forest definitions of the two studies need to be further analysed to determine if these datasets are indeed comparable. Also further circumstances need to be taken into account to allow a correct interpretation of deforestation trends in the RoS, as cited in FAO (2006):

> *"It must however be noted that the 28 years between 1972 and the year 2000 are composed of two entirely different periods of approximately 14 years each. The first period (1972 - 1986) witnessed the heaviest removal of forests to be replaced by state assisted mechanized agriculture. The heavy tree uprooting and burning for agriculture started in the early seventies and reached its maximum in the early eighties of last century when the horizontal expansion of mechanized agriculture ceased. That period also witnessed the famous droughts of 1974 and 1984 that caused wide tree mortalities and greatly impacted desertification effects. This first period is very much different from the second period (1987 – 2000) where the Government much curtailed any new encroachments on forests lands, issued Ministerial Decrees to this effect and actually stipulated by legislation (Forest Law 1989) that 10 percent of all mechanized farms should be forested in the form of shelter belts, wind breaks or woodlots*
>
> *The second period also witnessed the establishment of the FNC which was a turning point in national forestry history where great efforts were made to stop tree removal through both effectuating the Forest Law and enhancing people's participation in tree protection and tree planting. FNC also staged large reforestation programmes amongst which the "Restocking of the Gum Belt for Desertification Control" projects in northern Kordofan and Darfour which added sizable areas of forests to those drought stricken zones and reforestation of mechanized schemes in Gadaref State through a joint venture between Farmers' Union, Gum Producers' Union, Gum Arabic Company and FNC. It can be seen from the above comments that the results*

of the calculation of the rate of change in the forestry extent using 1972 and 2000 as reference years which yields a negative annual change rate (...) is largely due to the heavy tree removal in the first period. The second period is expected to result in much higher figures of forested areas and show changes of much less than that."

Regarding estimates on biomass, it should be noted that the forest resources exhibit a wide range of standing wood volume in different climatic zones. Whereas the average volume was estimated at 25 m^3/ha in 1960, the local average was 150 m^3/ha in mountain forests. The average standing volume was approximately 25.0 m^3/ha in the early 1960s but has declined to a range of 1.0 – 7.0 m^3/ha in the arid regions. At present, the standing volume in the Blue Nile region (which encompass present day Blue Nile, Sennar, Gezira & Gadaref States) is much lower than it had been in 1960s. The Blue Nile region was one of the richest forest resources in the country but was left with only 9.0 m^3/ha in 1995 (Abdel Salam, *et al.* 2003).

3.2.3. Sudan Second National Communication to the UNFCCC

Sudan's Second National Communication to the UNFCC provided an overview of emissions of greenhouse gases from the LUCF sector. The inventory results (table III.1 below) show that in 2000 the LUCF sector is a net source of 9,392 Gg CO_2e, which is equal to about 12% of total emissions of Sudan. The conversion of forests and grasslands accounts for all emissions from the LUCF sector (23,924 Gg CO_2e). This is mostly due to the deforestation and degradation of forests and rangelands associated with unsustainable biomass extraction in rural areas.

Regarding CO_2 removals by sinks, changes in forest and other woody biomass stocks that are under management of the FNC account for about 76% of all sequestered CO_2. The remaining 24% of all sequestered carbon is associated with the abandonment of agricultural lands.

Table III-1: GHG inventory of Land use Cover & Forestry (LUCF) sector, year (2000), in Gg

Greenhouse Gases Sources and Sinks Categories	CO_2e	CO_2 Emissions	CO_2 Removal	CH_4	N_2O	NO_2	CO_2
Total emissions from LUCF	**9,392**	**23,924**	**-15,906**	***59***	**0**	***15***	***520***
A. Change in forests and other woody biomass stocks	-12,125	0	-12,125	-	-	-	-
B. Forest and grassland conversion	25,298	23,924	0	59	0.4	15	520
C. Abandonment of managed lands	-3,781	0	3,781	-	-	-	-
D. CO_2 emissions and removal from soils	0	0	0	-	-	-	-
E. Other	0	0	0	0	0	0	0

Note: Only emissions of CO_2, CH_4 and N_2O were included in the determination of total CO_2e levels

3.2.4. Studies on growth in plantation species

Growth, yield and rotation age are the main parameter needed to estimate the carbon stock changes of any tree species. As a result of the variable cultural and other factors, the growth and wood increment of the plantations have varied widely. For quality class III sites, which appear to make up most of the areas, yields to rotation age of 8 years for seedling stands have varied from 1 m^3/ha/yr (sometimes even less) to about 10 m^3/ha/yr, with a mean of about 6.5 m^3/ha/yr. In a few instances, on better sites, they have reached 23 m^3/ha/yr. Masson and Osman (1963) gave the average yield of irrigated *Eucalyptus microtheca* plantations in the Gezira as 7.3 m^3/ha/yr at 7.5

years. In his analysis of production and production prospects for these plantations, Foggie (1967) noted that water was commonly applied irregularly and frequently in inadequate quantities. Under these conditions, the average yield was 6.6 m^3/ha/yr although, sometimes, under more consistent watering regimes, MAI reached 9.9 m^3/ha/yr. He believed that, under more adequate, regular irrigation, the average should be at least 12 m^3/ha/yr. El Houri (1977), in his management tables for the same species at Gezira, showed average MAIs from seedling stands at 9 years of 23.3, 14.1, and 6.9 m^3/ha/yr for quality class I, II, and III sites with mean heights of 40-60, 40, and 30-40 m respectively. Ahmed also noted that MAIs in succeeding coppice rotations should average 15% more than those from the seedling rotations in class I sites and 10% more for class II stands, although it would be 17% less in class III stands. Mean annual increment (MAI) rotation age data for some species is shown in the Table III-2 below.

Table III-3: Estimated Mean Annual Increment for some plantation tree species in Sudan.

Author	Year	Species	MAI (m^3/ha/yr)	Rotation
Bayoumi	1983	*Acacia nilotica*	12	25-30
Houri	1989	„ , „	22.6	
Poulin	1984	„ , „	1.63	
Goda	1987	„ , „	7.43	
Foggie	1967	*Eucalyptus microtheca*	7	8+6+6+6
Houri	1977	*Eucalyptus microtheca*	4.0	
Khan	1967	*Eucalyptus microtheca*	9.8	
Semizoglu	1987	*Eucalyptus microtheca*	9	
Talaat	1988	*Eucalyptus microtheca*	8.0	
Jackson	1960	*Cupressus lusitanica*	20	
Houri	1989	„ „ „	3.9	
Houri	1989	*Pinus 106adiate*	24	
Houri	1989	*Tectona grandis*	53	
Bayoumi	1983	„ , „	8	
Jackson	1960	„ „ „	5	
N.A.S.	1980	*Acacia seyal*	0.5-1.0	15-20
Abdel Nuor	1984	„ „ „	1.0-.4	
NAS	1980	*Prosopis chilensis*	7	
Anon	1986	*Acacia mellifera*	0.7-1.0	
Jackson	1960	„ „ „	0.6	
Jackson	1960	*Balaniaties aegyptiaca*	0.5	
Magid	1995	*Acacia senegal*	0.5	15-20

Source: Abdel. Magid 1995

The above data has been developed by experts who worked as forest researchers, forest teacher, forest service employers and also worked in the three fields, from 1960-1990. In Sudan there are more than 300 native species, exotics, natural and planted and the concentration is towards productive species. Volume equations are commonly used in management plans and with production and tending operations. Biomass equations are confined to studies in the universities, HCENR, Research Centres and FNC. FNC deals with biomass data in FRA reports, using IPCC guidelines, and the HCENR with FNC and other institutions are giving biomass attention since the climate change issues emerged as a global topic.

3.2.5. Planned activities

The Sudan REDD+ Coordinating Unit is planning to join up with the European Space Agency (ESA) and the World Bank who by 2013 have entered into the second phase of collaboration to mainstreaming earth observation (EO) information into operational activities. Within this framework, ESA will extend its financing and technical support to produce and deliver EO information services on forestry, including forest resources assessment and agriculture monitoring, providing a platform to identify further opportunities and to address new areas like ecosystems services, renewable energy, or capacity building in water resources management. This cooperation can take the full advantage of the technological capabilities of ESA, European satellite missions, and the up-coming ESA-EU joint initiative of the Global Monitoring for Environment and Security (GMES/Copernicus). This program will develop, launch and operate the biggest fleet of the next-generation EO satellites to provide long-term continuity of satellite data and fully operational environmental information services over the next decades. An application was launched by Sudan in July 2013 through the World Bank operational task team of AFR region who steps in with FCPF co-financing.

3.3. Characteristics of Sudan's forests and drivers

Due to its geography and topography, Sudan has a number of very distinct eco-floristic zones with a number of broad forest ecosystems. The stratification of these forest ecosystems will be undertaken as soon as the forest definition for Sudan has been completed. For purposes of illustration, we here identify three types of forest ecosystem:

1. Humid and sub-humid dense forest. These forests are found in the South Western part of the country, where rainfall is highest. Crown cover is generally >30% and standing commercial stock is about 60m^3/ha.
2. Rangeland shrub forest. These forests are found in the transitional belt from the sub-humid south to the arid north. Crown cover is between 10% and 30% and standing stock is low. These forests tend to have a relatively high Soil Organic Carbon (SOC) content.
3. Riverine forests. These forests are found along the major rivers & tributaries thereof flowing through Sudan.

In addition to these three forest types, tree plantations will be considered as an additional "forest" category for purposes of REDD+ implementation. Tree plantations are typically found at tail-ends of irrigation systems, where excess water from irrigation is available to nurture the trees, or close to the major rivers.

It should be noted that Sudan has not yet established a definition of "forest" for purposes of REDD+ and other UNFCCC-related reporting. Development of that definition will take place as part of the FCPF readiness activities.

Due to large differences in environmental conditions in these forest ecosystems, the forests are subject to different drivers of degradation and deforestation. The most important drivers of deforestation and forest degradation are the following (see Component 2A for more details and a discussion of the drivers):

- Agricultural expansion. Large areas of land, predominantly those with access to water and with favourable topography, have been converted into irrigated and rain-fed agriculture.

- **Extraction of wood for various uses exceeds natural regrowth.** Wood is extracted in large quantities for domestic and small-scale industrial use. See the Annex for details on the Forest Products Consumption Study of 1994.
- **Grazing by goats and other domesticated animals.** In rural areas large numbers of goats and other village-based and transhumant livestock graze in the forest for fodder. This leads to direct loss of biomass and to a very low rate of regrowth as young saplings are destroyed.
- **Drought and desertification.** In the northern fringe of the rangeland shrub forest the vegetation is susceptible to droughts and shifting sands.

Sudan, as a member of the Least Developed Countries group of the UNFCCC, will adopt for the application of a Development Adjustment Factor (DAF) in the implementation of REDD+ in general and in the development of RELs and RLs in particular. The relevant national circumstances will be identified through a process of participatory assessment (see Component 2). The national circumstances are expected to include, among others:

- Agricultural expansion is a national priority to enhance food security for the population of Sudan.
- The rural population of Sudan depends on a number of wood-based forest products for their immediate needs. The development and implementation of alternatives or intensified use of wood products is a lengthy process for which Sudan is lacking the resources to hasten identification, development, adoption and implementation of sustainable alternatives.
- The fight against desertification in northern Sudan is negatively impacted by climate change, making the establishment and protection of forests both difficult and expensive.

3.4. Reference (Emission) Level development

The process of constructing RELs/RLs is a multi-phased and continuous endeavour. In the construction of RELs/RLs strict protocols will be applied in order to meet with the stringent requirements of the IPCC Guidelines on National Greenhouse Gas Inventories, in particular those related to the Agriculture, Forestry and Other Land Use (AFOLU) sector, and the International Consultation and Analysis (ICA) process established under the UNFCCC. As such the RELs/RLs – and thus the reports on REDD+ achievements to the UNFCCC – will be compatible with National Communications and National Greenhouse Gas Inventory reports to the UNFCCC.

The RELs/RLs are to be used as a reference case for comparing and quantifying REDD+ activities (e.g. policy, measures, projects) performance. The RELs are linked to and mostly based on projections from past or recent historical trends in biomass stock changes and associated emissions resulting mostly from deforestation and forest degradation in developing countries. The RLs refer to those REDD+ activities that enhance removals of greenhouse gases. IPCC methodologies can be used to convert past or future land use change into associated emissions or removals. Available IPCC guidelines and methodologies that can be used include the 1996 Guidelines for National Greenhouse Gases Inventories, Good Practice Guidance (2000) and its LULUCF Good Practice Guidance (2003), the 2006 Guidelines for National Greenhouse Gases Inventories and the most recently finalized, the 2013 Revised Supplementary Methods and Good

Practice Guidance Arising from the Kyoto Protocol and the 2013 Supplement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories on Wetlands.

Sudan will adopt an incremental approach in the development of RELs/RLs to match the available institutional, human and financial resources. However, the RELs/RLs will be developed using the highest standards and best possible sources of information, all the while considering the national capacity and circumstances.

3.4.1. Identification of required Reference (Emission) Levels

The variety of forest types and drivers of deforestation and forest degradation imply that Sudan, in fact, needs a set of RELs in order to properly assess the performance of implementation of eligible activities to reduce emissions of greenhouse gases from the forest sector. Table III-3 identifies these RELs.

Table III-4: Matrix of Reference Emission Levels by forest type, driver and activity.

Forest type Driver	Activity	Humid and sub-humid dense forest	Rangeland shrub forest	Riverine forest	Plantations
Agricultural expansion[1]	Reducing emissions from deforestation	REL	REL	REL	
Wood extraction	Reducing emissions from forest degradation	REL	REL	REL	
Grazing	Reducing emissions from forest degradation	REL	REL	REL	
Drought and desertification	Reducing emissions from forest degradation		REL		

[1] Sudan reserves the right to develop forest land for agricultural development in order to meet the national priority on food security. However, REDD+ considerations will be applied in further agricultural expansion leading to a reduced intensity of future agricultural expansion.

Similar to the RELs, RLs need to be developed for specific types of improved forest management aimed at enhancing removals of greenhouse gases in the forestry sector, Table III.4

Table III-5: Matrix of Reference Levels by forest type, management option and activity.

Forest type Management	Activity	Humid and sub-humid dense forest	Rangeland shrub forest	Riverine forest	Plantations
Sustainable Forest Management	Sustainable Management of Forest	RL	RL	RL	RL
Protected area management	Conservation of forest carbon stocks	RL	RL	RL	
Improved plantation	Sustainable Management of				`RL

management	Forest				
Reduced impact of NTFP and small timber collection	Enhancing forest carbon stocks	RL	RL	RL	
	Sustainable Management of Forest	RL	RL	RL	

Tables III-3 and III-4 should be taken as indicative, as a more in-depth analysis of drivers of deforestation and forest degradation and planning of interventions are subject to a participatory process of analysis and identification.

While these tables seem to be quite onerous on the development of RELs and RLs, it should be noted that all RELs and RLs are developed on the basis of a single data set of land cover derived from satellite imagery using a standard protocol, using similar techniques for identification of REL/RL relevance, but with different parameters depending on the combination of forest type, intervention and driver. Several of the combinations (the "cells" in the matrices above) may be served with a single REL or RL, reducing the actual number to be developed; it is expected that the total will be less than 10. Furthermore, emphasis will initially be on the development of RELs, since the activities requiring RLs are not likely to be implemented in the first few years of the National REDD+ Programme and their development can thus be staggered. The RELs/RLs will be created on the basis of satellite imagery and forest inventories and all data will be managed in the SFMS (see Component 4a), making the development of a larger number of RELs/RLs more laborious, but not significantly so. This level of differentiation, however, will have tremendous benefits when assessing performance of implementation of eligible activities in terms of reducing emissions and enhancing removals of greenhouse gases because the individual RELs/RLs are much more sensitive to the specific intervention; it can be interpreted as a natural extension of the IPCC *good practice* to do Forest Land sub-categorization.

Stakeholders

Stakeholder	Role/Interest
FNC	Lead agency for the identification ERLs/ FLs and assessment and piloting of degradation, deforestation, annual increment.
HCENR	Designated entity for calculating GHG emissions for all sectors
Remote Sensing Authority of the National Research Centre NRC	Lead agency for the LMS. Satellite images
Environmental Metrology Station	Information , and data in land cover change periodically

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Identify the set of RELs for Sudan							
Identify the set of RLs for Sudan							

Identification of the required set of RELs/RLs is mostly a one-off activity that can closely follow (or be integrated with) the participatory processes on drivers of deforestation

3.4.2. Mapping of forest areas for Reference (Emission) Levels

Historical data on forest cover and land use for Sudan can be delivered from:

- NEA forest resource survey to assess the country energy requirements.
- In 1982 the WB undertook assessment of the issues and options in the country's energy sector.
- In 1983-1984 CIDA conducted an aerial photography covering Blue Nile Provinces using randomly selected plots to determine the tree standing volume.
- In 1987 Lund University conducted a survey of 58 Mha in central Sudan.
- The NFI (1995-1997).
- The Africover Project in 1997 which was the first survey effort to cover the whole area of current Sudan.
- Africover update by the Sudan Institutional Capacity Program: Food Security Information for Action (SIFSIA).

With the possible exception of the Africover data, the historical data will only be used for reference and generic trend analysis; due to the different approaches, methodologies, data source, classification, coverage and other factors, the other mapping products are difficult to compare and the temporal consistency cannot be ascertained. Instead, new mapping will be performed to create a consistent time series. To the extent possible, the Africover approach will be applied such that the time series can be rooted in 1995 (when initial Africover data for Sudan was acquired).

Mapping of the forest areas is a task that has to be closely coordinated with other land-based sectors in Sudan in order to maintain consistency between sectors in the National Communications to the UNFCCC. Following the standing practice of Sudan's National Communications, which is based on IPCC Guidelines, all land is mapped into six categories. For REDD+, the Forest Land category will be subdivided into a small number of categories, provisionally the four forest types indicated in the previous section; this sub-categorization is considered *good practice* by the IPCC.

Sudan will implement Approach 3, *sensu* IPCC Guidelines, for mapping of forest land sub-categories and identification of areas where land use has changed, i.e. deforestation, reforestation and changes in forest type. Sudan favours an approach where national coverage is achieved rapidly, albeit at a lower spatial resolution, over an approach where full spatial detail is achieved early on but with limited geographical coverage due to lack of institutional, human and financial resources. The rationale behind this choice is as follows:

- Sudan has extensive land areas with forest cover, over terrain that tends to be relatively uniform, yielding uniform forests over relatively large spatial scales. This applies particularly to the rangeland scrub forests and, to a lesser degree, to the humid and sub-humid forests. Using medium-resolution satellite imagery is expected to capture much of the variability in these forest types.
- Using medium-resolution satellite imagery it is possible to generate time series of data over large periods of time. For instance, the MODIS sensors on board the Terra and Aqua satellites of NASA have been producing data since 1999 with a repeat coverage of Sudan every two days. Such data can be used to very accurately distinguish forest cover from other vegetation due to differences in response to the onset of the rainy season and wilting after the rains subside. The 15 year time

window also makes construction of consistent RELs/RLs possible. Similar arguments hold for other medium-resolution sensors.

- Use of medium-resolution imagery allows Sudan to rapidly achieve national coverage, which can then be improved over time, following Decisions on REDD+ by the CoP of the UNFCCC.
- Using medium-resolution imagery allows Sudan to rapidly achieve and maintain a biennial reporting schedule with national coverage as was decided at CoP-16 in Cancun, December 2010.

Use of imagery at 250 m spatial resolution is assumed to be adequate for rangeland forests and humid and sub-humid forests, but for riverine forest and plantations such imagery is less ideal. A sampling strategy with higher resolution satellite imagery (e.g. Landsat, SPOT, Aster) will be applied on all four forest types, with emphasis on areas of plantations and riverine forest, until a transition is made to higher resolution satellite imagery.

While initially use will be made of medium-resolution satellite imagery for all forest land, a transition to better satellite imagery is foreseen to take place in concert with increasing institutional, human and financial capacities in Sudan. In this transition a prioritization will be made to quickly improve the quality of the RELs/RLs where such gains can be easily made. Of special interest is the European GMES/Sentinel-2 platform which will have multiple spectral bands suitable for vegetation mapping at a high spatial resolution and about 5-day repeat frequency once two platforms are in orbit, as planned by 2016. Once such capacity is achieved, historical high-resolution data will be classified to build a consistent time series back to 1995, where appropriate.

Initially, the Reference Levels will be based on MODIS satellite imagery, using the period 2000-2014. When more capacity is built in Sudan's institutions, use will be made of more detailed satellite imagery such as the series of Landsat platforms and the to-be-launched ESA Sentinel platforms, to generate a reference period dating back to 1990. (Section 3.4.2)

Assessment of land use, including forest land sub-categories, has to be made every two years in order to present current information in the Biennial Update Reports (BUR). For the forestry sector the mapping of forest types will therefore be set up in the form of a Land Monitoring System, with standard protocols for large-scale satellite image interpretation and detailed sampling with high-resolution satellite imagery, such that repeated assessments are internally consistent and comparable. See section 0 for more detail on the Land Monitoring System and the choice of satellite imagery.

Stakeholders

Stakeholder	Role/Interest
Remote Sensing Authority (RSA) of the National Research Centre NRC	The premier Sudanese agency for remote sensing and land cover mapping. RSA has many professional staff capable of working with satellite imagery and large data sets.
University of Khartoum, Faculty of Forests	Many researchers have experience with forest cover mapping and interpretation of satellite imagery.
University of Sudan for Science and Technology, Faculty of Forests and Range	Many researchers have experience with forest cover mapping and interpretation of satellite imagery.

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Establishment of Land Mapping System							
Medium-scale mapping, biennially 2000-2020							
Sampling at high resolution							
High-resolution mapping, biennially							
Historical mapping, high resolution, 2000-2018							

Mapping will be done on a biennial basis from the year 2000 onwards, using medium-resolution satellite imagery. From 2016 onwards higher resolution satellite imagery will be introduced in parallel. Historical data at higher resolution will be interpreted as well, in order to establish a true correspondence between the medium- and high-resolution data sets.

3.4.3. Assessment of carbon dynamics

IPCC Guidelines and Good Practice Guidance provide three methodological tiers capturing a wide range of national circumstances, for countries to select the appropriate tier in their national context. Sudan so far used mainly Tier 1 methods in its national inventory reporting to the UNFCCC, using IPCC default emission factors and other parameters included in the IPCC Guidelines. However, for most source/sink categories Sudan used its national activity data, which is no doubt improves the quality of the resulting GHGs estimates when compare to applying Tier 1 with both default activity data and emission factors. The national activity data used are from different sources varying in terms of quality.

There are several sources for the secondary data used to estimate GHG emissions associated with land use change and forestry, as listed below. The reliability of these data is considered high.

- Annual reports of Forests National Corporation for the years, 1998, 2001, and 2003;
- Sudan Forestry Sector Review, 2007;
- FAO report (Forest Resource Assessments for 2000 and 2005);
- Reports of Ministry of Energy, 2000; and
- Range and Pasture Administration

There are a number of assumptions and key uncertainties defined by the national inventory team. These include default factors from the IPCC's 1996 Guidelines, which were assumed to be adequate for most categories. The sole exception concerning annual tree growth rates based on national data. Key uncertainties sources are defined as follows:

- Soil data: There are significant limitations regarding soil data availability due to the diversity of ecological zones and the historic lack of national data collection efforts.
- Biomass conversion: There is difficulty in collecting biomass data concerning post-grassland/forest conversion levels, the fraction of biomass that is burned in-situ, and the carbon fraction of above–ground biomass burned in-situ.
- Managed lands: The annual rate of above-ground biomass growth and the carbon fraction of aboveground biomass are difficult to obtain due to poor data availability and/or quality.

Sudan first National Communication clearly indicated lack of good quality activity data and basic national parameters, e.g. emissions factors. Good quality estimates of GHGs emissions depend

on availability of country specific data and use of improved methods. Therefore it is necessary that part of the support for the readiness phase be used for developing country specific emission factors and parameters required for developing RELs/RLs and estimating carbon stock changes associated with the implementation of REDD+ activities. These can be in the form of some specific studies based on national forest inventory data and available research to generate values such as: biomass expansion factors, allometric equations, root-shoot ratios, increment (v/h/y) and stocking density (volume/hectare) for the dominant species and/or important forest types etc. The studies can be conducted in collaboration with the research and academic institutions and can inform current and future research programmes of these institutions.

Sudan will use its best available data to apply appropriate IPCC methodologies within is its national context. Based on current experiences with reporting GHG inventory information in the National Communications, mostly improved Tier 1 estimates will be made, with national activity data, and where possible Tier 2 level estimates will also be made for key categories depending on availability of national data, to estimate its historical emissions/removals. A key category analysis will be made to assess relevant carbon pools. Sudan will conduct review, assessment and quality check of all existing historical data on carbon stocks and define data gaps that need to be addressed. The data sources described in this Component and the Annex 3, combined with the emissions default and where available national emission factors and other parameters, will be used for estimating historical emissions and removal relevant for REDD+ activities in Sudan. Historical emission/removal will be developed by combining the activity data with emission factors, uncertainties' sources will be defined, assessed and their estimates will be provided.

Sudan is planning to undertake a new national forest inventory intending to get better accuracy and sustainable flow of data through permanent sample plots, using a combination of remote sensing tools and ground surveys bearing in mind the new requirements and the data related to climate change for instance: wood density, biomass expansion factors, emission factors, canopy reduction, emissions, sinks, GHG inventory, etc. The country will continue to increase related capacity building and provision of the financial resources from international, regional and local bodies. That will be the basis for future monitoring and the maturity in the last phases that REDD+ will help in that.

Pending the outcome of the key category analysis, the following assumptions are made with regards to carbon pools to be included in the RELs/RLs (and thus the measurement protocols for REDD+ projects throughout Sudan):

- The only greenhouse gas of concern is carbon-dioxide.
- Above-ground biomass is included in all protocols.
- Below-ground biomass is too difficult to assess and use will be made of IPCC default emission factors.
- Litter will be assessed in all forest types to establish whether or not it is a significant carbon pool.
- Dead wood will be assessed in all forest types to establish whether or not it is a significant carbon pool.
- Soil organic carbon will be assessed in all forest type. It is expected to express significant dynamics in rangeland scrub forest and humid and sub-humid forest both under processes of deforestation and regeneration.

For plantations there is currently sufficient national data to attain a Tier 2 estimate of above-ground biomass, with an expectation to achieve Tier 3 with minimal but directed research. All other forest types are lacking in basic information on conversion and expansion factors and/or allometric equations. Sudan will embark on silvicultural research to attain Tier 2 estimates for all forest types and carbon pools that are considered key categories; all other carbon pools will be assessed at Tier 1 level. Directed research will be undertaken to achieve Tier 3 estimation level where deemed relevant.

Stakeholders

Stakeholder	Role/Interest
FNC	FNC is the lead agency in Sudan on forest management.
University of Khartoum, Faculty of Forests	Many researchers have experience with forest survey and silvicultural research in natural forests and plantations.
University of Sudan for Science and Technology, Faculty of Forests and Range	Many researchers have experience with forest survey and silvicultural research in natural forests and plantations.

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Key category analysis							
Silvicultural research – plantations							
Silvicultural research – natural forest							

3.4.4. National circumstances

This activity takes its input from Component 2 (2a, 2b and 2d), including different aspects such as environmental and socio-economic factors and their effects on forest resources, variables such as GDP, geographical characteristics, national policies and strategies, socioeconomic factors, climatic factors, population growth, woody and non woody products consumption, agricultural expansion, forest fires, energy balance, industry growth, development and investment plans. This step should lead to identifying the development adjustment factors.

The definition of forest for the purpose of reporting to the UNFCCC is still being debated in Sudan. It is likely that a definition similar to the IPCC suggested definition will be applied, using the lower ranges of canopy cover and height at maturity such that the extensive sparse forests in the semi-arid regions of Sudan can be considered under the National REDD+ Program. (Section 3.3).

The only carbon pool that will in all certainty be included in measurement and estimation protocols is above-ground biomass. Litter and dead organic matter will be sampled in the various ecosystems to determine if they are key categories and included in protocols is found to be key. Below-ground biomass and soil organic matter are potentially key carbon pools, but Sudan currently lacks the capacity to sample these carbon pools. (Section 3.4.3 provides more detail on carbon pools and the approach for measurement and estimation.)

In Sudan, low canopy cover characterizes the majority of forest areas. This is one of the key factors in the national circumstances considered in the national definition of forest. For Sudan, it makes sense for REDD+ related activities to use the current FAO guidelines for defining forest cover as threshold to be used across Sudan (a canopy cover of 10% in a 0.5 ha minimum forest

area with tree height able to reach 5 meters). Based on rainfall, soil and climatic conditions various forest classifications and definitions have been developed in Sudan for different climatic zones. A situation analysis should be done to identify related RELs/RLs adjustment factors. This should include the following activities:

- Analysis of deforestation, degradation and drivers of deforestation including land use conflicts
- Analysis and review of related legislations and policies (landuse, forestry, rangelands, etc)
- Analysis of existing national strategies and long term development plans (need to project future changes)
- Climate Change impacts (vulnerability and adaptation)

Based on the data analysis, results and findings and the situation analysis of the national circumstances, different future scenarios that affect RELs/RLs will be understood. Developing future trajectories of emissions/removals for Sudan's forests will involve taking into consideration the different projected socio-economic, environmental and development changes (main drivers) such as:

- Economy performance and GDP
- Population growth
- Agricultural expansion and development, including the use of fire
- Poverty level
- Energy Consumption
- Forest industry growth
- International and national commodity prices
- Other sectoral development (livestock, urbanization, infrastructure, etc.)
- Adjustment coefficients.

The drivers of deforestation and forest degradation, as identified in Component 2A, will be assessed for their impact in the various ecosystems using the techniques described in sections 3.3 and 3.4. Separate drivers will be developed into separate RELs such that interventions aimed at specific drivers can be individually assessed (i.e. a forest can be subject to multiple drivers of deforestation and forest degradation, so multiple RELs may apply). The RELs will be managed inside the SFMS (Component 4A) and their application will be transparent to the analyst (i.e. depending on the forest area and the intervention applied, the appropriate REL or RL will be applied to estimate reduced emissions or enhanced removals).

Of special interest is the domestic use of fuel wood. The demand study has clearly established historical trends in wood consumption and a few scenarios were developed to predict future use of fuel wood. Considering that fuel wood extraction is a major cause of forest degradation, this information can be used to build the REL for fuel wood use. Projections on the consumption were built on the fact of increasing growth rate of population and the decreasing of the resource. Even if the population increased the consumption might decrease and resource might retain some sort of stability increase for certain factors of reforestation/afforestation, community involvement, poverty reduction, etc.

The major part of the consumption that goes to fuel wood is actually emissions from fire-wood and charcoal that amounts for 80-90% of the consumed total wood. The fuel wood consumption can be a measure of emissions to compare with other methods. The country shall use the GPG and IPCC guidelines and develop when building more capacities meanwhile researching on emission factors for the amount of wood consumed. Just like the consumption study (1994) and the following NFI 2000, the proposed inventory should be accompanied with Wood Consumption Survey to give more accurate and up to date results for emissions. The Second National Communication of the Sudan indicates emissions till the year 2000 based on the data available at that time.

Construction of RELs/RLs with national circumstances and their projection into the future is a continuous process, having a degree of "politics" in the sense that policies need to be reflected in the forecasts. Sudan will separate the policy side from the natural resource side in order to maintain as high a degree of evidence-based forecasting as possible.

Stakeholders

Stakeholder	Role/Interest
FNC	The lead forestry agency in Sudan
HCENR	Experts in reviewing the legislation and policies
Agriculture and irrigation	Expert in reviewing the legislation and policies
University of Khartoum	Expert in reviewing the legislation and policies & soci-economic (studies on contribution of forest sector in GDP)
Range and Pasture	Expert in reviewing the legislation and policies
National Council of Population	Many statistics, data information related to population policies
Ministry of Energy	Experts in reviewing energy policies

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Assessment of national circumstances							
Integration national circumstances in RELs/RLs							

Assessment of national circumstances will be repeated periodically and updated RELs/RLs produced, in concert with Biennial Update Report preparation.

3.4.5. Management of Reference (Emission) Levels

The RELs/RLs and all the data that has been used in their construction will be stored in a database. In this way it will always be possible to retrace how a specific REL or RL was constructed and updates will be easily constructed using a compatible approach.

As the condition of the forest changes, so must the RELs and RLs change over time to properly reflect the current situation. Such changes will be made in concert with the Biennial Update Reports such that a well-defined set of RELs/RLs applies to a single reporting period.

Throughout the development and use of RELs/RLs a system of Quality Assurance / Quality Control (QA/QC) will be employed, in line with instructions contained in the IPCC Guidelines, in order to minimize and quantify uncertainties in the estimates underpinning the RELs/RLs and thus the estimates of reduced emissions and enhanced removals of greenhouse gases from REDD+ projects in Sudan.

The RELs/RLs will be maintained in the National Forest Monitoring System of the National REDD+ Programme (see Component 4a) such that it is easy to combine measurements of carbon pools in REDD+ projects to the applicable REL or RL; this assignment of REL/RL to a measurement is "automatic", in the sense that the REDD+ eligible activity, the location of the project and the date of measurement jointly determine which REL or RL applies.

Sudan intends to submit its set of RELs/RLs to the UNFCCC for technical review and assessment, as outlined in Decision 11/CP.17. The individual RELs and RLs will be included in the submission to the UNFCCC, together will a full description of the rationale behind the stratification by forest type, driver and REDD+ eligible activity. The RELs and RLs will also be composited into an aggregate RL to comply with the Decisions of the UNFCCC on reference level reporting.

Stakeholders

Stakeholder	Role/Interest
FNC	The lead forestry agency in Sudan
HCENR	Experts have experiences ERL/FL, IPCC Guidelines & methodologies
Research Centres & Academia	Experts have experiences ERL/FL IPCC Guidelines & methodologies
Range and pasture	Experts have experiences ERL/FL IPCC Guidelines & methodologies

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Implementation of REL/RL management system							
Development/Update of RELs/RLs							

The scheduling of REL/RL updating may shift to coincide with the Biennial Update Report preparation.

3.4.6. Methodological schedule and expected outputs

The RELs/RLs are constructed in a complex and iterative schedule, that essentially follows two streams that converge in the application of the RELs/RLs:

1. **Resource assessment** – Forest Land mapping and determination of emissions and removals of greenhouse gases from Forest Land. This process is repeated on a biennial basis and reported upon in the National Communication of Sudan to the UNFCCC and the intermittent Biennial Update Report. This assessment has to align with assessments of other land-based sectors, in particular agriculture.
2. **Assessment of national circumstances and forecasting** – These are more policy-oriented activities which embody the context of Sudan's National REDD+ Programme and it's ambition in meeting the national development priorities and the ultimate objective of the Convention. This process is repeated every four years for reporting in the National Communication of Sudan to the UNFCCC.
3. **Application of RELs/RLs** – Once constructed, the RELs/RLs are placed in the SFMS (Component 4) and automatically applied in the assessment of the performance of REDD+ interventions.

Resource assessment

Step R.1	**Land Use Category mapping**
Activity	Mapping of the entire territory of Sudan into 6 IPCC categories
Methodology	Using MODIS satellite imagery (or a different type of imagery with similar characteristics) the entire territory of Sudan is mapped into the 6 categories of land use that the IPCC requires for LUCF/AFOLU reporting. The 2014 satellite imagery will be the starting year, with field work undertaken to establish ground-truth for classification using image interpretation software. Older years are cross-referenced to the 2014 imagery. When more institutional, human and technical capacity has been developed, satellite imagery of higher spatial resolution will be used, such as Landsat-ETM+/8 or GMES/Sentinel.
Outputs	Base maps of land use categories in Sudan from the year 2000 onwards, on a biennial basis.
Schedule	Starting with the year 2014, working backwards towards 2000 in two-year steps. This work is expected to be completed by the end of 2015. This work will involve stakeholders outside of the forestry sector. From 2016 onwards, this work will be repeated on a biennial basis.
Step R.2	**Forest Land mapping**
Activity	Sub-classification of the Forest Land category into forest strata
Methodology	The Forest Land mapped in step R.1 is sub-divided into strata of forest, on broad eco-physiological properties. The sub-classes of Forest Land are yet to be determined (in conjunction with the development of the definition of forest). Mapping will be done on the basis of the criteria identified and extensive field work will be conducted to validate the sub-categorization.
Outputs	Base maps of forest land sub-categories in Sudan from the year 2000 onwards, on a biennial basis. These maps will define the areas where REDD+ activities can be developed.
Schedule	This work will be performed in concert with step R.1.
Step R.3	**Forest Land change assessment**
Activity	Assessment of changes in forest land sub-categories
Methodology	Subsequent maps of forest land sub-categories are analysed to determine the change in forest land, following the IPCC Approach 3 for land use category mapping (i.e. full spatial mapping of changes). This work will be implemented in a GIS software tool.
Outputs	Forest land sub-category change assessment, in tabular format.
Schedule	This work will be performed after every new production of a forest land sub-category map, in time for reporting in the NC or BUR.
Step R.4	**Forest Land sub-category biomass assessment**
Activity	Estimation of biomass in each of the forest land sub-categories
Methodology	Using the results from the NFI, for each of the forest land sub-categories (step R.2) and for each of the forest land change categories (step R.3) an estimation of emissions or removals of greenhouse gases will be made using the IPCCC 2003 Good Practice Guidance for LULUCF. The specific estimation method that is applied depends on the context of forest sub-category, driver of change and carbon pool. For instance, the **default method** will be applied to the assessment of forest degradation from fuelwood collection, while the **gain-loss method** or generic allometric equations will be applied to forest categories where the main source of information is from repeat measurements through the NFI. In all cases, the estimation method will be fully described in the reports. Sudan is expecting to introduce Tier 2 estimation and reporting for the most relevant carbon pools by 2016 and moving towards Tier 3 estimation (e.g. nationally derived allometric equations for each of the forest strata) and reporting from 2020 onwards.
Outputs	For each forest land sub-category and each forest land change category an assessment of emissions or removals of greenhouse gases is made.
Schedule	This work will be performed after every new production of a forest land sub-category map (step R.2) and change assessment (step R.3), in time for reporting in the NC or BUR.

National circumstances and forecasting

Step N.1	Identification of national circumstances
Activity	Identification of national circumstances and the Development Adjustment Factor
Methodology	Through a process of stakeholder consultation at national and state levels, the national circumstances of Sudan are periodically assessed. For this task an analysis of national development policies and national land policies will be made. Sudan is particularly vulnerable to the effect of climate change on desertification and the impact that that has on forest health and agriculture. Construction of hydrological infrastructure (e.g. reservoirs, irrigation systems) is essential for Sudan's agricultural production and this takes precedence over forest development.
Outputs	A report of national circumstances taken into account when constructing reference levels. This report will be included in every National Communication.
Schedule	This work will be performed once every four years, for inclusion in the NC.
Step N.2	**Forecasting**
Activity	Forecasting of resource trends
Methodology	The trends that are observed from the resource assessments (steps R.2, R.3 and R.4) are forecasted into the future (≈ 10 years), taking the national circumstances (step N.1) into consideration. A business-as-usual scenario will be developed using standard statistical trend analysis, assuming that past trends and policies will continue to prevail during the forecasting period. This BAU scenario projects actual observations and is therefore relatively "neutral" of new policies. A DAF scenario will be developed taking all national circumstances into consideration. This DAF scenario will depart from the BAU scenario and vary according to the national circumstances that are applied. This scenario is relatively "political" as it reflects the policies and ambition of the Government of Sudan. This scenario will be the one applied to the assessment of performance from REDD+ projects. Both BAU and DAF scenarios will be submitted to the UNFCCC for technical review (Decision 13/CP.19).
Outputs	A report of how all reference levels were developed, both BAU and DAF, and an elaboration of how national circumstances impact the reference levels. This report will be submitted to the UNFCCC for technical review and it will form an integral part of every National Communication.
Schedule	This work will be performed once every four years, for inclusion in the NC.

Application of reference levels

Step M.1	Management of reference levels
Activity	Management of all information relating to reference levels
Methodology	All data and information that went into the development of all reference levels needs to be carefully recorded for posterity. All of the resource data will reside in the Sudan Forest Monitoring System (Component 4). Similarly, all of the activities, studies, reports, policies, discussions and decisions that went into the definition of national circumstances and the DAF scenarios will be recorded in the SFMS.
Outputs	-
Schedule	Continuous, responding to every activity in the development of reference levels.
Step M.2	**Assessment of performance**
Activity	Assessment of performance of REDD+ activities
Methodology	All REDD+ projects will record measurements of forest properties in the SFMS, through the REDD+ Project Registry (Component 4). In addition, the NFI will generate information on forest resource status in general and in those areas where no REDD+ projects are operational. These measurements will be converted into emissions and removals (described in more detail in Component 4) and then they will be compared against the applicable reference level in order to establish the performance of the REDD+

	project or general forest policy. The selection of applicable reference level will be done automatically, based on the properties of the REDD+ project or NFI measurements, such as location, type of intervention, etc. This functionality will be an integral part of the SFMS.
Outputs	-
Schedule	Continuous, automatically performed when assessing performance of REDD+ projects prior to BUR production.

3.5. Institutional setting

The development of the RELs/RLs will be based on a consultative participatory approach, involving all relevant custodians, institutions and stakeholders at Federal and State level such as the FNC, HCENR, MEFPP, MAI, Survey Authorities, Research Centres, Universities, Livestock Authorities, Remote Sensing Centres and others as relevant, who are involved in forest ecology and measurement of carbon stocks. Different modalities shall be used including meetings, consultations, working groups, workshops, etc.

The different activities of developing and maintaining RELs/RLs require inputs from specific stakeholders at specific points in time. The sections above already indicate the most relevant stakeholders. Below are listed some more generic activities in REL/RL management not included in the sections above.

Table III-6: Activities and stakeholders for REL/RL development.

Item	Main activities	Stakeholders
Institutional arrangements	This activity includes assessment of resources, expertise and capacities to implement the different tasks involved in developing the RELs/RLs of Sudan.	Natural Resources Administration, Wild Life Administration, Federal Ministry of Agriculture & Irrigation, HCENR of MEFPP, Ministry of Energy, National Centre for Research, Forestry Research Centre, Ministry of Higher Education (U o Khartoum and Sudan University of Science & Technology), National Remote Sensing Authority, Survey National Corporation.
Consultations	The consultations will aim towards soliciting stakeholders' inputs on the proposed methods, data and the stepwise approach to developing and updating Sudan's RELs/RLs. This task shall include an inception workshop, which is expected to contribute to consolidating building awareness about Sudan National REDD+ Programme among all stakeholders and to facilitate the implementation of the proposed plan.	MEFPP, Ministry of Agriculture & Irrigation, Mechanized Farming Corporation, Ministry of Livestock, Range & Fisheries, Remote Sensing Authority, HCENR, Research Centres
Capacity development	Assessment of capacity needs of all relevant sectors and institutions, involved in the development of the RELs/RLs is essential. Findings of such assessment will be based on consultation with all relevant stakeholders. This task will be followed by planning and implementation of adequate capacity building programs addressing the needs identified, mainly to improve: 1-Carbon stock assessment, Data collection and data analysis; 2- IPCC guidance and	FNC, Related Ministries; forestry, energy, livestock, agriculture, water, education, research, extension, remote sensing centres, etc

Item	Main activities	Stakeholders
	manuals; 3- Use of technology and equipment (e.g. GPS, measuring devices, etc.); 4-Use of data analysis software, data management, remote sensing and GIS; 5- REDD+ issues (carbon and non-carbon, co-benefits), SFM; 6- Dissemination of information	

Capacities and resources needed for the preparation of the RELs/RLs include:

- Comprehensive training on remote sensing including image processing, interpretation and change detection.
- Training in the use of advanced GIS and GPS software and programs.
- Training on the IPCC Guidelines and Good Practices and their application to Sudan circumstances.
- Training on software and models used in the estimation of GHGs emissions.
- Training on approaches, methods and tools used for projections of emissions and changes in carbon stock based on historical data and trends.
- Institutional and technical support for data collection, management and archiving.
- Technical support for defining the time frame, application of definition of forest in the context REDD+ process, deciding on forest activities and pools to be included.
- Technical and institutional support for QA/QC, uncertainty assessment, documentation, etc.

3.6. Budget

For the development of the national forest reference emission levels and/or forest reference levels, the following activities are budgeted (Table III.6):

Table III-7: Summary of Reference Level Activities and Budget.

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Institutional arrangements	Consultations and capacity building	50	50			100
Land Monitoring System	Design and implementation of the LMS	50	150	50		250
	Mapping of forest cover 2000-2016 from medium-resolution satellite imagery, at 4-year intervals, applying IPCC Approach 3 for land use category mapping and change analysis.		100	50		150
	Mapping of forest cover 2010 and 2016 from high-resolution satellite imagery, applying IPCC Approach 3 for land use category mapping and change analysis; linking to Africover data.			200		200

	Design	30	50			80
National Forest Inventory	Silvicultural research in plantations and natural forests to establish conversion factors and allometric equations	50	50	50	50	200
RELs/RLs	Identification of relevant RELs/RLs on the basis of drivers of deforestation and forest degradation, including the assessment of National Circumstances	30	30			60
	Preparation of the initial set of sub-national RELs/RLs and the aggregate national REL/RL.		50	50		100
Total		**210**	**480**	**400**	**50**	**1,140**
Government		**100**	**100**	**50**	**50**	**300**
FCPF		**110**	**380**	**350**		**840**
UN-REDD Programme (if applicable)						

Component 4: Design Systems for National Forest Monitoring and Information on Safeguards

The Methodological guidance for activities relating to reducing emissions from deforestation and forest degradation, the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+) will be followed by Sudan in accordance with Decision 4/CP.15. That means developing a robust and transparent national forest monitoring system for the monitoring and reporting of REDD+ activities in addition to a system for providing information on the REDD+ safeguards.

While the forest monitoring system is presented in Component 4a, the system for providing information on the REDD+ safeguards and co-benefits is presented in component 4b.

4A. National Forest Monitoring System

4A.1. Sudan Forest Monitoring System

The context of this part aims to give general vision on how to establish the Sudan Forest Monitoring System (SFMS) in a result-based manner, elaborating the expected outcomes and outputs according to the overall objectives of the component. Therefore the activities were generated so as to attain the objectives.

The objective of this subcomponent is to provide a proposal and workplan for the initial design of the SFMS, supporting the functions of Measurement, Reporting and Verification (MRV) of emissions and removals of greenhouse gases from the forest sector as a result of the implementation of REDD+ eligible activities. A functioning SFMS is a condition for Sudan to achieve REDD+ readiness and to enter Phase II of REDD+ implementation.

The SFMS will build high accountability and transparency level while measuring the emissions and removals and to measure the degree of the human interference in forests and lands.

4A.2. Measurement, Reporting & Verification (MRV)

Measurement

Based on the methodological issues set out in decision 4/CP.15, paragraph 1(d) and the guidelines to be used with regards to activities relating to this decision, measurements will "use a combination of RS and ground-based forest carbon inventory approaches for estimating, as appropriate, forest-related GHG emissions by sources and removals by sinks, forest carbon stocks and forest area changes", applying "the most recent IPCC directives and guidelines, as adopted or encouraged by CoP, as appropriate; as a basis for estimating anthropogenic forest-related GHG by sources and removals by sinks, forest carbon stocks and forest area changes".

Forest area changes will be assessed using satellite imagery. A Land Monitoring System (LMS) will be established as part of the SFMS to create consistent time series of forest cover, classified into a small number of sub-categories.

A second area-based measurement function of the SFMS is the REDD+ Project Registry (RPR) of areas where REDD+ eligible activities are being implemented, together with details of their proponents, implementers, forest management plans, financing, etc. The RPR will be a crucial element of the SFMS to determine how benefits from results-based payments to Sudan need to be distributed to the stakeholders. The RPR will also be the main interface of REDD+ practitioners to the Sudan National REDD+ Programme; a web-based portal will be developed such that project information can be uploaded and retrieved by the project proponents and implementers. The National REDD+ Programme planners and evaluators will be able to use the RPR to monitor the adoption of REDD+ eligible activities in Sudan's forests and evaluate the effectiveness of interventions in reducing emissions and enhancing removals of greenhouse gases.

Measurement of emissions and removals of greenhouse gases will take place at two levels:

1. The National Forest Inventory (NFI) will establish a number of permanent sampling plots (PSP) to periodically assess the condition of all forest resources in the Sudan. The PSPs will be established in such a way that for every identified forest sub-category, and every additional stratum thereof, a sufficient number of independent measurements is made to allow for a statistically robust estimate of a number of key parameters. In addition to more general NFI objectives (e.g. merchantable timber volume, ecological properties, special protection functions), for REDD+ purposes this includes parameters such as wood density, biomass expansion factor (BEF) and/or allometric equations, as well as parameters that provide a robust correlation between forest condition and canopy reflectance such that linkages with satellite imagery can be made with higher accuracy. The NFI will also support associated academic research into parameters not easily measured in the field, such as soil organic carbon (SOC) and below-ground biomass, carbon dynamics in land use change, fire dynamics and emissions of greenhouse gases, and forest ecology. Given the highly distinct characteristics and spatial representation of forest types in the Sudan (e.g. large expanses of rangeland scrub forest compared to riverine forests in narrow elongated strips along the rivers) a stratified sampling scheme for the PSPs will be employed. The NFI measurement protocols will be tailored to the objective of initially estimating all key categories of carbon pools at Tier 2 level, for all individual forest types, evolving to Tier 3 level estimation over a period of 10-15 years.
2. Implementers of REDD+ projects will be required to periodically measure the forest resources. These measurements are specific to the type of REDD+ eligible activity being implemented and protocols will be developed for the different types of measurements, including training materials and other supporting documents. The measurements should be made in a participatory approach by the immediate stakeholders of the project, usually local communities, with (initial) support from professional foresters, NGOs or other facilitators. The measurements will be reported through the RPR, which will provide feedback to the project in terms of assessed fidelity of the data, trends in forest resources (comparing subsequent measurements) and comparison to neighbouring project or regional averages.

Reporting

Reporting of REDD+ achievements will be done through the Biennial Update Reports (BUR), applying the IPCC Guidelines on reporting and any guidance from the UNFCCC.

The measurements of forest area changes and emissions and removals of greenhouse gases will be retrieved from the SFMS and subjected to a rigorous analysis procedure, adhering to IPCC

guidance on QA/QC. Local estimates of emissions and removals – from NFI PSP data or REDD+ projects – will be compared to the relevant local reference (emission) level in order to establish the local performance, along with an estimate of uncertainty. This analysis procedure will be automated to the extent possible, to reduce human error, omissions, subjective interpretation, etc., using tools such as statistical software and GIS.

The reporting will include information from all individual forest categories and sub-strata. In addition, an overview will be provided of all registered REDD+ projects and their performance within their specific forest category (and stratum).

Verification

Verification of the BUR will be conducted by the UNFCCC Secretariat, through the process of International Consultation and Analysis (ICA). While the verification is nominally restricted to the BUR itself, Sudan will allow the technical assessment team remote access to relevant parts of the SFMS to support its work, in particular in addressing any questions about the BUR that the team may pose to Sudan.

4A.3. Linkages between REDD+ strategies and monitoring components

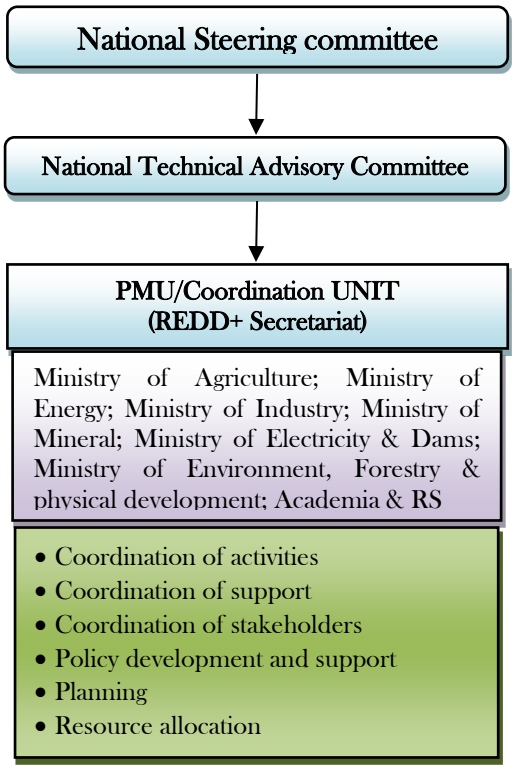
The SFMS will accommodate all activity data that are indicative of deforestation, forest degradation, SFM, enhancement of forest carbon stocks, and forest conservation in forests and forest analogue home gardens that would ultimately result in changes in carbon stocks or emission factors. The reference (emission) levels (Component 3) and safeguards (Component 4A) will be incorporated into the SFMS.

The REDD+ strategies proposed for Sudan are in continuous development and improvement while still linked with existing policy frameworks, and laws and plans that play a key role in forest conservation and management.

4A.4. Approach to development and implementation of the SFMS

4A.4.1. Organizational structure

The Sudan Forest Monitoring System will be designed and implementation through a participatory process of consultation with all relevant stakeholders. See the functional diagram for the general organizational structure of the National REDD+ Programme.



4A.4.2. Design of the forest monitoring system

Sudan currently uses a number of reporting systems for forestry purposes. Mapping of forest resources is provided by a few federal agencies. Forest resource assessments and research are provided by FNC and academia. Sudan, however, does not possess an integrated forest monitoring system that could be used as a basis for the SFMS. Therefore, an entirely new system will be designed, but building on the capacity and

resources in the relevant agencies.

An SFMS action plan will be developed in consultation with the relevant stakeholders and will identify the activities to be implemented to allow implementation and operationalization of the SFMS through phases II and III of REDD+ readiness. The SFMS action plan will ensure that the activities are in line with international guidance (UNFCCC and IPCC), national context and will consider existing and future national institutional, legal and procedure arrangements for the forestry sector's GHG inventory. The activities will consider the human, financial and technical gaps identified by the capacity needs assessment.

One of the objectives of the SFMS is to allow evaluating the degree to which Sudan's REDD+ strategies are effective in reducing GHG emissions and/or increasing removals and accordingly the monitoring indicators will need to be linked to the proposed REDD+ strategies using indicators that are directly or indirectly linked to the strategies and can be monitored.

The SFMS will integrate a number of separate systems. These separate systems implement logically separate and complete functions, such as the NFI, the LMS and the RPR. All information that those sub-systems operate upon and which pertains to the Sudan National REDD+ Program is managed within the central system, which ultimately integrates all flows of information for analysis and subsequent reporting. The main functional building blocks of the SFMS and their interaction is depicted in Figure IV-1 and described as follows:

- The Land Monitoring System (LMS) provides forest cover and area consistently over a number of years. During Phase I of REDD+ readiness the satellite imagery used will be of medium resolution (≈100-250m pixel size) to achieve national coverage rapidly; with increasing capacity in Sudan (Phases II and III) high-resolution imagery will be used (≈10-30m pixel size). Repeated mapping of forest allows for the monitoring of change. Field data collection and interpretation of the forest land area changes require the use of remote sensing in combination with field

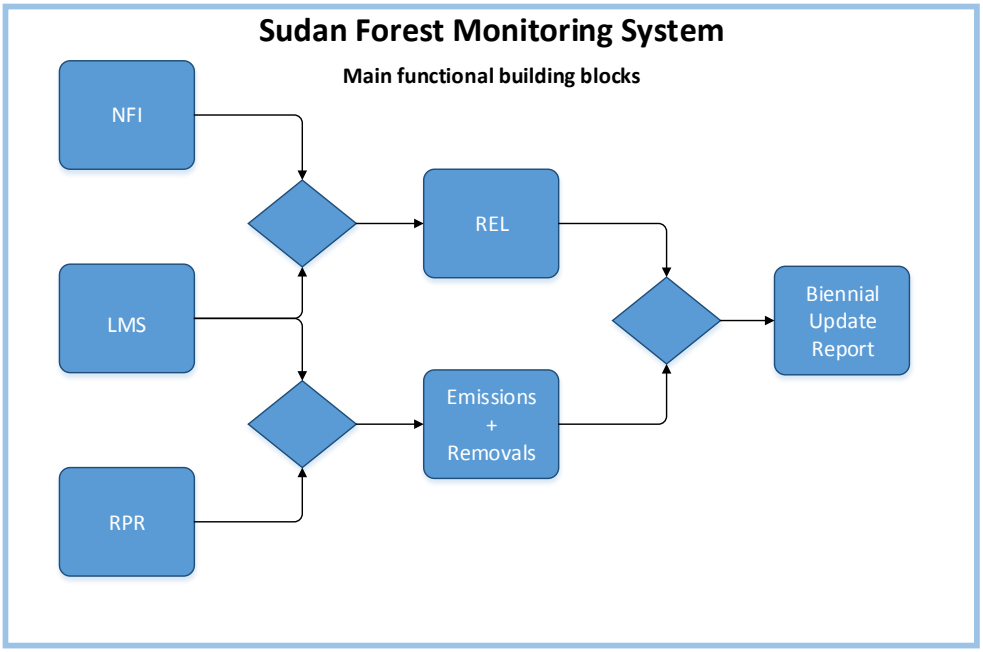


Figure IV-1: Main functional building blocks of the SFMS.

data measurements. In addition to existing geo-referenced data for vegetation description, additional data collection will be undertaken to assess the accuracy of the interpretation of the satellite imagery of demonstration activities. The system will continue to be improved through Phase I and becomes in operation for land monitoring in Phase II to provide for results-based sub-national demonstration activities as well as provision of national coverage data and land use indicators (such as forest cover change). The system will become fully operational in Phase III of REDD+. During the two latter phases, the system will use data obtained through remote sensing (RS) in combination with (NFI) and the RPR system. The outcomes of national REDD+ policies and measures will as well be monitored. Consideration of the Sudan national specificities in terms of anthropogenic activities and interactions with the forest requires that the LMS ought to be country-specific.

- The (NFI) shall be designed to support both national forest policy and forest management programmes and the National REDD+ Programme. A series of PSPs will be established to robustly capture the characteristics and variability of the forest resources throughout Sudan. Special attention will be provided to collect the data that would enable Sudan to estimate emissions and removals at Tier 2 (Phases I and II of REDD+ readiness) and Tier 3 (Phase III). The data from the NFI will be especially useful in the development and updating of RELs/RLs (see Component 3), but also for baseline reporting in the BURs.
- The REDD+ Project Registry (RPR) will record all particulars of registered REDD+ projects, from organizations and local communities involved, to forest management plans, implementation details and measurements or observations from forest resources. Information from the RPR will be critical to evaluate the effectiveness of interventions in reducing emissions and enhancing removals of greenhouse gases from the forest – thus being a very valuable tool for the evaluation of Sudan's forestry policies and measures – and it will allow for the proper distribution of benefits to stakeholders through the analysis of measurements of forest properties. Those measurements, as well as other observations, will be conducted in a participatory manner between the local communities and all other stakeholders.

The SFMS will integrate the various flows of information to produce the REDD+ reports that go into the BUR.

The SFMS will securely store all information that is generated in the course of the National REDD+ Programme such that audits, recalculations and system integrity can be ensured.

Stakeholders

Stakeholder	Role/Interest
FNC	Lead agency for the SFMS. Lead agency for NFI and RPR.
RSA of NRC	Lead agency for the LMS.
University of Khartoum, Faculty of Forests	NFI research.
University of Sudan for Science and Technology, Faculty of Forests and Range	Research on RS, NFI
ZinaNet Company	Design of databases, RPR.

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Design of the SFMS							
Establishment of LMS							
Establishment of the NFI							
Establishment of the RPR							
SFMS analysis and reporting functions							

This timeline only depicts the development of the SFMS. Operational tasks are performed continuously after becoming operational.

4A.4.3. Remote Sensing in the LMS

Increasing the knowledge in remote sensing (RS) and GIS is needed. This will be attained through development and provision of training programmes on LMS data and interpretation. Use will be made of the existing GIS/RS software and remotely sensed data available at the National Technical Unit of the FNC and RSA. Training will be conducted on available system for analyses of satellite imagery while looking forward for the more recent ones to be acquired.

The management of RS, GIS and database and the monitoring of forest cover change using remote sensing require high technical capacities. This is necessary for all institutions currently involved in land mapping in Sudan. That means it is important to identify all relevant stakeholders, as done in Component 3 above, and arrange for integration and collaboration between them for training. Provision of training will accordingly focus on remote sensing, GPS/GIS and database management for the forest monitoring system.

Different types of satellite imagery can be used to monitor forest cover changes. It is important to consider the spatial, temporal and spectral resolution of satellite imagery in order to be able to monitor different types of forest cover changes such as deforestation, forest degradation and illegal logging activities or to map agro-forestry systems. This activity will require identification and organization of satellite imageries for Sudan in a database, assessment of the quality of these data and analysis of the impact of the use of different forest definitions on the system for national forest monitoring and monitoring of REDD+ activities. RS is the simplest way to determine land cover types and land area, as well as changes, and is the main tool for monitoring deforestation. RS techniques are well adapted to fit the data principles of adequacy, consistency, completeness, and transparency required by the IPCC Guidelines. Using medium-resolution data at first, RS can provide consistent historical land representation, covering the entire territory of Sudan every two years in concert with BUR preparation. When capacity and resources in Sudan increase, higher resolution satellite imagery will be introduced.

The role of community mapping and its feasibility in Sudan will be assessed and integrated into the mapping to the extent possible.

Stakeholders

Stakeholder	Role/Interest
RSA of NRC	Lead agency for the LMS.
University of Khartoum, Faculty of Forests	Research on RS, training provider.
University of Sudan for Science and Technology, Faculty of Forests and	Research on RS, training provider.

Range	

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Design of the RS protocols and data sources							
RS training							

4A.4.4. National Forest Inventory

The first NFI in Sudan was completed in 1998. Since then, no activities have been undertaken to assess forest volume or biomass on a national basis. However, intensive processes of forest inventories have been going on at individual natural and plantation forests reserves and huge data is available at each of the eighteen States. It is the mandate of the technical sectors at each State to plan and conduct inventories in forests reserves.

The design of the NFI would be based on the information needs and targeted variables, targeted accuracy and available funds, considering multi-purpose in order to provide the relevant data to support national forest policy and provide the necessary data to report for REDD+ under the UNFCCC. The design will take into consideration IPCC guidelines to ensure that the outputs from the NFI will be in line with the UNFCCC reporting requirements and provide Tier 2 level for the EF, transiting to Tier 3 as more knowledge is generated. This implies that methods for NFI and the satellite monitoring system must be consistent. This activity focuses on designing the NFI and providing a manual for field measurement. Such a manual can be used for demonstration activities in order to ensure that forest measurement in sub- national activities are integrated into the national framework and can be used to assess EFs.

Forest stratification is an issue of importance in the context of forest inventory. Sudan has categorized forests as Dry Zone Forests, Moist Deciduous Forests, Wet Zone and Montane. Classification is developed by the States. This classification will be useful for REDD+ purposes. The classification system will be consistent with the IPCC Guidelines and consider the existing forest classification and ecological zones in order to facilitate efficient forests and GHGs inventories.

Stakeholders

Stakeholder	Role/Interest
FNC	Lead agency for NFI.
University of Khartoum, Faculty of Forests	NFI research.
University of Sudan for Science and Technology, Faculty of Forests and Range	Research on NFI
NGOs & CBOs at state level	Community-based data collection.

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Design of the NFI, measurement protocols							
NFI training							
NFI implementation							

4A.4.5. Enhanced Capacity Building for various stakeholders involved in the SFMS

Once the institutional arrangements, roles and responsibilities for each component and systems for collaboration and coordination are established, stakeholders to be engaged in developing the GHG inventory for the forestry sector will receive training on MRV, IPCC Guidance and Guidelines, and UNFCCC Guidelines for national systems. The training for all those engaged in technical field work will be initiated before implementation of the activities related to the SFMS and the NFI, and will be offered at multiple levels and whenever appropriate, to ensure that each group is provided with the training at the most appropriate technical level and at the most appropriate time.

Specific training on NFI needs to be undertaken and the training will present how NFI data can be used to produce the necessary EFs to report to the UNFCCC for the forest sector. As the NFI in Sudan was implemented during 1995 – 1998, national capacities may need refreshment training. Needs assessment will consider the technical capacities (forest mapping, field data collection, processing, analysis, accuracy assessment, EF analysis and information management) and define the needs for field equipment and office activities.

Collection and harmonization of the data on forest inventories including equations, wood density, and conversion factors (CF) is an urgent need for data analysis and assessment of biomass and carbon stocks. Currently, the CFs available in Sudan are not compatible with those accepted by the IPCC under the GPG to be used for EF Database of the IPCC. The available information in Sudan will not allow reporting under Tier 2 level except in limited situations, but the HCENR is undertaking specific studies for development of these factors. It is necessary to collect country-specific CFs and equations and enhance efforts for development of CFs. Based on the existing data it will be possible to identify the gaps and identify the necessary actions to be undertaken in Phase II.

It is important to develop a tree species database based on future NFIs and improve existing CFs biomass expansion factors, equations and wood densities. This database can be linked to the information related to their use, allowing the consideration of the linkages between carbon and multiple benefits, e.g. biodiversity.

The IPCC provided the 1996 Guidelines for GHGs inventory processing which include default data for all forest carbon pools throughout the world at Tier 1 level. Sudan used these CFs for the first NC Report. In the second NC Report (2013) attempts were made to promote the use of CFs at Tier 2 level but these were confronted with limited data. Hence it is urgent to continue in developing CFs factors already started at the HCENR. Existing and future forest inventories would facilitate improvement in data availability to enhance development of EFs.

Needs assessment and identification of gaps will help in further improvement of construction of conversion figures and to improve the accuracy of the carbon stock change assessment. The EFs need to be consistent with the AD, which requires the harmonization of the existing data.

Work on activity data (AD) and EFs should be trained, coordinated and harmonized between different institutions such as universities, research centers and NGOs in order to conclude into compatible results. Improved values for CFs equations, wood density, and soil and litter carbon stock enhance GHGs inventory and analysis and facilitate assessment of changes. Their integration into the SFMS and further use in analysis needs to be instructed as well.

Stakeholders

Stakeholder	Role/Interest
FNC	Lead agency for NFI and emission and removal analysis.
University of Khartoum, Faculty of Forests	Forest research.
University of Sudan for Science and Technology, Faculty of Forests and Range	Forest research.

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Design of the analysis protocols							
Training in analysis							

4A.4.6. Cost-benefit analysis for the SFMS

Sudan has already produced land use maps or land cover assessments covering the entire country; updated 2012. The cost and time associated with monitoring the REDD+ activities across the entire country would be substantial, hence identifying the cost associated with the different types of satellite imagery and land cover and land use maps development is imperative. Such analysis will provide a useful platform for the design of the monitoring system.

The benefits come in the form of results-based payments to Sudan, but multiple benefits from sustainable forest management promoted under REDD+ should be considered as well. In particular, the National REDD+ Programme will strive to achieve sustainable livelihoods for the local communities living in or near the forest.

Stakeholders

Stakeholder	Role/Interest
FNC	Lead agency for the SFMS.
HCENR	Lead agency for policies and evaluation.

Timeline

Activity	FCPF support			National REDD+ Programme			
	2014	2015	2016	2017	2018	2019	2020
Cost-benefit analysis							

4A.4.7. Monitoring of Safeguards

Establishment of a central database and archiving system including the provision of information on REDD+ safeguards will be an important task within the SFMS. Within this context, it will be necessary that an archiving system is developed to serve the REDD+ data related to monitoring and MRV, as well as the information on the safeguards. The archiving system will also serve in the preparation of the national inventory reports. The archiving system will host a central database the structure of which will allow effective, efficient and transparent QA/QC procedures.

The LMS will also contribute to providing information on some of the REDD+ safeguards, specifically those requiring geo-spatial information. The possibility of using certain types of satellite imagery to provide information on some of the safeguards will be explored. The LMS provides data on the net outcomes of policies and measures through provision of land use and

land use change data for sub-national demonstration activities during Phase II and at national level for Phase III. In Phase II the country should begin to implement national policies and sub-national REDD+ demonstration activities – ensuring they are results-based through a monitoring system – and implement a system for providing information on how the REDD+ safeguards are being addressed and respected, as set out by the UNFCCC.

For stakeholders and timeline, see Component 4b.

4A.5. List of anticipated outcomes from the SFMS

- A country-specific forest monitoring system developed and operationalized (Responsible agency, period or deadline (month/year));
- Agency staff capacity enhanced on forest cover monitoring, RS, GIS and database management, etc.;
- Identified and validated parameters for forest monitoring system with stakeholders;
- Role of community mapping in determining forest cover change identified;
- A cost-benefit analysis performed for the forest monitoring system;
- Available satellite and/or aerial imagery types for Sudan identified and organized in a database; the characteristics of these data are assessed in terms of spatial and temporal coverage, cloud cover, spatial and spectral resolution, and image registration;
- Different forest definitions are used and their effect on the system for national forest monitoring analysed;
- Recommendations for the use of imagery for past and future forest cover assessments, forest stratification and monitoring of REDD+ activities are provided;
- Forest definitions and forest stratification system delivered;
- A central database and archiving system including the provision of information on REDD+ safeguards established;
- Harmonization of existing EFs and AD made compatible and data gaps identified;
- NFI designed.

Additional factors to be considered

Deforestation and afforestation/reforestation can be monitored with high-resolution remote sensing data (e.g. Landsat, SPOT, IRS-imagery). For other REDD+ interventions that occur at finer spatial scales and may not result in a significant change in land cover, very high-resolution satellite imagery and aerial photography may be necessary for monitoring small-scale changes in land cover and forest condition. The possibility of using both high-resolution imagery and freely available RS data should therefore be evaluated and a draft monitoring framework developed to identify gaps as part of the TOR for the TF on RL/MRV.

Methodology and Data Needs

The methodology used for the GHG inventory is the Revised 1996 IPCC Guidelines for National GHGs Inventory. Volume I (Reporting Instructions) of these Guidelines provides step-by-step directions for assembling, documenting and transmitting completed national inventory data consistently. The UNFCCC 2005 software, version 1.3.2 was used.

According to the 1996 Revised IPCC Guidelines, the GHG inventory covered five sectors in Sudan, among which LUCF was included. The following data are needed for GHG reporting:

For the Land Use Change and Forestry sector, emissions and removals may occur from:

- Changes in forest and other woody biomass stocks,
- Forests and grassland conversion,
- Abandonment of forest land,
- Forest soils.

The information needed to calculate emissions and removals resulting from changes in forests and other woody biomass stock are:

- Area of Forest/Biomass Stocks,
- Annual Growth Rate,
- Carbon fraction of dry matter.

To calculate total biomass consumption from stock the following information must be known:

- Commercial Harvest, if applicable,
- Biomass Conversion/ Expansion Ratio, if applicable,
- Total Traditional Fuel wood Harvest (FAO Data),
- Total Other Wood Consumption.

To estimate annual loss of biomass resulting from forest and grassland conversion one needs to know:

- Area Converted Annually,
- Biomass Before Conversion,
- Biomass After Conversion,
- Fraction of biomass burned on site,
- Fraction of biomass burned off site,
- Fraction of biomass oxidized on site,
- Carbon fraction of above ground biomass,
- Average area converted (10 year average),
- Fraction left to decay.

For this section the information above must be known for different vegetation types which are classified as:

- Wet/Very Moist;
- Moist, short dry season;
- Moist, long dry season;
- Dry;
- Montane Moist;
- Montane Dry.

To calculate Annual Carbon Uptake in Aboveground Biomass resulting from abandonment of managed land, the following information needs to be estimated:

- Total Area Abandoned and Re-growing,

- Annual Rate of Aboveground Biomass Growth.

The Revised 1996 IPCC Guidelines provide default data where the country specific data is unavailable or insufficient.

Data for soil is also needed. Lack of soil data was encountered in both first and second NCs. Field study and researches are needed in this area. However, for REDD+ purposes it may be decided to omit the soil carbon pool, if evidence can be provided, that this is conservative.

4A.6. Capacity Requirements

Although Sudan has expertise on forest management, forest carbon measurements and GIS/RS, it is insufficient to implement and operate the SFMS. To carry out monitoring activities more staff and expertise than the current staffing and equipment are required. Therefore, capacity building and training are urgently needed to enhance the ability of different stakeholders to effectively hold the system's different procedures and employ field activities in an informed and systematic manner. This necessitates more capacity building support in order to build Sudan's MRV capacity for GIS/RS and field-based forest (carbon) assessments in acquiescence with the required IPCC standards. In conclusion, FNC and other related institutions and stakeholders have existing capacities that need to be strengthened at all levels in particular at the state and forest dependent communities' levels.

Capacity needs as regards REDD+ specific activities under component 4a can be recapped as follows:

- Additional staff to develop and implement the REDD+ forest monitoring system;
- Additional training of staff on data collection, storage, processing, analysis, accounting and reporting according to UNFCCC guidelines;
- There is a need to strengthen capacities for GIS/RS monitoring, processing and interpretation;
- There is a need for more office equipment and software for RS/GIS, and forest carbon inventory to improve existing ones;
- Training on forest carbon measurement methods based on IPCC guidelines and good practices;
- Forest-dependent communities need to be trained properly in sampling and gathering of data; relevant methods for monitoring of land cover changes and carbon stock changes; monitoring of field activities in an informed and systematic manner and reporting, to be able to deliver data that can be included in monitoring systems.
- Forest personnel in charge of institutional forests such as in Sugar Estates and Agricultural Schemes need to be oriented and trained on the same parameters as those for forest-dependent communities,
- Such orientation and training need to encompass other stakeholders such as personnel in Range Management, Wildlife Management, Gum Arabic Producer Associations, Research & Academia and NGOs.

MRV structure, functions and tasks

- Monitoring the periodic change in forest carbon stock and reporting;
- Measuring the changes in forest carbon stock at national level;

- Participate in the evaluation (progress/performance) of the national REDD+ strategy;
- Monitor the carbon stock changes at a scale equivalent to where the results-based payments may be expected (e.g., payment at sub-national/project level and/or to a community engaged in REDD+ strategy implementation).

Key Tasks

- Development of national standards in line with international protocols.
- Establishment of an independent national organization with required capacity to monitor and verify information;
- Establishment of non-carbon MRV systems, including social and environmental safeguards;
- Coordination and harmonization of carbon accounting and MRV systems across sectors and scales;
- Establishment of transparent and coordinated systems for managing information, and ensuring their availability in public domain for all stakeholders;
- Reporting to the relevant national and international agencies and providing relevant information to actors in carbon market as appropriate;

4A.7. Monitoring workplan

Table IV-1: Major Elements of the SFMS in Components 4a and 4b

Time frame	National Forest Inventory	Remote sensing of land cover change and major drivers	Forest Degradation	Carbon density data	Non-carbon multiple benefits, and impacts	Governance and stakeholder participation
Current country monitoring capacity	Basic knowledge is present in FNC	Limited studies have been executed by FNC and FAO in national and regional surveys of forest resource assessment	Forest degradation identified on some areas	Only from the 1st and 2nd NCs	Information exists in production of such NWFPs as Gum and Bee Honey	Initial contacts and meetings with major stakeholder groups
Near-term monitoring capacity objectives	Enhance cooperation with FAO and ESA	Cover all forest areas of Sudan with a complete satellite based land-cover change system	Have a complete register of forest degradation types with field checks	Establish a tier 2 carbon database for major land use types		Active involvement of all relevant stakeholder groups in the national REDD+ process
Longer-term monitoring capacity objectives	Independent Inventory Unit at FNC	Establish a database of major land use / land cover systems and modelling using land use change matrices	Incorporate major degradation stages in the land use change modelling	Complete coverage of carbon density of all significant land use types		Participation of all relevant stakeholder groups in the development and implementation of the REDD+ National Strategy. Some community based forest carbon monitoring.

4A.8. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Institutional arrangements	Consultations with stakeholders	50	100			150
Design of the SFMS (LMS and NFI design and implementation are part of Component 3)	Institutional assessment, including capacity building needs assessment	80				80
	Design of the REDD+ Project Registry		80			80
	Design of SFMS component integration, including LMS and NFI, distributed over relevant agencies at central and state levels		150			150
	Development of RS protocols for use in the SFMS		50			50
Implementation of the SFMS	Establishment of physical infrastructure for the SFMS		400			400
	Implementation of IT services, including web-based interfaces for stakeholders		300	100		400
SFMS capacity building	Training of government staff in agencies managing SFMS components		300	300		600
	Training of stakeholders in REDD+ project implementation		100	200	200	500
Total		**130**	**1,480**	**600**	**200**	**2,410**
Government		**50**	**400**	**200**		**650**
FCPF		**80**	**1,080**	**400**	**200**	**1,760**
UN-REDD Programme (if applicable)						

4B. Designing an Information System for Multiple Benefits, Other Impacts, Governance, and Safeguards

4B.1. Background

In population terms, Sudan in 2012 ranked 35th, 3rd and 9th globally, in Arab and African terms respectively. Total population is 33.4 million' with an annual growth of 2.8% (1993-2008). This is an increase of more than 16 folds in 11 decades as it was around 2,000,000 in 1900. Some 30% of the population live in urban areas and 63% in rural areas. The remaining 7% live a nomadic lifestyle. Of the total Sudanese people who live in rural areas 64.5% sustain their livelihoods from utilizing the available natural resources. The sedentary group of these rural people practice traditional agriculture on a subsistence basis, while nomadic groups depend on communal rangelands in raising livestock (World Bank, 2007). The preliminary evaluation of the economically accessible resources indicates that there is a large gap between the woody biomass that the country can presently produce on a sustainable basis and the current demand for fuelwood. Such gap is in the order of 5 million cubic meters annually, which is approximately 1/3 of the current consumption. This causes a series of negative consequences, including overexploitation of forests and woodlands, high carbon emission rates, increasing price of fuelwood and subsistence energy scarcity, and increased vulnerability for the poorest segments of the population in deficit areas (SIFSIA, 2012).

Experience and historical practices related to land use in Sudan indicate that forests provide a wide range of ecosystem products, services and functions of great importance for people's life and for the environment. When such understanding is reflected in co-benefits generation it will enhance integrated management of forests to guarantee safeguards of the co-benefits while managing for REDD+ and CC mitigation effects. Multiple benefits in association with REDD+ activities are apt to decelerate and eventually prevent deforestation and degradation of forest ecosystems, and facilitate increased carbon stocks. In Sudan the level of land degradation and deforestation is growing with an increasing cost due to the exposure to extreme weather events under dry land conditions. Accordingly, the monitoring of the multiple benefits is an important component of the National REDD+ Strategy in Sudan.

The main objective of REDD+ is reduction of GHG emissions, compatible with the goal of the UNFCCC to achieve "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system". However, it is expected that REDD+ will bring extra benefits than emissions reductions; as a result of careful design to achieve multiple benefits. These benefits potentially include poverty alleviation, indigenous people's & forest neighbours rights, improved community livelihoods, technology transfer, sustainable use of forest resources and biodiversity conservation.

Safeguards for REDD+ are included in the Cancun Agreements to ensure that REDD+ actions do not cause negative social or environmental impacts and enhance other social and environmental benefits (Box IV.1). Safeguards can be broadly understood as policies and measures that aim to address both direct and indirect impacts to communities and ecosystems, by identifying, analysing, and ultimately working to manage risks and opportunities. Good design and implementation of safeguards can help REDD+ provide a suite of multiple benefits. It is however necessary to develop a system for providing information on how safeguards are addressed and respected

during correct implementation of REDD+ activities. In addition, it is also necessary to link the system with MRV systems and modalities.

Relevance of Co-benefits under REDD+

Determination of co-benefits, their definition and sustainable management is influenced by various factors including the type of forests, their regional location and condition. Based on these factors, the forests to be involved in the activities and implementation of REDD+ will be selected (Annex 2a section 3, 4 and 5.) and the extent to which the local population are dependent on the forest resources. It is necessary that the implementation of REDD+ considers adoption of monitoring system in order to maintain and encourage the support of benefits and ensure their safeguards. The major objective behind these approaches is to develop a system which can enhance protection and conservation of ecosystems through REDD+ activities and to avoid harmful influences. Reference is made to *COP Decision 1/CP.16*: Reporting on Safeguards that encourage actions to enhance the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits.

The synergies and relationships between forest monitoring systems and monitoring multiple benefits may better be identified. To do so, it may be necessary to collect relevant information so as to get an adequate picture for the relationships between multiple benefits and forest monitoring system which help in understanding the potential harmful influences from REDD+.

4B.2. Understanding the most important co-benefits for Sudan under REDD+

Identification and listing the most important co-benefits for Sudan REDD+ will be the key issue in planning and successfully implementing REDD+ activities that will guarantee encouraging outcomes that will have socio-economic values. In addition, emission reductions will be maintained as a result of the enhanced conservation and protection of the ecosystem. The most important non-carbon benefits for Sudan will include enhancement of livelihoods, income generation & poverty reduction; in that order. Incentives from these aspects will enhance ecosystem conservation and protection; increased forest cover and biodiversity conservation. Moreover, soil conservation and protection of agriculture environment represent important aspects in support of food & water security.

Monitoring System for the social, environmental and economic benefits of REDD+ activities:

Although Sudan recognises the importance of REDD+ in reducing emissions from deforestation and forest degradation, it is also aware of the underlying risks of the programme and potential challenges it might pose on Sudan's environment and communities. Therefore, the monitoring of social, economic and environmental safeguards is needed to attain the challenges of REDD+ that will lead to the conservation of the degraded and deforested areas in Sudan. The exchange of countries experience is important to identify the main criteria for social and environmental safeguards in Sudan.

Free, Prior and Informed Consent

The collective right of peoples and/or individuals to give or withhold consent regarding actions that may affect their lands, territories, and resources or their rights associated with these lands, territories and resources.

FPIC is a key international instrument that can be applied across a range of land-based sectors, such as conservation, extractive industries, forestry, industrial plantations, and infrastructure development.

Recognized as a key right of Indigenous Peoples under UNDRIP. In the context of UN-REDD country programmes, it applies to all indigenous peoples and local communities whose rights and interests may be affected by implementation of REDD+ strategies.

In the case of REDD+, safeguards are measures taken to protect or prevent undesirables social, economic and/or environmental effects on local people, livelihoods, soil and forest (UN REDD Programme, 2011). **Safeguards should cover different stakeholders in Sudan, including:**

1- Farmers
2- Local people around forests
3- Gum Arabic producers
4- Charcoal producers
5- Kilns bricks makers
6- Honey producers
7- Fire wood collectors
8- Pastoralists
9- Other wood consumers (e.g. tea makers, bakeries)
10- Women groups

Objectives;

To many gaps should be covered by the main following objectives :???

- Identify the stakeholders and their benefits from REDD+,
- Identify the issues related to the safeguards items for the monitoring system in Sudan;
- Identify the measures of protection and conservation of stakeholders.
- Set up clear guidelines to facilitate engagement of indigenous people and a participatory approach in monitoring of social and environmental safeguards.

The implementation of REDD+ activities will increase the ecosystems provision of services that enhance sustainable livelihoods for local communities, including fair and equitable access to NWFPs. This is also reflected in an increase in job opportunities and household income, food security support, permanent access to herbal & homeopath medicines and fuel wood.

The monitoring system of the social and economic benefits will include:

1- Protection of environment (forest & biodiversity conservation and protection)
2- Co-benefits of REDD+ (non-carbon benefits, such as economic development and poverty reduction, and participation of vulnerable groups in decision making processes, including women, youth and ethnic minorities)
3- Protection of people's diverse cultures, traditions and knowledge
4- Promotion of gender equality
5- Protection of human rights

Also the monitoring system should include the main indicators, relating to:

- Policy indicators,
- Process indicators
- Outcome indicators.

Biodiversity

There are some 184 species of trees and shrubs including 33 exotics together with a few endemic and near endemic. Special areas with a wealth of rare species are found in the Red Sea Coast and the tropical rain forests in south west and east. About 204 range species were identified. Most of the wildlife resources of the country are to be found within the HRWS. Recent surveys indicated that there is and in spite of losses and disturbance to wildlife in the region due to wars and civil strife there still remain substantial numbers of migratory wildlife between RoS and neighbouring countries particularly Ethiopia, RSS and Central African Republic.

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 for soaring and migratory birds from Eurasia to Africa. The Sudanese Red Sea is still fortunate to have attractive and mostly pristine habitats, particularly its coral reefs. There are remnants of mangrove stands, sea grass beds, and associated marine fisheries and biodiversity including sharks, dugongs, turtles, and variety of sea birds. Two protected areas are established; Sanganeb and Dongonab-Mukawar Island with good representation of the Red Sea marine ecosystems.

Dungonab Bay and Mukawwar Island is a turtle nesting site of regional and possibly international significance and it is internationally recognized as an Important Bird Area. The Dugong population may be the most important remaining on the coast of Africa. Regional action plans (following regional surveys) were developed for corals, mangroves, turtles and breeding seabirds and are being implemented nationally via national action plans.

Cereal crops grown in Sudan include sorghum, pearl millet, wheat, maize, rice, finger millet and barley (Anon 2009). The important oil crops grown are sesame and groundnut. Recent years witnessed expansion in the areas allotted for sunflower. Sesame (*Sesamum indicum*) is grown under rain-fed and of late under irrigated conditions by subsistence, semi-commercial and commercial farmers. Cow pea (*Vigna unguiculata*) is among the important summer legumes. Other summer legumes include pigeon pea (*Cajanus cajan*) and hyacinth bean (*Lablab purpureus*). A number of vegetables such as okra, onion, tomato, potato, peppers, eggplant, melons, watermelon, pumpkins, squash, sweet potato, radish, Jews mallow = molukhia (*Corchorus olitorius*), purselane (*Portulaca oleracea*), rocket (*Eruca sativa*) and chard (*Beta vulgaris* subsp. *cicla*) are grown. Several fruit species are grown, some of which date back in ancient history while others were recently introduced. The most widespread are palm dates, banana, guava, citrus and mango.

However, no ecological surveys of wood or rangelands were made since mid-1950s.

Information on wildlife, livestock, human activities and habitat contribute to the assessment of threats to and formulation of specific recommendations for strategic planning of wildlife protected areas and sustainable management of natural resources.

Fire is a serious problem in all forest, range and wildlife areas except the semi-desert area where the grass is sparse and the small areas of the moist closed forests in the South West.

Livelihood benefits

The forestry sector contribution to the national economy of Sudan is estimated at 6%. Export of forest products such as gum Arabic (*Acacia senegal* and *A. seyal*), senna (*Cassia senna*) and garad pods (*A. nilotica*) annually contribute some $ 100 million amounting to about 1% of non-oil

exports. The major contribution comes from timber production including sawn wood, building poles, firewood and charcoal. Employment in the public forestry sector represents an important source of livelihood amounting to nearly 4,800 people, while more than two million people are involved in informal forestry sector activities across the country. Also more than 6 millions live within the gum arabic belt and mainly depend on the production of gum for income generation. A large segment of people in the rural areas is forest dependent using the forests for various livelihood support including on farm trees, feed for livestock, wood harvesting and collection of NWFPs inclusive of aromatic, culinary and medicinal plants. The role of forests and forest co-benefits at the national level can be indicated through forest role on control of erosion and siltation at rivers and reservoirs.

Nearly 40% of the rural communities are dependent on the diverse ecosystem services. Forest-based cottage industry in the rural areas is well established for decades producing various types of commodities based on fibres, bamboo, fruits, and wood. These products support the development of eco-tourism providing significant sources of income to local communities. At other levels benefits such as jobs related to the forest industry and income from forest-based products are very clear.

Therefore, potential co-benefits of REDD+ on livelihoods of local communities and employment across the country are thought to be significant and may have economic values that may encourage policy development towards conservation of forests and forest habitats of threatened species that are increasingly under pressure from population growth and the need for development.

Water harvesting

REDD+ will frequently increase the water supply by enhancing the potentiality of land to infiltrate water during the rainy season. This water then becomes available to local people, most of them harvesting water in Hafeer (big low level land area near to villages used for storing water for different uses, even for their animals).

4B.3. Objectives of Environmental and Social Impact Assessment (ESIA)

The safeguards

Environmental and social impact assessment for REDD+ implementation in Sudan represents monitoring system for maintaining the safeguards and keeping these safeguards in existence and to ensure the positive social and environmental impacts while CC is considered. That means the provision of environmental management plan that identifies the positive impacts to be enhanced and the negative impacts to be mitigated would provide a system for monitoring co-benefits. That brings the link between the identified safeguards described in the strategy and the monitoring system for the social, environmental and other impacts created due to REDD+ implementation.

The support of the policies, strategies and national laws is then perceived as important safeguards in order to enhance interventions against illegal and unplanned actions that cause deforestation and forest degradation. The R-PP will develop and implement a set of methodologies for collection and provision of information such as baseline, indicators and verifiers. In association with these methodologies the provision of information on the National REDD+ Safeguards, described in the strategy will be necessary in order to ensure that potential risks are minimized

and benefits are enhanced through systematic monitoring of the REDD+ process in Sudan particularly in considering multiple-benefits.

REDD+ Safeguards and Multiple Benefits

At a minimum, a REDD+ safeguard system will identify potential negative impacts of REDD+ activities, and identify and operationalize measures to minimize or mitigate negative impacts. Beyond this minimum, there are additional benefits. An appropriately designed safeguard system will identify potential positive impacts of REDD+ activities, and actions that could increase or maximize these positive impacts. An important element of any REDD+ safeguard system is broad participation and open access to information.

As explained earlier in section 2d, safeguards are applied in all World Bank financed activities and will be used in FCPF promoted programs as minimal standards to comply with. Aligned to the UNFCCC, Sudan is seized to the REDD+ safeguards as stipulated in the Cancun Agreements and listed in the following box:

Box IV.1: REDD+ Safeguards in the Cancun Agreements

The following safeguards should be promoted and supported in REDD+ implementation:

- That actions complement or are consistent with the objectives of national forest programmes and relevant international conventions and agreements;
- Transparent and effective national forest governance structures, taking into account national legislation and sovereignty;
- Respect for the knowledge and rights of indigenous peoples and members of local communities, by taking into account relevant international obligations, national circumstances and laws, and noting that the United Nations General Assembly has adopted the United Nations Declaration on the Rights of Indigenous Peoples;
- The full and effective participation of relevant stakeholders, in particular indigenous peoples and local communities, in REDD+ actions;
- That actions are consistent with the conservation of natural forests and biological diversity, ensuring that REDD+ actions are not used for the conversion of natural forests, but are instead used to incentivize the protection and conservation of natural forests and their ecosystem services, and to enhance other social and environmental benefits;
- Actions to address the risks of reversals; and
- Actions to reduce displacement of emission.

Taking into account the need for sustainable livelihoods of indigenous peoples and local communities and their interdependence on forests in most countries, reflected in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), as well as the International Mother Earth Day.

Source: UNFCCC, 2011, p. 24–25

For measuring and/or monitoring safeguards, there are more elaborated standards, including definitions, scope and methodologies similar to those set out for REDD+ in the Cancun Agreements. Sudan can use these standards obtained from various sources that could influence how REDD+ safeguards are defined and measured:

UN-REDD Programme's Social and Environmental Principles and Criteria (SEPC) with its Benefits and Risk Tool (BeRT),

- World Bank's Safeguards and Strategic Environmental and Social Assessment (SESA) with the Environmental and Social Management Framework (ESMF),
- REDD+ Social and Environmental Standards (REDD+ SES), developed by the Climate, Community & Biodiversity Alliance (CCBA) and CARE International with technical support from the PROFOR Initiative, and
- Forest Stewardship Council (FSC) Principles and Criteria.

These standards vary in their coverage of the criteria set out in the safeguards portion of the Cancun decision. Some provide comprehensive assessments of the sustainable forest management criterion, while others better address biodiversity and poverty alleviation criteria. While the first three are being used by governments in their REDD+ readiness activities, the FSC Principles and Criteria have been used for forestry projects.

Sudan will build a National REDD+ Information System to give information about how relevant safeguards which listed in annex 1 of the Cancun decision are being considered along the implementation of all the REDD+ activities In the context of Sudan, the information on some REDD+ safeguards (for e.g., transparent and effective national forest governance structures; respect for the knowledge and rights of indigenous peoples and forest resource owners; and actions that complement or are consistent with the objectives of national forest programs and relevant international conventions and agreements) will be provided to government acts and decisions. The REDD+ Information system will be linked to the National MRV System because some of the REDD+ safeguards (e.g., actions to address the risks of reversals; the conservation of the natural forest, and actions to reduce displacement of emissions) will necessitate monitoring activities to give information on their implementation, beside providing protection of the rights of the affected stakeholders, specially the local communities. The emphasis on participatory approaches for forest management will greatly contribute to this effort. To do so the REDD+ information system will engage the local communities in the publishing of the forest assessments reports and on the incorporation of their local plans with the national REDD+ policies and measures.

The important element of the Sudan REDD+ safeguard system will be the broad participation and open access to information. There are key issues to be considered when to design the national system for safeguards in Sudan:

Key Issues

The key issues required attention at national local level to design the safeguard system in consideration of safeguards defined by the UNFCCC. Sudan planned to address all issues related to safeguards and to develop the indicators, and mainly issues considered:

1- Policy coherence and consistency with international agreements, as in Sudan the benefits from forest land and forest tenure is quite clear.
2- Transparent and effective governance & Information sharing
3- Actions to reduce displacement of emission
4- Respect the knowledge and rights of indigenous people and local communities
5- Full and effective stakeholder participation
6- Actions to address the risks of reversals

Box IV.2. Preliminary list of the key multiple benefits, other impacts, governance and safeguards issues relevant to Sudan and likely to be monitored with proposed indicators

Key Issues	Related issues likely to be monitored	Proposed Indicators	Related Safeguards
Biodiversity	• Benefits of conservation and protection of endemic and threaten species • Repairs of ecological resilience • Protection of natural vegetation	Loss or gain of the endemic and threatened species Assessment of the changes in the key species of flora and fauna Rehabilitation of the degraded natural area	Cancun agreement REDD+ safeguards, FPIC, SEPC,SESA, REDD+SES, FSC
Socio-economic	• Impacts on forest communities livelihood connected to employment, income, gender, education and health, availability of food, conflict, and customs and norms	• Food security • Loss or creation of jobs • Increase or decrease in income • Gender balance • Provision of education and health services • Change in customs and norms • Number of conflicts over use of forest resources • Inter and intra migration resulting from REDD+	Cancun agreement REDD+ safeguards, and FPIC, ILO convention number 169, UN development group (guidelines on indigenous people, SEPC,SESA, REDD+SES, FSC
Environmental	Impacts of the REDD+ activities on the Environment	Number of incidence of fire outbreaks per year	Cancun agreement REDD+ safeguards, SEPC,SESA, REDD+SES, FSC, and FPIC
Alignment with national development plans	Ensuring that the REDD+ activities don't hinder the of the national development	REDD+ in states development plans Area under sustainable forest management Area under sustainable agricultural production	Cancun agreement REDD+ safeguards, SESA and FPIC
Governance	Governance of REDD+ activities	Development of related policies, regulations and measures for REDD+ implementation	Cancun agreement REDD+ safeguards, SESA and FPIC, ILO convention number 169, UN development group (guidelines on indigenous people

The Sudan National REDD+ Safeguards, the indicators and verifiers described in the above table represent an instrument that facilitates the recognition and enhancement of potential benefits of REDD+ as well as identification and mitigation of potential social and environmental risks. The potential risks and benefits of REDD+ will be found in a wide range of socio-economic, environmental and biological sectors including biodiversity conservation and ecosystems management. They will be found in human rights, poverty reduction and overall sustainable

development goals of the country. In this regard, the extent of the relationship of forests and livelihood support and biodiversity conservation for the country has to be well understood and policies should be able to give procedural rights to stakeholders and to enable these rights to be maintained in order to ensure that REDD+ actions would not cause conflicts with local communities that depend on forests.

A summary of important activities leading to the development of nationally adapted social and environmental standards is shown in Figure IV-2.

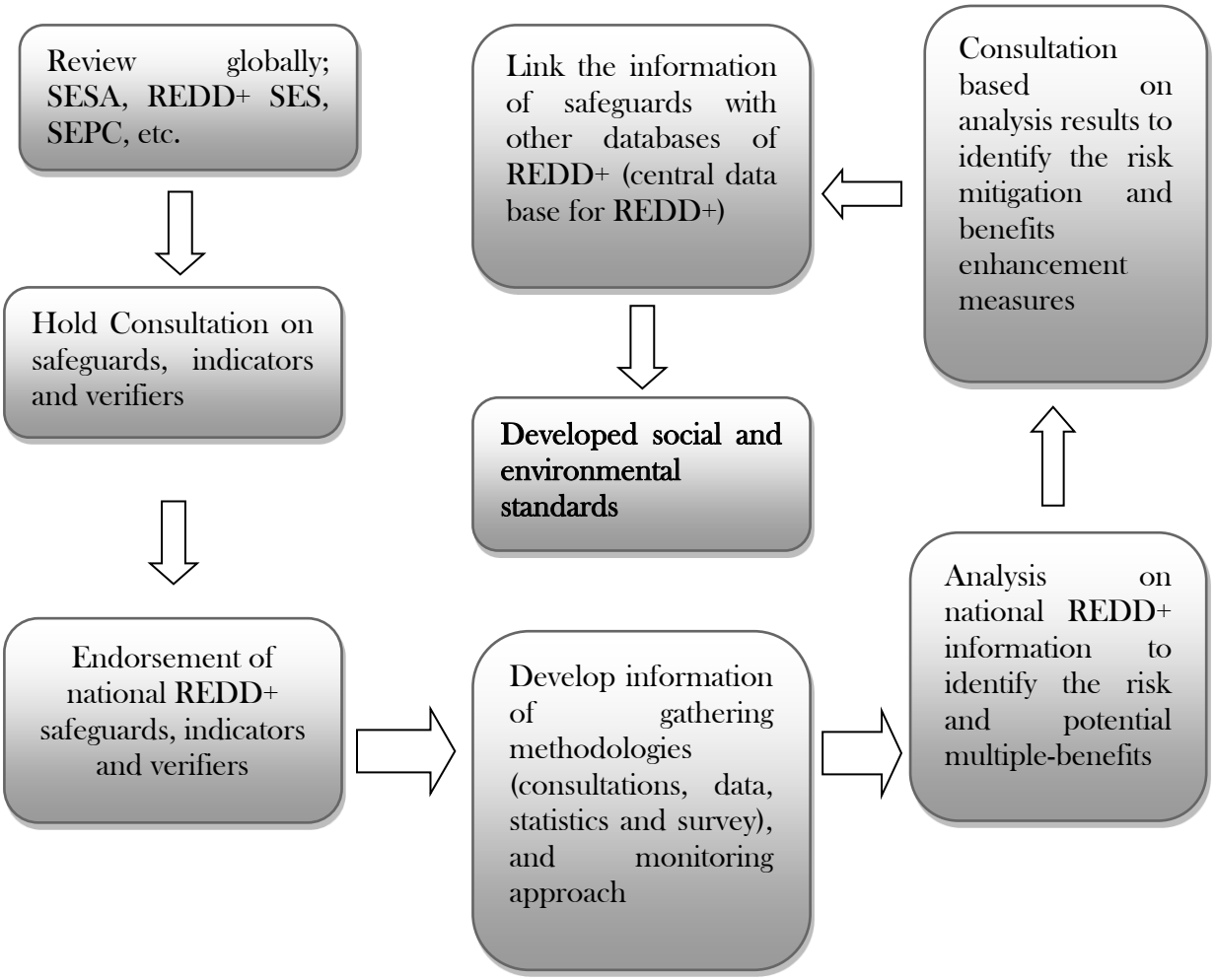


Figure IV- 2: Activities for nationally adapted Social and Environmental Standards development.

4B.3. Description of Activities

Development of Monitoring System for Multiple Benefits resulting from REDD+ activities

A participatory process will be followed to develop and set up a monitoring system for ecosystems multiple benefits and other positive impacts associated with REDD+ activities. This shall involve all relevant stakeholders and custodians such as FNC, RPGD, forest neighbouring and dependent communities, GAPAs, Pastoralist & Farmer Unions. The process will start under the coordination of different related institutions supported and facilitated by consultation to expertise and specialists from government sector, academia, NGOs and local stakeholders. The process

will start based on available information and present capacities of these groups and national institutions and scaled up with the increase in capacity building. The FNC has accumulated huge experience over inventories and remote sensing experience while planning and execution of national inventories and management planning. Added to that is the experience of academic and research institutions of forestry and other related institutions.

The major task of the process will incorporate:

- Data collection for information related to the co-benefits provided by forest ecosystems
- Development of a set of indicators and verifiers
- Evaluation of the parameters related to deforestation and forest degradation drivers

The main task of the system will be the evaluation of social benefits gained from sustainable development and poverty reduction, such as increased income, increased sources of livelihood, the improvement and strengthening of forest governance and, environmental benefits, particularly improved protection of biodiversity, soil and water conservation and the recovery of key ecosystem services, such as the regulation of water flows.

To select priority additional benefits in a participatory manner to be evaluated in the Monitoring System, and to identify and establish verifiers and indicators for each benefit selected, the following steps shall be followed:

Identification of stakeholders to participate in the monitoring system.
Establishment of institutional framework for monitoring process
Development of methodologies for data collection
Selection of the most important additional benefits at local and national levels that will be taken into account in the monitoring system.
Establishment of indicators for each of the benefits that will be monitored and development of a process of socialization of list of indicators.
Organization of workshops for proposal validation.

The actions to be carried out under the section on co-benefits and safeguards during R-PP implementation will be carried out on the basis of the REDD+ Safeguards work described in the strategy. The activities are listed as follows:

Provision of information on co-benefits:

Investigation on the most important co-benefits to be monitored under REDD+ will be associated with using indicators for risk mitigation and benefit enhancement. The process involves indicators such as changes in ecosystem services, biodiversity, governance, and social aspects.

The process will be carried step-wise to explore all relevant co-benefits:

- Exploration of the potential most important co-benefits of REDD+ to be monitored.
- Analyses of the multiple benefits, and options of managing them
- Capacity building for such analysis.
- Conducting consultation with stakeholders to test indicators and gain stakeholders acceptance
- Development of indicators for each co-benefit to be monitored.
- Provision of Information on National REDD+ Safeguards

The participatory process involving key national stakeholders in Sudan with regards to REDD+ multiple-benefits and Safeguards will facilitate identification of risks and benefits and indicators for measuring and monitoring them. This will ensure transparency and accountability.

The indicators used for monitoring the environmental and socio-economic aspects may include impact of REDD activities on:

- Natural and plantation forests, biodiversity and other related ecosystem services;
- Socio-economic benefits such as right of holders; indigenous peoples and gender; livelihoods, traditional knowledge and culture.

Types of Assessments

Assessment of Social and Environmental Risks and Co-Benefits

It is expected that REDD+ may have impacts on socio-economic aspects related to stakeholder rights, livelihoods of local communities, national development planning and economic policy. Likewise, it would have environmental impacts on forest conservation and natural resources management in and outside of forests. That means, recognizing the potential co-benefits and risks in Sudan is very important for understanding the impact of REDD+ on the social and environmental conditions and is helpful in identifying suitable interventions for enhancing the co-benefits and mitigating the risks. Use should be made of the strategy explained in the situation analysis, such as the analysis of drivers of deforestation and forest degradation in order to identify the indicators that help in monitoring the risks and co-benefits related to the applied REDD+ Safeguards.

Governance Assessment

There are various factors that affect governance on the socio-economic and environmental developments including institutional capacity for proper management of the resource. There is lack of cooperation, coordination and collaboration between the different institutions as a result of the domination of sectoral policies and inadequate resources. Development projects ignore consultation to stakeholders. Large scale deforestation and forest clearance have been identified to be major results of poor governance.

Poor forest governance represented by poor coordination in regulations, sectoral policies and law enforcement, uncertain land tenure, lack of respect for rights to land and overlapping responsibilities, is recognized as major cause of deforestation in Sudan. The situation of poor governance coincides with cases of low levels of transparency, accountability, and lack of participatory decision making processes. These conditions are enhancing to illegal and unplanned forest conversion and use, and conflicts over land/ forest ownership and access rights. Progress in capacity building towards good governance can improve transparency, increase participation and information sharing, which will lead to limitation of deforestation.

The use of public consultation and participatory process with regards to capacity building and good governance is then necessary to facilitate strategic development and policy reforms. Associated with this is the selection of indicators including transparency and accountability as indicators for governance safeguards.

Box IV.3. Main messages on REDD+ safeguards and multiple benefits (D. Murphy 2011)

Safeguards

- Country experiences can provide lessons for measuring and reporting on safeguards. Examples include: free, prior and informed consent (FPIC); community forest management; payment for ecosystem services (PES); REDD+ SES; Forest Law Enforcement, Governance and Trade (FLEGT); and forest certification. These experiences need to inform the negotiations.
- Country policies should be able to give procedural rights to stakeholders and to enable these rights to be maintained in order to ensure that REDD+ actions would not cause conflicts with local communities that depend on forests
- Broad participation of stakeholders is needed to identify and measure impacts of safeguards. Local communities should be involved in measuring safeguards.
- Transparency and accountability need to be basic principles of a safeguard system. Information and reports should be publicly available and readily accessible, including through the Internet.
- A safeguard information system could have international guidelines or general principles that each country can adapt to their situation. Implementation of safeguards should be country-based and not enforced externally. Safeguards need to be flexible and reflect national circumstances, and not construed as additionality. Development of a safeguards information system could consider the form, content, audience, access rules for such systems, medium of dissemination (e.g., rural radios in poor areas), etc.

Multiple Benefits

- Equitable benefits sharing is an important element of going beyond "do no harm" to create multiple benefits.
- Benefits sharing require clarification of property rights over carbon, land tenure and other rights. Benefits sharing should be very flexible and based on national and local circumstances.
- Transparency, accountability and broad participation should underlie the achievement of multiple benefits. REDD+ activities need to recognize and involve as many stakeholders as possible, including local communities, indigenous peoples and the private sector.
- Forests are more than carbon; they provide such benefits as ecosystem services, water and biodiversity. This added value should be used as an incentive to leverage additional funds and a higher price for credits.

4B.4. Budget

To design an information system that monitors co-benefits, other impacts, governance and safeguards accruing from REDD+ activities, the following budget and activity items are proposed over the coming four years (Table IV.2).

Table IV-2: Summary of Component 4b related Monitoring Activities and Budget

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Building national consensus on REDD+ impacts and co-benefits monitoring	Capacity building	5	5			10
	Consultation with stakeholders workshops	10	15			25
Developing a national REDD+ impacts and benefits monitoring system	Development of indicators for each risk and co-benefit to be monitored	15	10			25
	Consultation with stakeholders to test indicators and gain stakeholders acceptance	10	5			15
	Elaboration of an adapted national safeguard system			10		10
Valuation of the national monitoring system	Survey with local stakeholders	10	10			20
	Reporting and distribution of information			15		15
Design Monitoring &Evaluation plan for other benefits	Consultation with stakeholders	20				20
Test Monitoring plan for co-benefits indicators in selected sites			25	25		50
Total		**70**	**70**	**50**		190
Government						28
FCPF						76
UN-REDD Programme (if applicable)						86

Component 5: Schedule and Budget

The following table 5-1 provides the overview of the total budget, scheduled over four years and allocation of funds across donors.

Table 5-1: Schedule and Budget

Component 1a: Summary of National Readiness Management Arrangements

Main Activity	Sub-Activity	Estimated Cost (in thousands US$)				
		2014	2015	2016	2017	Total
Setting up the necessary institutional structures and supporting arrangements to manage and co-ordinate the REDD+ Readiness process	Meetings and workshops with all stakeholders	20	20			40
	Dissemination of Minutes of Meetings (MoM) and reports	5	5			10
Ensure that the REDD+ programme is supported by technical capacity, effective communication, capacity building and human resource development	Hire communication specialist Training workshops and seminars Study tours Meetings and group discussions	30	30			60
Conflicts and Grievance Mechanism development	Consultation. Capacity building. Hiring 1-2 staff	30	30			60
Mainstreaming REDD+ into broader cross-sectoral plans and programmes, including national development goals, CC goals and REDD+ goals	Meetings and workshops	30	30			60
	Dissemination of MoM and reports	10	10			20
Total		**125**	**125**	**0**	**0**	**250**
Government						35
FCPF						100
UN-REDD Programme (if applicable)						115

Component 1b: Information Sharing and Early Dialogue with Key Stakeholder Groups

Main Activity	Sub-Activity	Estimated Cost (in thousand $)

		2014	2015	2016	2017	Total
Identify and list potential stakeholder groups & partners	Dress up a list of potential stakeholders	5				5
	Reach out for and capacity building of stake holders, resource custodians and partners in envision, formulation and ultimate implementation of REDD+ activities	15	10			25
Share information with potential stakeholders	Information distribution	10	10			20
	Translation of available jargon on REDD from English into Arabic & reproduction thereof	10	10			20
Capacity building	Advocacy & awareness raising gatherings	15	10			25
	Publicizing and subsequently mainstreaming the very concept of REDD+.	10	10			20
Total		**65**	**50**	**0**	**0**	**115**
Government						**20**
FCPF						**46**
UN-REDD Programme (if applicable)						**49**

Component 1c: Consultation and Participation Process						
Main Activity	**Sub-Activity**	**Estimated Cost (in thousand $)**				
		2014	**2015**	**2016**	**2017**	**Total**
Reaching for & capacity building of all resource stakeholders & custodians on REDD+ concept, activities formulation & implementation thereof	Reach out for indigenous & women groups Workshops on land tenure, grievance & conflict management	20	10			30
	Identification of strategic approaches	20				20

	& modalities					
Promotion of REDD+ concept, publicity and mainstreaming	Communications & awareness raising	15	15			30
	Consultation on key topics as stated in the C&P plan: deforestation and degradation, drivers of deforestation, SFM, safeguards and governance, MRV, M&E, conservation and enhancement of carbon stocks	40	30	20	10	100
Total		**95**	**55**	**20**	**10**	**180**
Government						**27**
FCPF						**72**
UN-REDD Programme (if applicable)						**81**

Component 2a: Assessment of Land Use, Land Use Change Drivers, Forest Law, Policy and Governance

Main Activity	Sub-Activity	Estimated Cost (in thousand $)				
		2014	2015	2016	2017	Total
Formulate new range & water policies	Formulate new range policy (series of advocacy & consultation workshops)	25	25			50
	Formulate new water policy (series of advocacy & consultation workshops)	25	25			50
Revise Sudan's National Forest Programme (nfp) and Forest Policy	Undertake sector review and revise nfp	50	30			80
	Revise forest policy	25				25
Reclassify and assess biodiversity status of flora & fauna	Undertake botanical, ecological and biodiversity surveys	50	50			100
Undertake research for adapted and tolerant multi-purpose plant species and varieties and measures to mitigate the effects of climate change and	Conduct pilot research on tree species to suit the changing environment due to climate change and in anticipation of construction of	50	50			100

associated phenomena	Renaissance dam in Ethiopia					
Revision of curricula of higher educational institutes of forestry & range	A series of training and validation workshops together with curriculum formulation	25	25			50
Rehabilitate areas affected by Refugees & IDPs	Pilot afforestation and reforestation of degraded areas impacted by IDPs and refugees	150	250			400
Revise & update demand survey of forests goods & services	(using equipment provided for NFI) In collaboration with NSB and a university design survey, organize training session , conduct survey, analyse, endorsed and publish findings	150	150			300
Revise control / management of invasive alien species	Piloting biological, chemical control for Prosopis & other invasive species	25	25			50
Assess the contribution of forest & range products to the GDP	In collaboration with universities and research centres conduct required studies to ascertain contribution of forests & range goods and services + national validation workshop	25	25			50
Initiate advocacy and debate on the need for and means for integrating forest, range & wildlife concerns into policies and activities of other sectors such as Agriculture, Water, Mining and Oil Resources	Review of policies of related sectors such as water, energy, mining, etc. + validation workshop	25	25			50
Initiate advocacy and debate on the need for and means for embedding importance of judicious & rational utilization of natural resources in forthcoming constitution of Sudan	A series of brainstorming session, advocacy and publicity	20	10			30

Total	645	690	0	0	1,335
Government					200.25
FCPF					534
UN-REDD Programme (if applicable)					600.75

2B.4. Budget

Output (major Activity)	Organizations involved	Activities or Sub-activities	Budget allocations (estimated cost in thousand $				
			2014	2015	2016	2017	Total
Outcome 1: Process of carbon balance initiated							
1.1 Amount of wood wasted through wasteful harvesting & poor conversion into sawn wood reduced, 1.2. Feasibility of shifting brick firing from wood to LPG examined, 1.4. Feasibility of shifting domestic, service and industrial consumption of wood & charcoal to other energy sources assessed.	FAO / UNEP / WB / FNC / Private sawmill owners / private forest owners / universities	1. Pilot projects to support FNC and private sector to process/manufacture small - size *A. nilotica* wood	50	50	50		**150**
		2. Technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG	25	25			**50**
		3. Technical, socio-economic and environmental benefits / drawbacks of shifting building with wood-fired clay bricks to concrete blocks.	10	10			**20**
Outcome 2: Process of promoting sustainable charcoal industry initiated							
2.1. Charcoal conversion improved, 2.2. Productivity of charcoal producing forests enhanced, 2.3. *Acacia / Balanites* mix and Misquite for charcoal examined	FAO – UNEP -WB – FNC - Private charcoal producers & exporters researchers.	1.Pilot projects to produce sustainable high quality charcoal for domestic urban consumption and export	100	50	50		**200**
		2. Technical / environmental / socio-economic studies on charcoal from *Acacia-Balanites* mix and from Mesquite.	10	10	10		**30**
Outcome 3: Process of promoting sustainable firewood production initiated							
3.1. Recovery of high calorie lower part of trees improved, 3.2. Efficiency of firewood stoves enhanced, 3.3. Cost & benefit of implementing FES programme compared to that of incentives for shifting to LPG stoves, 3.4. Means of curbing ox-bow lake siltation looked into	FAO – UNEP - WB – FNC - Private Firewood value chain stakeholders, producers, researchers	1.1. Establish firewood plantations of high calorific value indigenous tree species and fast growing exotic trees in various settings and ownership,	100	100	100		**300**
		1.2. Improve harvesting efficiency & recovery of firewood from riverine *A. nilotica* forest plantations.	25	25			**50**
		1.3. Design, test and disseminate FESs particularly in high consumption such regions like Darfur.	25	25	25		**75**
		Technical & socio-economic studies to: 2.1. Compare the costs and benefits of implementing an FES programme compared to incentives for substituting to LPG stoves,	10	15			**25**

Output (major Activity)	Organizations involved	Activities or Sub-activities	Budget allocations (estimated cost in thousand $				
			2014	2015	2016	2017	Total
		2.2. Consider means to reduce siltation in riverine *A. nilotica* forests					
Outcome 4. Understanding of national energy budget & mix better understood							
4.1. Understanding of national energy mix enhanced	UNDP-UNEP-WB – FNC-Ministries of Electricity & Dams, Energy Research Centre, International Consultants.	Studies into the role and position of wood-based energy compared to sustainable alternatives such as solar power, wind and hydro options.	25	25			**50**
Outcome 5. Process of diversification & sustainable production of Gums enhanced							
5.1. Development of protocols for production of Gums other than Hashab (*A.senegal*) initiated.	FAO-UNEP-WB – FNC-Communities, Gum Arabic Board, GAPAs, researchers,	Develop protocols for production of gums other than gum Gum Hashab (*Acacia senegal*) through popular participation, agroforestry and agro-pastoral systems	25	50	50		**125**
Outcome 6. Sustainable management of isolated forest & woodland tracts initiated together with community involvement & bond to local environs							
6.1. Awareness of forest neighbouring & dependent communities and their vested interest in sustainable non-destructive benefits from forests & trees enhanced	FAO-UNEP-WB – FNC-Communities, Farmer & Pastoralist Unions, NGOs, consultants, researchers	1. Assess the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds,		25			**25**
Outcome 7. Case built for expansion of reforestation & forest plantations for sustainable production of wood & NWFPs for domestic & export purposes.							
7.1. Dynamics of viable expansion of forest plantations for sustainable production of wood & NWFPs for domestic & export better understood	FAO-UNDP-UNEP-WB – FNC, consultants, researchers	Study into the profitability of forest plantations, considering the domestic and international markets, and potential economic incentives to foster the development of forest plantations.	10	15			**25**
Outcome 8. Viability, sustainability & realization of tangible benefits of agroforestry and agro-silvo-pastoral systems demonstrated							
8.1. Prove, demonstrate, consolidate & instil concepts of multiple tangible benefits of agroforestry & agro-silvo-pastoral systems	FAO-UNEP-WB – FNC-Communities, Farmer & Pastoralist Unions, NGOs, consultants, researchers	1. Piloting with agroforestry and/or agrosylvopastoral systems to produce high value food cash crops, livestock & products thereof, building poles, firewood, charcoal and gums in communal lands, private holdings & FNC and State	100	100	100		**300**

Output (major Activity)	Organizations involved	Activities or Sub-activities	Budget allocations (estimated cost in thousand $				
			2014	2015	2016	2017	Total
		forest reserves, capitalizing on recent developments in water harvesting. 2.Research/studies on cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting					
Outcome 9. Reconciliation of initiated of conflicting policies of rival economic sectors together with streamlining of activities and capabilities of sister supporting sectors such as education & research							
9.1. Appreciation of all recourse users and custodians of sustainable resource use upgraded 9.2. Rationalization and Maximization the use of available meagre resources initiated	FAO-UNEP-WB – FNC-Academia, NGOs, CSOs	Advocate and urge: 1. Reconciliation of forest, range and wildlife policies with those of rival sectors particularly Agriculture, Industry, Mining, Petroleum, Tourism and Finance & National Economy 1. Full integration/ merger of research and higher education institutes of Forestry, Range & Wildlife, 2. Revision of research programmes and teaching/training curricula of Forestry, Range and Wildlife to accommodate variables emanating from CC, Desertification, geo-political realities and socio-economic development		10	15		25
Total			*515*	*535*	400	0	1450
Government							218
FCPF							*580*
UN-REDD Programme (if applicable)							652

Component 2c: REDD-plus Implementation Framework						
Main Activity	Sub-Activity	Estimated Cost (in thousand$)				
		2014	2015	2016	2017	Total
Establish a work plan and ToRs	Workshops	10	10			20
	Elaborate and disseminate documents	*5*	*5*			10

Conduct studies on the raised topics	Execute studies	20	20			40
	Disseminate policy briefs of results	5	5			10
Establish appropriate institutional structures	Capacity building workshops		10			10
	Restructuring			20		20
Design and implement various modalities of community participation in forest & rangeland conservation & management across Sudan		100	150	150		400
Total		**140**	**200**	**170**	**0**	**510**
Government						**77**
FCPF						**204**
UN-REDD Programme (if applicable)						**229**

Component 2d: Social and Environmental Impacts during Readiness Preparation and REDD+ Implementation

Main Activity	Sub-Activity	Estimated Cost (in thousand $)				
		2014	2015	2016	2017	Total
Stakeholder identification	Workshops	$20				20
Analysis of environmental and social issues of baseline situation in Sudan and of the planned REDD+ process	Develop TORs	5				5
	Conduct study	15	20			35
Development of ESMF	Develop TORs			5		5
	Conduct study			10	20	30
Total		**40**	**20**	**15**	**20**	**95**
Government						**17**
FCPF						**38**
UN-REDD Programme (if applicable)						**40**

Table III-8: Summary of Reference Level Activities and Budget.

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Institutional arrangements	Consultations and capacity building	50	50			100

Land Monitoring System	Design and implementation of the LMS	50	150	50		**250**
	Mapping of forest cover 2000-2016 from medium-resolution satellite imagery, at 4-year intervals, applying IPCC Approach 3 for land use category mapping and change analysis.		100	50		**150**
	Mapping of forest cover 2010 and 2016 from high-resolution satellite imagery, applying IPCC Approach 3 for land use category mapping and change analysis; linking to Africover data.			200		**200**
National Forest Inventory	Design	30	50			**80**
	Silvicultural research in plantations and natural forests to establish conversion factors and allometric equations	50	50	50	50	**200**
RELs/RLs	Identification of relevant RELs/RLs on the basis of drivers of deforestation and forest degradation, including the assessment of National Circumstances	30	30			**60**
	Preparation of the initial set of sub-national RELs/RLs and the aggregate national REL/RL.		50	50		**100**
Total		**210**	**480**	**400**	**50**	**1,140**
Government						**300**
FCPF						**840**
UN-REDD Programme (if applicable)						

Table 4a

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Institutional arrangements	Consultations with stakeholders	50	100			**150**
Design of the SFMS (LMS and NFI design and implementation are part of Component 3)	Institutional assessment, including capacity building needs assessment	80				**80**
	Design of the REDD+ Project Registry		80			**80**
	Design of SFMS component integration, including LMS and NFI, distributed over relevant agencies at central and state		150			**150**

	levels					
	Development of RS protocols for use in the SFMS		50			50
Implementation of the SFMS	Establishment of physical infrastructure for the SFMS		400			400
	Implementation of IT services, including web-based interfaces for stakeholders		300	100		400
SFMS capacity building	Training of government staff in agencies managing SFMS components		300	300		600
	Training of stakeholders in REDD+ project implementation		100	200	200	500
Total		**130**	**1,480**	**600**	**200**	**2,410**
Government						650
FCPF						1,760
UN-REDD Programme (if applicable)						

4.2. Related Monitoring Activities and Budget

Main Activity	Sub-Activity	Estimated Cost (in thousands)				
		2014	2015	2016	2017	Total
Building national consensus on REDD+ impacts and co-benefits monitoring	Capacity building	5	5			10
	Consultation with stakeholders workshops	10	15			25
Developing a national REDD+ impacts and benefits monitoring system	Development of indicators for each risk and co-benefit to be monitored	15	10			25
	Consultation with stakeholders to test indicators and gain stakeholders acceptance	10	5			15
	Elaboration of an adapted national safeguard system			10		10
Valuation of the national monitoring system	Survey with local stakeholders	10	10			20
	Reporting and distribution of information			15		15

Design Monitoring &Evaluation plan for other benefits	Consultation with stakeholders	20				20
Test Monitoring plan for co-benefits indicators in selected sites			25	25		50
Total		70	70	50	0	190
Government						29
FCPF						76
UN-REDD Programme (if applicable)						85

Component 6: Program Monitoring and Evaluation Framework						
Main Activity	**Sub-Activity**	**Estimated Cost (in thousand $)**				
		2014	**2015**	**2016**	**2017**	**Total**
Review of draft Programme M&E Framework including risk assessment	Meeting with main stakeholder groups	20				20
	Elaboration of final version of M&E Framework	10				10
Annual evaluation of programme progress against the M&Framework	ToR for external evaluations	5				5
	External evaluations of programme performance	20	20	20	20	80
Updating of M&E Framework and dissemination of results and proposals for corrective actions	Updating of M& E Framework		5	5	5	15
	Dissemination of results		5	5	5	15
Total		55	30	30	30	145
Government						20
FCPF						60
UN-REDD Programme (if applicable)						65
Grand Total		2090	3735	1685	310	7820
Government						320

FCPF	3500
UN-REDD Programme (if applicable)	4000

Component 6: Design a Program Monitoring and Evaluation Framework

The Republic of Sudan will account for the progress made towards REDD+ readiness, and develop the necessary detailed Programme M&E Framework allowing to immediately flag when planned activities are delayed. The Programme M&E Framework is a standard tool used in programmes or projects to monitor progress against the ToRs. A combination of process and product indicators shall be used, as outlined in the following draft M&E Framework of Table 6-1. For these activities a budget of US$ 145k is scheduled for four years as presented in table 6-2. Further details, including a risk assessment of each output, will be added during the starting phase or the readiness programme.

Table VI- 1: Draft Programme M&E Framework of the Sudan REDD+ Readiness Process.

Comp	Outcome for this component	Output (for each outcome)	Major activities, & responsible organization, for each output	Qualitative or quantitative indicators for each output or activity	Time frame of indicators
1a	Setting up the necessary institutional structures and supporting arrangements to manage and co-ordinate the REDD+ Readiness process	Meetings and workshops with all stakeholders	Organization of events. FNC	Minutes of X meeting and Y workshops	2014 and 2015
		Dissemination of Minutes of Meetings (MoM) and reports	Organization of events. FNC	Distribution lists of the documents	2014 and 2015
	Ensure that the REDD+ programme is supported by technical capacity, effective communication, capacity building and human resource development	Hire communication specialist	Training sessions, FNC	Findings of workshops, meetings and group discussion to be distributed	2014
		Hire economist	Training sessions, FNC	Findings of workshops, meetings and group discussion to be distributed	2014
	Mainstreaming REDD+ into broader cross-sectoral plans and programmes, including national development goals, CC goals and REDD+ goals	Meetings and workshops	Organization of events. FNC	Distribution lists of documents and publications	2014
		Dissemination of MoM and reports	Organization of events. FNC	Distribution lists of documents and publications	2014
1b	Identify and list potential stakeholder groups & partners	Dress up a list of potential stakeholders	Direct consultation through; workshops seminars, meetings. FNC	Distribution of stakeholders lists, distribute of MoM	2014
		Reach out for and capacity	Sessions of	Publications,	2014

		building of stake holders, resource custodians and partners in envision, formulation and ultimate implementation of REDD+ activities	implementation of FPIC, FNC HQ & State, NGOs, national and local media	awareness campaign, short messages,	
	Share information with potential stakeholders	Information distribution	National and local media, websites, FNC and related organizations and institutions	Publications, documents, information notes, reports and periodic news letter	2014
		Translation of available jargon on REDD from English into Arabic & reproduction thereof	Hire of national consultant FNC & relevant Organizations	Distribution of all translated documents and information at local level	2014
	Capacity building	Advocacy & awareness raising gatherings	Dissemination of all information and documents, FNC and related organization and institutions.	Mass media, newspapers, and short extension messages	2014
		Publicizing and subsequently mainstreaming the very concept of REDD+.	Workshops, FNC	Dissemination of workshop findings	2014
1c	Reaching for & capacity building of all resource stakeholders & custodians on REDD+ concept, activities formulation & implementation thereof	Reach out for indigenous & women groups	Field survey, meetings discussions. FNC and related organizations	Continuous follow of information, distribute the field survey findings	2014
		Workshops on land tenure, grievance & conflict management	Assessment, FNC, CBOs	Distribute the assessment findings	2014
		Identification of strategic approaches & modalities	Hire consultant	Presentation of findings	2014
	Promotion of REDD+ concept, publicity and mainstreaming	Communications & awareness raising	Meetings, discussions, FNC, NGOs	Publications, media.	2014
2a	Formulate new range & water policies	Formulate new range policy)	series of advocacy & consultation workshops	Publications, periodic news	2014
		Formulate new water policy	series of advocacy & consultation workshops	Publications, periodic news	2014
	Revise Sudan's National Forest Programme (nfp) and Forest Policy	NFP and forest policy updated	Undertake sector review and revise nfp FNC, development	Declared and endorsed forest policy statement Revised nfp document prepared	2014

			partners (FAO, WB and UNDP) and stakeholders		2014 &2015
	Full-fledged national forest inventory (NFI)	NFI conducted and finding released	Training , purchasing of equipment, tools & software, identification of inventory design and plans	NFI findings and results approved, endorsed and disseminated to national and international partners Global MRV fulfilled	2014 & 2015
			Ground Survey and truthing, analysis and reporting FNC, FAO, Resource users, Private sector, gum processing and exporting companies , Banks and Gum Arabic board		
	Reformulate management plans of riverine, non-riverine and motane forests to accommodate revised designated functions and consolidate livelihood aspects	Sustainable management plans prepared	Inventory& socio economic survey, stock mapping and management plans formulation Training for forest dependent communities on participatory management, governance & benefits sharing	Management plans endorsed and sanctioned by federal and state forest authorities	2014 & 2015
	Reclassify and assess biodiversity status of flora & fauna	Reclassified status of fauna and flora of new Sudan in place	Undertake botanical, ecological and biodiversity surveys FNC, Wildlife, Range and Pasture, NGOs and Academia	Data and results endorsed and published	2014
	Undertake research for adapted and tolerant multi-purpose plant species and varieties and measures to mitigate the effects of climate change and	Research planned and conducted	Conduct pilot research on tree species to suit the changing environment due to climate change and in	Results and findings released and disseminated through extension systems and media	2014-2016

	associated phenomena		anticipation of construction of Renaissance dam in Ethiopia ARC & other research institutes		
	Revision of curricula of higher educational institutes of forestry & range	Process initiated and framework of new curricula outlined	A series of training and validation workshops together with curriculum formulation Higher education institutes & curricula formulation authorities	Curricula and syllabi adopted by some higher education institutes	2014 & 2015
	Rehabilitate areas affected by Refugees & IDPs	Area quantifies and intervention measures identifies and A/R started	Pilot afforestation and reforestation of degraded areas impacted by IDPs and refugees FNC, HUNCR , State governments, and local community	Substantial areas of degraded forest and range land rehabilitated and reforested	2014-2016
	Revise & update demand survey of forests goods & services	Demand survey updated	(using equipment provided for NFI) FNC In collaboration with NSB and a university design survey, organize training session , conduct survey, analyse, endorsed and publish findings	Data and results endorsed and published	2014
	Revise control / management of invasive alien species	Control/management plans outlined	Piloting biological, chemical control for Prosopis & other invasive species FNC, ARC, Agric schemes		2014

			and other stakeholders		
	Assess the contribution of forest & range products to the GDP	Assessment planned and conducted	In collaboration with universities and research centres conduct required studies to ascertain contribution of forests & range goods and services + national validation workshop	Hire of consultants Findings forwarded to related partners	2014
	Initiate advocacy and debate on the need for and means for integrating forest, range & wildlife concerns into policies and activities of other sectors such as Agriculture, Water, Mining and Oil Resources	Consultation on principles done and guidance outlined	Desk Review of policies of related sectors such as water, energy, mining, etc. + validation workshop and identification of gaps, overlaps National assembly (specialized committees, environmental law makers and relevant stakeholders	Meeting , workshop, discussion Guidance and recommendation submitted to decision makers	2014
	Initiate advocacy and debate on the need for and means for embedding importance of judicious & rational utilization of natural resources in forthcoming constitution of Sudan	Consultation on principles done and guidance outlined	A series of brainstorming session, advocacy and publicity	Meeting , workshop, discussion Guidance and recommendation submitted to decision makers	2014
2b	Analytical studies on alternative energies and wood energy efficiency	Study on technical, socio-economic and environmental feasibility of shifting brick firing from wood to LPG Studies & pilot experimentation on non-cost demand factors that could act as barriers to fuel substitution and fiscal instruments linked to REDD+ finance that would make LPG cheaper at point of sale	Studies conducted and findings in place Relevant institutions, national and international consultants Local communities	Data base on energy and forestry production formulated	2014 & 2015

		Technical/environmental/socio-economic studies on charcoal from *Acacia-Balanites* mix and from Mesquite			
		Technical & socio-economic studies on design and dissemination of firewood efficient stoves			
		Study to determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar/ wind energy would be cost effective			
		Study to analyse cost-effectiveness of increasing efficiency of existing hydro plants, development of small hydro plants along the Nile, extending electricity grids to reach a higher proportion of population and alternative sources of carbon finance, including REDD+ and funding for renewable energy, determine whether the subsidies for meeting the opportunity costs of switching from wood fuel to solar/ wind energy would be cost effective			
	Analytical studies on improving forestry production	Assessment of the impacts on deforestation from switching FNC funding from levies on wood products and non-wood forest products to REDD+ funds			
		Analysis on the profitability of plantations with and without state subsidies			
		Economic analysis of the domestic and international market demand for sustainably managed plantation timber, charcoal and firewood (see also option 2 on sustainable charcoal), including examination of certification schemes and fiscal instruments such as levies,			

		tariffs and consumer taxation			
	Analytical studies on improving agriculture and rangelands	Analysis of possible incentives to persuade mechanized rain fed farmers across the belt of Sudan to conform to regulations of putting 10% of holdings under tree formations Analysis of the supply and demand effects of integrated policies for agricultural intensification, rangelands and sustainable forestry and forest protection Cost-benefit analysis of agroforestry schemes, including examination of diversification benefits and supplementary irrigation from water harvesting	Studies conducted and findings in place Relevant institutions, national and international consultants Local communities	Findings and recommendation submitted to relevant partners	2014 and 2015
	Wood processing is improved	Piloting,with innovative processing methods	Technical and economic support to FNC & private forest owners to process small - size *A. nilotica* wood	Specimen new product exhibited and mapped	2014/2015
	Participatory modalities in various production systems are in place	Develop protocols for production of gums other than gum Hashab (*Acacia senegal*) through popular participation, agroforestry and agro-pastoral systems	Research plan and conducted, ARC, FRC, FNC GAPAs	Research findings simplifies, and communicated by extension system to end users	2014-2016
		Design of various modalities of community participation in forest & rangeland conservation & management across Sudan within and without the context of such regional initiatives as the Great Green Wall of Sahara & Sahel	Management plans formulated, FNC, communities, pastoralists and farmer unions, regional initiatives eg; GGWSS	Management plans endorsed and sectioned by federal and state forest authorise	2014-2015
	Mechanisms are in place to coordinate sectoral policies of forestry, agriculture and rangelands	High level meetings to create new administrative structures	Series of fora/seminars, FNC, relevant institutions and partners	Modality in place	2014
	Priority strategic options are endorsed		Dissemination of strategic options and meetings with		

			key stakeholder groups		
2c	Establish a work plan and ToRs		Workshops		
		Elaborate and disseminate documents	REDD+ framework in place FNC, resource custodian and stakeholders and development partners	Work plan document pre[pared and announced and distributed	
	Conduct studies on the raised topics	Execute studies			
		Disseminate policy briefs of results			
	Establish appropriate institutional structures	Capacity building workshops			
		Restructuring			
2d.	Stakeholder identification	Workshops			
	Analysis of environmental and social issues of baseline situation in Sudan and of the planned REDD+ process	Develop TORs			
		Conduct study			
	Development of ESMF	Develop TORs Conduct study	Study conducted FNC, WB, Consultants and local communities	Findings and results published and disseminated	2014 2015-17
3	Stakeholder consultations	Consultation made, modality for institutional arrangements developed, data on REL collected and methods and approaches of REL development reviewed	Workshops, meeting, seminars conducted, consensus on approaches and methodologies reached FNC, remote sensing centre, Universities NGOs , development and CBOs	Results of consultation, report and recommendation , approved and distributed to targeted stakeholders	2014
	Institutional arrangements				
	Developing the required capacities				
	Data collection				
	Review, assess and identify approach, methods, tools used for developing forest REL/RL				
	Assess and define forestry activities and the carbon pools to be considered in the development of REL/RL				
	Assessment of Sudan's national circumstances and adjusting factors				
	Preparation and testing of the REL/RL				
4	National consensus reached on Sudan REDD + program	National REDD strategy and programme endorsed and approved Implementation methods identified	Workshops , discussion , training, consultation FNC, stakeholders ,	REDD+ initiative visible, mainstreamed, and ready for implementation	2014-2016
	Stakeholder engagement in REDD+ readiness process				

	enhanced		NGOs and REDD+ national team		
	National REDD road map				
	Management arrangements contributing to the National REDD+ Process				
	Capacity Building Action Plan developed for REDD+				
	Improved Stakeholder Awareness and Effective Engagement				
	Stakeholder engagement in REDD+ readiness process enhanced				
	National REDD+ Strategy and Implementation Framework				
5	An efficient programme accounting system is in place	Consultancy conducted Accounting system developed	Hire of consultants Consultation conducted FNC, Consultants and national team	Accounting system functioning	2014-2016
6	Effective M & E framework	M & E framework developed	Consultation, FNC, stakeholders, resource users	M & E system in place and functioning	2014-2016

6.1. Budget

Main Activity	Sub-Activity	Estimated Cost (in thousand $)				
		2014	2015	2016	2017	Total
Review of draft Programme M&E Framework including risk assessment	Meeting with main stakeholder groups	20				20
	Elaboration of final version of M&E Framework	10				10
Annual evaluation of programme progress against the M&Framework	ToR for external evaluations	5				5
	External evaluations of programme performance	20	20	20	20	80
Updating of M&E Framework and dissemination of results and proposals for corrective actions	Updating of M& E Framework		5	5	5	15
	Dissemination of results		5	5	5	15
Total		55	30	30	30	145
Government						20
FCPF						60
UN-REDD Programme (if applicable)						65

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